ROYAL COLUMBIAN HOSPITAL REDEVELOPMENT

SCHEDULE 1

STATEMENT OF REQUIREMENTS

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Part 1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Agreement:

"Access Provider" means an organization that will provide a wide range of telecommunication services to individuals or other organizations;

"Advanced Digital Hospital" means a framework of hardware, software, partner point solutions, and consulting services that lay the foundation for the digital transformation of healthcare service delivery. A digital hospital is one that has implemented a comprehensive, pervasive IT infrastructure to enable clinical and administrative workflow and communications as well as process and quality improvements and has begun to expand those process improvements beyond the hospital's four walls. In a digital hospital, various advanced technologies, such as critical medical devices, intelligent information systems, facility control systems, sensors, and digital communication tools, are fully integrated to improve staff productivity, hospital operations, process quality, Patient safety, and the overall Patient experience;

"**Authority**" has the meaning on the first page of the Agreement;

"**Authority Activities**" means any activities carried on or to be carried on by the Authority, or other Persons permitted by the Authority, in the Facility, related to the provision of clinical and non-clinical services, other than the Services;

"Authority Having Jurisdiction" means any federal, provincial, territorial, regional, municipal or local governmental authority, quasi-governmental authority, Court, government or self-regulatory organization, commission, board, tribunal, organization, or any regulatory, administrative or other agency, or any political or other subdivision, department or branch of any of the foregoing, having jurisdiction in any way over or in respect of any aspect of the performance of this Agreement or the Project;

"BICSI" means the professional association supporting the information and communications technology (ICT) industry. ICT covers the spectrum of voice, data, electronic safety & security, project management and audio & video technologies

"**BMS**" has the meaning set out in Section 7.7.1.1(1) of Schedule 1 [Statement of Requirements];

"British Columbia Building Code" or "**BCBC**" means the British Columbia Building Code;

"Building" means the component of the Facility, providing the Mental Health Substance Use Service, to be constructed by the Design-Builder pursuant to this Agreement, as described in Section 2.2 of Schedule 1 [Statement of Requirements];

"**Building Systems**" means the architectural, mechanical, electrical and other systems in or servicing the Facility;

"Campus" means the Existing Hospital and Facility;

"**Ceiling Height**" means the minimum clear height between the finish floor and the finish ceiling where there are no obstructions or protrusions within or below the specified height;

"**City**" means the City of New Westminster, British Columbia;

"**Clinical Specifications**" has the meaning set out in Section 2.3 of Schedule 1 [Statement of Requirements];

"**Columbia Tower**" means the existing Columbia Tower building in the Existing Hospital.

"**Commissioning**" means testing and commissioning the equipment or system in accordance with any commissioning requirements set out in this Agreement, all applicable standards and Good Industry Practice, including to ensure that the Equipment is operating in accordance with the manufacturer's requirements and specifications;

"**Core Network Equipment**" means equipment that is classified as backbone device that are central to the network's successful operation. Core Network Equipment is used connect to servers, Internet service provider (and to aggregate all switches that used to connect end-use equipment and other devices. Typically located in the main Equipment Room;

"CSA" is the Standards organization which develops standards in 57 areas including climate change, business management and safety and performance standards, including those for electrical and electronic equipment, industrial equipment, boilers and pressure vessels, compressed gas handling appliances, environmental protection, and construction materials;

"Data Drop" is the complete Category 6A structured cabling connection or permanent link between the RJ45 connector in a telecommunication outlet and the horizontal cross connect in a Communications Room;

"**dBA**" is the unit of sound pressure level in the typical case where sound is measured using the A-weighting feature of a sound level meter. The A-weighting replicates the frequency sensitivity of the human ear to sound at moderate intensities;

"**Direct Line of Sight**" means an unobstructed observation path, a minimum of 400mm wide, from an origin point to a destination point;

"Edge Network Equipment" is the equipment that connects to end-use devices, security cameras, wireless access points, etc. Typically located in a Telecommunication Room;

"**Emergency Evacuation Plan**" has the meaning set out in Section 5.2.6 of Schedule 1 [Statement of Requirements];

"End-use Equipment" is any device used directly by an end-user to communicate;

"**Energy Centre**" has the meaning set out in Section 2.2 of Schedule 1 [Statement of Requirements];

"Entrance Facility Room" (EF Room) is an enclosed environmentally controlled architectural space. The EF Room consists of the pathways, cables, connecting hardware, protection devices and other passive and active equipment that support the access provider;

"**Equipment**" means collectively the Category 1 Equipment, the Category 2 Equipment and the Category 3 Equipment;

"Equipment Room" (ER) is an enclosed environmentally controlled centralized architectural space. The ER houses telecommunication and data processing equipment, connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection apparatus. An ER may also provide any or all the functions of a Telecommunications Room and house equipment and horizontal terminations for a portion of the building;

"**Equipment List**" means the list of Equipment set out in Appendix 1P [Equipment List];

"**Evidence Based Design**" has the meaning set out in Section 3.2 of Schedule 1 [Statement of Requirements];

"**Existing Hospital**" means all the existing buildings, including utilities, vehicle and pedestrian access points, forming part of the Royal Columbian Hospital;

"**Facility Users**" means the Authority, Authority Persons, Patients, visitors and volunteers using or present at the Facility;

"**Good Industry Practice**" means using standards, practices, methods and procedures to a good commercial standard, conforming to Law and exercising that degree of skill and care, diligence, prudence and foresight which would reasonably and ordinarily be expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances;

"HSSBC" is the provider of non-clinical support services to British Columbia's health authorities. The Authority currently receives and partners with Health Shared Services BC also known as HSSBC on Information Technology services and standards. Effective April 1, 2016, HSSBC will change its name to BC Clinical and Support Services Society also known as "BCCSS". "Health Shared Services BC", "HSSBC", "BCCSS" have a corresponding meaning of "BC Clinical and Support Services Society";

"IEEE" is the Standards development organization for the development of industrial in a broad range of disciplines, including electric power and energy, biomedical technology and healthcare, information technology, information assurance, telecommunications, consumer electronics, transportation, aerospace, and nanotechnology;

"**IMIT**" means information management and information technology;

"Information Technology" is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data;

"**Indicative Design**" has the meaning set out in Section 2.10 of Schedule 1 [Statement of Requirements];

"**Infrastructure**" means everything required to support an IMIT system except for the required Software, network equipment and Server(s);

"**Lockdown**" means a circumstance whereby the Patients are confined to their rooms in response to a declared emergency, riot, outbreak, pandemic, labour disruption or other major disaster;

"**Master Site Plan**" has the meaning set out in Section 4.2 of Schedule 1 [Statement of Requirements];

"Patient" means inpatient or outpatient as it relates to the delivery of Mental Health Substance Use Service at the Building;

"**Patient Centred Care**" has the meaning set out in Section 3.4.1.2 of Schedule 1 [Statement of Requirements];

"**Permits**" means all permissions, consents, approvals, certificates, permits, licences, statutory agreements, zoning and by-law amendments and variances, and authorizations required from any Authority Having Jurisdiction, and all necessary consents and agreements from any third parties, needed to carry out the Project in accordance with this Agreement;

"**Person**" means an individual, legal personal representative, corporation, body corporate, firm, partnership, trust, trustee, syndicate, joint venture, limited liability company, association, unincorporated organization, union or governmental authority;

"Persons with Disabilities" has the meaning set out in the British Columbia Building Code.

"**Project Design Principles**" has the meaning set out in Section 3.1 of Schedule 1 [Statement of Requirements];

"**RTLS**" has the meaning set out in Section 7.10.5.1(1) of Schedule 1 [Statement of Requirements];

"**Safety and Risk Categories**" has the meaning set out in Section 5.9.1 of Schedule 1 [Statement of Requirements];

"**STC**" has the meaning set out in Appendix 1D [Sound Transmission Ratings];

"**Statement of Requirements**" means the provisions of Schedule 1 [Statement of Requirements];

"Telecommunications Room" (TR) is an enclosed environmentally controlled architectural space for housing telecommunication equipment, connecting hardware, terminations of horizontal and backbone cables and splice enclosures serving a portion of the building. Edge Network equipment, cable terminations, and cross-connect cabling;

"TIA" is the organization that develops industry standards for a wide variety of Information and Communication Technologies (ICT) products and is comprised of communications equipment manufacturers, service providers, government agencies, academic institutions, and end-users;

"**Utility**" or "**Utilities**" includes:

a) utility electrical power;

b) back-up and stand-by emergency power;

c) steam and chilled water;

d) water;

e) sanitary waste;

f) storm water;

g) gas, oil and any other fossil-based fuel;

h) medical gas compounds; and

i) telephone and data cabling;

1.2 Statement of Requirements

1.2.1 This Schedule is written as an output specification and defines what the Design-Builder must achieve in the Design and Construction. Except as expressly stated otherwise, the Design-Builder will carry out the Design and Construction as required and contemplated by each provision of this Schedule and its Appendices whether or not the provision is written as an obligation of the Design-Builder or is stated in the imperative form.

1.2.2 Where “cost effective”, “appropriate”, “sufficient”, “minimize” and related and similar terms are used, they are to be construed and interpreted in terms of whether they are cost effective, appropriate, sufficient, minimizing, etc. from the perspective of a prudent public Authority of a major public hospital facility who balances capital costs against maintenance, operations, clinical efficiency sustainability, energy efficiency and other non-capital costs over the life of the facility.

1.2.3 Unless expressly stated otherwise, each reference to a standard or code in this document will be deemed to mean the latest version of that standard or code as of the Financial Submission Date.

1.2.4 The Design-Builder will provide a complete and fully functional Facility fit for its intended use and purpose as specified in this Agreement.

1.3 Acronym List

1.3.1 AAS – Aluminum Association Standards

1.3.2 AAMA – American Architectural Manufacturers Association

1.3.3 AECB – Atomic Energy Control Board

1.3.4 AFUE – Annual Fuel Utilization Efficiency

1.3.5 AHJ – Authority Having Jurisdiction

1.3.6 AIBC – Architectural Institute of British Columbia

1.3.7 ANSI – American National Standards Institute

1.3.8 APEGBC – Association of Professional Engineers and Geoscientists of British Columbia

1.3.9 ARCAL – Aircraft Radio Control of Aerodrome Lighting

1.3.10 ASHRAE – American Society of Heating, Refrigerating and Air-conditioning Engineers

1.3.11 ASME – American Society of Mechanical Engineers

1.3.12 ASPE – American Society of Plumbing Engineers

1.3.13 ASTM – American Society for Testing and Materials

1.3.14 AV / IT – Audio Visual / Information Technology

1.3.15 AWCC – Association of Wall and Ceiling Contractors

1.3.16 AWMA – Architectural Woodwork Manufacturers Association

1.3.17 AWWA – American Water Works Association

1.3.18 BICSI – Building Industry Consulting Service International

1.3.19 BCBC – British Columbia Building Code

1.3.20 BCERMS – British Columbia Emergency Response Management System

1.3.21 BCICA – British Columbia Insulation Contractors Association

1.3.22 BCLNA – British Columbia Landscape & Nursery Association

1.3.23 BCSLA – British Columbia Society of Landscape Architects

1.3.24 BMP - Best Management Practices

1.3.25 BMS – Building Management System

1.3.26 CAR – Canadian Aviation Regulations

1.3.27 CATV – Community Access Television

1.3.28 CCD – Charge Couple Device

1.3.29 CCH – Campus Communication Hub

1.3.30 CCI/CRI – Canadian Carpet Institute/Canadian Rug Institute Program

1.3.31 CCTV – Closed Circuit Television

1.3.32 CEC – Canadian Electrical Code

1.3.33 CFL – Compact Fluorescent Lamp

1.3.34 CGA – Compressed Gas Association

1.3.35 CIC – Certified Irrigation Contractor – Commercial

1.3.36 CIF – Common Intermediate Format

1.3.37 CISCA – Ceiling Interior Systems Construction Association

1.3.38 CaGBC – Canada Green Building Council

1.3.39 CLIA – Certified Irrigation Designer and Certified Landscape Irrigation Auditor

1.3.40 CMCA – Canadian Masonry Contractors Association

1.3.41 CMMS – Computerised Maintenance Management System

1.3.42 CNSC – Canadian Nuclear Safety Commission

1.3.43 CODEC – Coder/Decoder

1.3.44 CPTED – Crime Prevention Through Environmental Design

1.3.45 CPU – Central Processing Unit

1.3.46 CRCA – Canadian Roofing Contractors Association

1.3.47 CRI/IAQ – Canadian Rug Institute/Indoor Air Quality Program

1.3.48 CRT – Cathode Ray Tube

1.3.49 CRTC – Canadian Radio-television and Telecommunications Commission

1.3.50 CSA – Canadian Standards Association

1.3.51 CSDFMA – Canadian Steel Door and Frame Manufacturers Association

1.3.52 CSLA – Canadian Society of Landscape Architects

1.3.53 CSSBI – Canadian Sheet Steel Building Institute

1.3.54 CT – Columbia Tower (Existing Hospital)

1.3.55 CTB – Care Team Base

1.3.56 DAS – Distributed Antenna System

1.3.57 DDC – Direct Digital Controls

1.3.58 DHI – Door and Hardware Institute

1.3.59 DID – Direct Inward Dialling

1.3.60 DFO – Department of Fisheries and Oceans

1.3.61 DISS – Diameter Index Safety System

1.3.62 DSSS – Direct Sequence Spread Spectrum

1.3.63 DVMS – Digital Video Management System

1.3.64 EC – Energy Centre

1.3.65 EF – Entrance Facility Room

1.3.66 EHR – Electronic Health Record

1.3.67 EIA/TIA – Electronics Industry Association/Telecommunications Industry Association

1.3.68 EMT – Electric Metallic Tubing

1.3.69 EPA – United States Environmental Protection Agency

1.3.70 ESA – Environmental Site Assessment

1.3.71 ESS – Electronic Security Systems

1.3.72 ePDU – Electronic Power Distribution Unit

1.3.73 ER – Equipment Room

1.3.74 FACP – Fire Alarm Control Panel

1.3.75 FATO – Final Approach and Take-off Area

1.3.76 FM – Factory Mutual

1.3.77 FMO – Facilities Management Office

1.3.78 FUS – Fire Underwriters Survey

1.3.79 GCABC – Glazing Contractors Association of British Columbia

1.3.80 GPS – Global Positioning Satellite

1.3.81 HAZMAT - Hazardous Materials

1.3.82 HCC – Health Care Centre (in the Existing Hospital)

1.3.83 HEPA – High Efficiency Particulate Air

1.3.84 HOA – Hand/Off/Auto

1.3.85 HP – Horsepower

1.3.86 HRC – High Rupture Capacity (fuse type)

1.3.87 HSSBC – Health Shared Services British Columbia

1.3.88 HVAC – Heating, Ventilating and Air-Conditioning

1.3.89 ICU – Intensive Care Unit

1.3.90 IDA - International Dark -Sky Association

1.3.91 IDS / IPS – Intrusion Detection System / Intrusion Prevention System

1.3.92 IESNA – Illumination Engineering Society of North America

1.3.93 IEEE – Institute of Electrical and Electronic Engineers

1.3.94 IIABC – Irrigation Industry Association of British Columbia

1.3.95 IGMAC – International Glazing Manufacturers Association of Canada

1.3.96 IP – Internet Protocol

1.3.97 IMIT – Information Management Information Technology

1.3.98 IT – Information Technology

1.3.99 ITIL – Information Technology / Telecommunication and Infrastructure Library

1.3.100 kW – Kilowatt

1.3.101 kWH – Kilowatt hours

1.3.102 kV – Kilovolt

1.3.103 kVA – Kilovolt Ampere

1.3.104 LAN – Local Area Network

1.3.105 LCD – Liquid Crystal Display

1.3.106 LED – Light Emitting Diode

1.3.107 LEED – Leadership in Energy and Environmental Design

1.3.108 Mb – Megabit

1.3.109 MCP – Motor Circuit Protector

1.3.110 MHSU – Mental Health and Substance Use

1.3.111 MIBC – Masonry Institute of British Columbia

1.3.112 MMCD – Master Municipal Construction Documents

1.3.113 MPI – Master Painters Institute

1.3.114 MSE – Mobility Service Engines

1.3.115 NCRP – National Council on Radiation Protection and Measurement

1.3.116 NEMA – National Electrical Manufacturers Association

1.3.117 NFCA – National Floor Covering Association

1.3.118 NFPA – National Fire Protection Association

1.3.119 NTSC – National Television Standards Committee

1.3.120 NWNA – National Woodworkers Manufacturers Association

1.3.121 OFDM – Orthogonal Frequency Division Multiplexing

1.3.122 OS&Y – Open Stem and Yoke

1.3.123 PACS – Picture Archiving and Communication System

1.3.124 PBX – Private Branch Exchange

1.3.125 PC – Personal Computer

1.3.126 PDA – Personal Digital Assistant

1.3.127 PDU – Power Distribution Unit

1.3.128 PoE – Power Over Ethernet

1.3.129 PTZ – Pan Tilt Zoom

1.3.130 PVC – Polyvinyl Chloride

1.3.131 RFID – Radio Frequency Identification

1.3.132 RCABC – Roofing Contractors Association of British Columbia

1.3.133 RCDD – Registered Communications Distribution Designer

1.3.134 RCH – Royal Columbian Hospital

1.3.135 RTLS – Real Time Location System

1.3.136 SAGA – System of Approach Azimuthal Guidance

1.3.137 SES – Safety Engineering Society

1.3.138 SIP – Session Initiated Protocol

1.3.139 SRC – Safety and Risk Category

1.3.140 SMACNA – Sheet Metal and Air Conditioning National Contractors Association

1.3.141 SMDR – Station Message Detail Recording

1.3.142 SNR – Signal to Noise Ratio

1.3.143 SQL – Structured Query Language

1.3.144 STC – Sound Transmission Coefficient

1.3.145 TCO – Total Cost of Ownership

1.3.146 TCP – Transmission Control Protocol

1.3.147 TDM – Time Division Multiplexing

1.3.148 THD – Total Harmonic Distortion

1.3.149 TIA – Telecommunications Industry Association

1.3.150 TLOF – Touchdown and Lift-off Area

1.3.151 TR – Telecommunications Room

1.3.152 TTMAC – Terrazzo and Tile Manufacturers Association of Canada

1.3.153 TVOC – Total Volatile Organic Compounds

1.3.154 TVSS – Transient Voltage Surge Suppressor

1.3.155 UL – Underwriters' Laboratories

1.3.156 ULC – Underwriters' Laboratories of Canada

1.3.157 UPS – Uninterruptible Power Supply

1.3.158 USGBC – U.S. Green Building Council

1.3.159 V – Volt

1.3.160 VAR – Volt Ampere Reactive power

1.3.161 VFD – Variable Frequency Drive

1.3.162 VLAN – Virtual Local Area Network

1.3.163 VOC – Volatile Organic Compounds

1.3.164 VoIP – Voice Over Internet Protocol

1.3.165 WAN – Wide Area Network

1.3.166 WAP2 – Wireless Application Protocol 2

1.3.167 WLC – Wireless LAN Controllers

1.3.168 WMM – WiFi Multimedia

Part 2. GENERAL

2.1 Applicability of Specifications to the Facility

2.1.1 This Schedule 1 and the Appendices attached to this Schedule 1 set out specifications for the Design and Construction of the Facility as follows:

2.1.1.1 Provisions for the Design and Construction of the following components are performance based specifications:

2.1.1.1(1) The Building (including the Bridges/Corridors);

2.1.1.1(2) The structural systems, shells (such as, but not limited to, building envelopes, exterior enclosure assemblies, and detailing), and interior architecture (such as, but not limited to, interior partitions and assemblies, materials, finishes and detailing) of the Energy Centre and the Campus Communication Hub.

2.1.1.2 Provisions for the Design and Construction of the following components are prescriptive specifications as set out in Appendix 1B(I) [Energy Centre Technical Specifications], Appendix 1B(II) [Campus Communications Hub Technical Specifications] and Appendix 1B(III) [Campus Perimeter Pathway System Technical Specifications]:

2.1.1.2(1) The Energy Centre's systems (such as, but not limited to, mechanical, electrical, telecommunications, plumbing and signal functions);

2.1.1.2(2) The Campus Communication Hub's systems (such as, but not limited to, mechanical, electrical, telecommunications, plumbing and signal functions);

2.1.1.2(3) The Campus Perimeter Pathway System;

2.1.1.2(4) The Renovation Work; and

2.1.1.3 The Design-Builder will cross-reference the documents mentioned in this Section 2.1 as required to fully coordinate and understand all requirements for the Facility.

2.2 Project Overview

2.2.1 The Facility will include:

2.2.1.1 The Building (including the Bridges/Corridors):

2.2.1.1(1) The Building will include all of the functional components, rooms and spaces described in Appendix 1A [Clinical Specifications], including the Bridges/Corridors.

2.2.1.1(2) The Bridges/Corridors are the required connections between the Facility and the Existing Hospital and will include the following scope:

2.2.1.1(2)(a) All applicable requirements in this Agreement;

2.2.1.1(2)(b) Layout and location of Bridge/Corridor in Level 0 of the Health Care Centre and location of connection points to the Existing Hospital as indicated in Section 1.7.3 External Circulation and Links of Appendix 1A [Clinical Specifications];

2.2.1.1(2)(c) All related interior and exterior renovation work (such as, but not limited to, demolition, removal, disposal of materials, structural upgrades, mechanical and electrical services and connections to existing services, finishes, etc.) contained within the Project Boundary Line as indicated in Attachment 1 and Attachment 2 to Appendix 1Q [Site Plan];

2.2.1.1(2)(d) Renovation of the 3 (three) Clinical Skills rooms (including all their interior components (such as, but not limited to, equipment, millwork, fixtures, etc.) located in Level 0 of the existing Health Care Centre as indicated in Section 1.7.3.6(1). The new location (shift) of the 3 (three) Clinical Skills rooms shall be toward the existing interior corridor reducing the width of this corridor to a dimension of no less than 1800mm. The internal dimensions of the Clinical Skills rooms shall be maintained to the extent possible;

2.2.1.1(2)(e) All interior renovation work in Level 0 of the existing Health Care Centre will be of new construction (e.g., when there is alignment of the Bridge/Corridor to existing partitions such existing partitions will be replaced with new construction, existing doors within the limits of the scope of work, unless otherwise noted, will be replaced with new construction, etc.); and

2.2.1.1(2)(f) Design of a 3000mm wide section/portion of the north face of the Bridge/Corridor in Level 1 of the Health Care Centre to allow for the future connection point to future phase with minimal future renovation work required. Refer to Attachment 2 to Appendix 1Q [Site Plan] for required location of connection point.

2.2.1.2 Underground parking:

2.2.1.2(1) The underground parking will include all of the functional components, rooms and spaces as required in Section 4.4 and elsewhere in this Schedule as applicable.

2.2.1.3 The Energy Centre:

2.2.1.3(1) The Energy Centre is the collection of rooms and exterior spaces housing the mechanical-HVAC, power distribution, telecommunications, plumbing and signal functions required for the Campus. The Energy Centre:

2.2.1.3(1)(a) will be the location where all energy required by the Campus is either generated or distributed from utilities to the different buildings within the Campus including the Building; and

2.2.1.3(1)(b) will provide energy capacity for the Campus, as well as provision to easily service future expansion without disruption to ongoing operations.

2.2.1.3(1)(c) will include a service link to the Existing Hospital through which services will be routed to and from the Energy Centre and the Existing Hospital; and

2.2.1.3(1)(d) will include a service link to the future development through which services will be routed to and from the Energy Centre and the future development.

2.2.1.4 The Campus Communications Hub:

2.2.1.4(1) The Campus Communications Hub (CCH) is a room that will function as the Equipment Room for the Building and the Energy Centre as well as the Telecommunications Room. In addition, the CCH will house:

2.2.1.4(1)(a) The Existing Hospital' primary core network equipment, telecom PBX, primary ENG Gateway, Distributed Antenna System (DAS) head end and the primary fiber distribution frame (MFDF);

2.2.1.4(1)(b) Direct care, clinical support, and site operations capabilities including image and voice processing, transmission and printing capabilities through network attached storage (NAS), storage area network (SAN), domain controller, print servers, remote desktop servers, and various database servers; and

2.2.1.4(2) Core equipment for such systems as Building Automation and Management, Security, Access Control, Audio Visual and Video Conferencing, Virtual Care (Telehealth), etc.

2.2.1.5 The Campus Perimeter Pathway System:

2.2.1.5(1) The Campus Perimeter Pathway System is an underground network of structures consisting of ducts and manholes that run around the perimeter of the Site and the Existing Hospital and tie into each building. The purpose of the Campus Perimeter Pathway System is to support an inter-building fiber ring as well as copper cabling infrastructure for the distribution of analog voice services to the campus. The Campus Perimeter Pathway System will also connect to access provider and third party structures in order to facilitate the provision of telecommunication and Wide Area Network (WAN) services to the site.

2.2.1.6 The Renovation Work:

2.2.1.6(1) The Renovation Work includes the following scope of work:

2.2.1.6(1)(a) Steam to Hot Water Conversion. Refer to Section 7.1.16.

2.2.1.6(1)(b) Ancillary Electrical Works in HCC and CT. Refer to Section 7.8.18.

2.2.1.6(1)(c) Service Entrance Facilities – Healthcare Centre and Columbia Tower. Refer to Section 7.9.4.2(14).

2.2.1.6(1)(d) In addition to the requirements of this scope in the aforementioned Sections, the Design-Builder will provide all related architecture as required such as, but not limited to, encasements, enclosures (e.g., walls, floors, ceilings, bulkheads, doors, etc.), finishes, etc., to the standards and requirements in this Agreement, as well as all required demolition, relocation, reinstatement of existing conditions, etc., to the satisfaction of the Authority. Deviation in the location and layout of the rooms related to this scope as shown in the Indicative Design drawings will be subject to the Acceptable Equivalents process.

2.2.1.7 Associated works:

2.2.1.7(1) Associated works includes all miscellaneous and additional work not specifically described in this Schedule required to complete the Design and Construction of the Facility to the satisfaction of the Authority.

2.3 Clinical Specifications and Schedules of Accommodation

2.3.1 Clinical Specifications for the Building are set out in Appendix 1A [Clinical Specifications] (the "**Clinical Specifications**").

2.3.2 The Design-Builder will design and construct the Facility:

2.3.2.1 so that it accommodates all of the spaces, activities, functions, design features and adjacencies described in Appendix 1A [Clinical Specifications]; and

2.3.2.2 in accordance with the requirements of Appendix 1A [Clinical Specifications], subject to any adjustments or refinements made in accordance with Schedule 2 [Review Procedure].

2.4 Additional Rooms and Spaces

2.4.1 Notwithstanding anything in Appendix 1A [Clinical Specifications], the Design-Builder will design and construct the Facility to include all rooms and spaces as required to comply with the terms of this Agreement, including sufficient rooms and spaces as necessary for the operation and maintenance of the Facility.

2.5 Standards

2.5.1 The Design-Builder will undertake the Design and Construction:

2.5.1.1 in accordance with the standards set out in this Schedule and without limiting this Section, the Design-Builder will undertake the Design and Construction in compliance with all applicable standards, including the standards listed in Appendix 1C [Standards];

2.5.1.2 in accordance with the British Columbia Building Code, and all applicable Laws;

2.5.1.3 having regard for the concerns, needs and interests of:

2.5.1.3(1) all persons who will be Facility Users;

2.5.1.3(2) all Authorities Having Jurisdiction; and

2.5.1.3(3) the community;

2.5.1.4 in accordance with Good Industry Practice; and

2.5.1.5 to the same standard that an experienced, prudent and knowledgeable long term Authority of a high quality health care facility in North America operated publicly would employ.

2.5.2 If more than one standard is applicable, the highest such standard will apply.

2.5.3 If the Design-Builder wishes to make reference to a code or standard from a jurisdiction outside of Canada, then the Design-Builder will demonstrate to the Authority's satisfaction that such code or standard meets or exceeds the requirements of this Schedule.

2.6 CSA Z8000: Canadian Health Care Facilities

2.6.1 CSA Z8000 complements the standards and codes specified in Schedule 1 by providing overarching design principles and referencing specific standards and codes that are appropriate for healthcare facility design.

2.6.2 The Design-Builder will:

2.6.2.1 refer to CSA Z8000 for design guidance to resolve issues not otherwise addressed in this Schedule; and

2.6.2.2 use as a guideline with:

2.6.2.2(1) any minimum standards and codes referenced in CSA Z8000 (except for any minimum space requirements that may be required by those standards and codes);

2.6.2.2(2) all infection control provisions set out in CSA Z8000; and

2.6.2.2(3) Accommodation of Bariatric Persons section of CSA Z8000.

2.7 Coordination and Project Control

2.7.1 The Design-Builder will coordinate the progress of the Work, Progress Schedules, Submittals, the use of the Site, access to the Site, temporary utilities, construction facilities and controls, and the Work of all sections of this Schedule to ensure the efficient and orderly installation of interdependent construction elements.

2.7.2 Coordinate the Work of the various sections having independent responsibilities for installing, connecting to and placing in service utilities and equipment.

2.7.3 Coordinate space requirements, supports and the installation of mechanical and electrical work including all systems and services required for the renovations and installation of new services in the Existing Hospital. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.

2.7.4 In finished areas, conceal pipes, ducts and wiring in floors, except as indicated in Section 5.1.1.6, walls, and ceilings. Coordinate locations of fixtures and outlets with finished elements and the Authority's requirements;

2.7.5 Coordinate the commissioning of the Work of separate sections in preparation for Substantial Completion.

2.7.6 Coordinate the completion and clean-up of the Work of separate sections in preparation for Final Completion.

2.7.7 Coordinate the move with the Authority.

2.8 Submittal Documents

2.8.1 Progressive Submittals

2.8.1.1 The Design-Builder is to make submissions to the Authority for review at the following stages:

2.8.1.1(1) Schematic Design - 30% complete;

2.8.1.1(2) Design Development - 60% complete;

2.8.1.1(3) Pre-Tender - 95% complete; and

2.8.1.1(4) Issued for Construction - 100% complete;

2.8.1.2 Refer to the corresponding sections and tables within this Section 2.8 for minimum list of drawings to be submitted at each stage.

2.8.1.3 The Design-Builder is to make submissions to the Authority for review, of the following, at appropriate times during construction:

2.8.1.3(1) Shop Drawings

2.8.1.3(2) Samples

2.8.1.3(3) Studies

2.8.1.3(4) Reports

2.8.1.3(5) Certificates

2.8.1.4 Non-conformances:

2.8.1.4(1) The Design-Builder will provide a list of non-conformances with its progress submittals.

2.8.1.4(2) Acceptance of any non-conformances is at the Authority's sole discretion.

2.8.1.4(3) Review and acceptance by the Authority will not be deemed as acceptance of any non-conformance; acceptance by the Authority will be in writing only.

2.8.1.5 The Design-Builder will deliver five (5) hardcopies of each Construction Document submission (drawings, specifications, reports, etc.), three (3) full size hard copies of all drawings (to scale), two (2) 11x17 reduced size hard copies of all drawings, and two (2) electronic versions on CD or USB device of each document. Submissions will be delivered; Consult the Authority prior to printing and shipping to confirm submission requirements and destination(s).

2.8.1.6 Not used.

2.8.1.7 Should the Authority deem submissions to be incomplete; resubmission will be at the Design-Builder's cost.

2.8.1.8 All drawings and specifications will be submitted in an orderly sequence and in accordance with the Project Schedule. Drawing packages for the different stages as indicated in this Section 2.8 will be submitted in accordance with the Submittal Schedule as reviewed and approved by the Authority.

2.8.1.9 Drawings, Models, and Visualization

2.8.1.9(1) The Design-Builder will provide:

2.8.1.9(1)(a) A BIM model using REVIT in accordance with the Fraser Health Building Information Management Requirements Overview;

(a).1 It is agreed that the Building Information Modelling (BIM) process is required to provide valuable information for facility operations and management at the end of the implementation stage of the project; the intention of the parties is that the format, extents and process by which this information is accrued will allow the information to be gathered by the Design-Builder efficiently throughout the project.

(a).2 The Design-Builder will lead and manage the BIM process throughout the implementation stage of the project, beginning with the development of the Project Execution Plan (PEP). The schedule for the evolution and production of the BIM deliverables outlined in the Building Information Management Requirements Standards will be established through a collaborative PEP development process, which will include representatives from the Design-Builder, the Authority and the

Authorities' Consultant. Some examples of the deliverables which will be defined include:

(a).2.1 Omniclass and assembly code meta data;

(a).2.2 Model audit process; and

(a).2.3 Key performance indicators.

(a).3 Fabrication files used will be defined by the Design-Builder. The Design-Builder will also be employing a software agnostic, cloud-based virtual coordination tool, such as Revizto, to allow all parties to collaborate and coordinate. This tool will also be used for the tracking and management of comments and revisions during the design review process.

2.8.1.9(1)(b) AutoCAD drawings including plot configuration files;

2.8.1.9(1)(c) Energy Model and Study as part of the BC Hydro New Construction Program

2.8.1.9(1)(d) PDFs of all drawings; and

2.8.1.9(1)(e) 3-Dimensional, photo-realistic colour exterior and interior renderings.

(e).1 3-Dimensional photo realistic exterior renderings should illustrate all Facility elevations, the Main Entry to the Building, and secure outdoor spaces.

(e).2 3-Dimensional photo realistic interior rendering should illustrate, at a minimum, the following areas:

(e).2.1 Waiting area as viewed from Reception;

(e).2.2 Recovery room and Post-Recovery room as viewed from the Electroconvulsive Therapy (ECT) Treatment room;

(e).2.3 Inpatient Unit, including Lounge (Quiet), Dining Room/Lounge, and Unit corridor, as viewed from the Care Team Base;

(e).2.4 Care Team Base (CTB), including central organization and equipment; and

(e).2.5 Secure Room and Shower space as viewed from the Secure Ante room.

(e).2.6 Patient Bedroom and Ensuite.

2.8.1.9(1)(f) Not used.

2.8.1.9(2) All 3-Dimensional photo realistic renderings will be updated, as the Design progresses, and provided at each of the Design stages as indicated in this Section.

2.8.1.9(3) All drawings will be in metric (millimeter) and prepared to current industry standards.

2.8.1.9(4) All drawings will be to 1:100 scale unless otherwise specified.

2.8.1.9(5) Site context plan will be to 1:500 scale.

2.8.1.10 Specifications

2.8.1.10(1) Submit specifications as hard copies and electronic copies in PDF and Word format;

2.8.1.10(2) Specifications for all disciplines will be organized according to CSI/CSC Master Format using CSC full-page Section Format/Page Format.

2.8.1.10(3) The Design-Builder will provide specifications for all disciplines progressively with sufficient information to enable the Authority to verify the compliance with the requirements of the Authority's Statement of Requirements and the Contract Documents and to accurately construct the Facility as intended.

2.8.1.10(4) Use proprietary specifications where proprietary products are known:

2.8.1.10(4)(a) Research sufficient additional materials to provide a range of acceptable products that will match the performance requirements specified.

2.8.1.10(4)(b) When a single source product, type and model are listed within the specification, it must include a full technical specification that lists critical technical characteristics deemed necessary to permit a review in order to assess compliance of any potential substitution.

2.8.1.10(4)(c) Not used.

2.8.1.10(4)(d) An advantage of the Design-Builder team, is an efficiency that allows for research by the constructor and designer, so that appropriate products are selected based on performance first, followed by meeting established budgets second.

2.8.1.10(5) Shop drawings and product data sheets are not considered as specifications for the progress submittals.

2.8.1.11 Design Narratives

2.8.1.11(1) The Design-Builder will provide at Schematic Design and Design Development stages the corresponding Design Narratives for each discipline, which will also address the methodology and solutions for the in addition to the following items:

2.8.1.11(1)(a) Functionality:

(a).1 Direct Line of Sight: CTB to Dining Room/Lounge, Lounge (Quiet), Secure Outdoor Patio, Patient Corridor;

(a).2 Travel distance: CTB to Patient Bedrooms, CTB to Secure Rooms

2.8.1.11(1)(b) Security and Safety:

(b).1 Asset Protection: Choice of materials, vandal proofing equipment and fixtures;

(b).2 Personal Safety: Direct Line of Sight, vision from corridors into rooms, personal safety devices and access control.

(b).3 CPTED principles.

2.8.1.11(1)(c) Accessibility:

(c).1 Disability: Ability to use all common spaces. Ability to perform personal care.

(c).2 Food: Food delivery from start of Bridges/Corridors on the Existing Hospital side to table in 20 minutes.

2.8.1.11(1)(d) Wellness:

(d).1 Natural Light: Direct daylight into Lounge (Quiet), Dining Room/Lounge, day spaces, Consultation/Therapy Room, Staff Lounge, and amount of daylight entering the Patient Bedroom, Secure Room, CTB, ECT Post-Recovery, ECT TMS and Patient Corridors;

(d).2 Artificial Light: Lighting design including controls;

(d).3 Material/Colour: Natural colours related to the local environment. Use of wood, glass, stone;

(d).4 External Views: Ability to see out of the windows in a chair or in a bed;

(d).5 Walking Loop: Avoidance of dead ends, areas for walking and destinations;
(d).6 Art: Place to display.

2.8.1.11(1)(e) Acoustics:
(e).1 Speech Privacy: Flanking sounds, materials.
(e).2 Reverberation: A non echo environment.
(e).3 Noise Isolation: Interior spaces protection from noise from equipment in other spaces and external noise.
(e).4 Exterior noise control: Satisfy environmental noise limits.
(e).5 Vibration: Satisfy performance criteria.

2.8.1.11(1)(f) Wayfinding:
(f).1 Intuitive: Use of landmarks, finishes and sightlines of destination;
(f).2 Signage: Location at decision points, ease of maintenance and replacement.

2.8.1.11(1)(g) Maintainability:
(g).1 Access to equipment: Access for maintenance and replacement, standardization of equipment;
(g).2 Energy: Functionality of the energy saving features;
(g).3 Durability: Material selection, protection of surfaces/finishes, warranties;
(g).4 Construction strategies: Ease of replacement in the future of materials chosen.

2.8.1.11(1)(h) External Environment:
(h).1 Pedestrian Connection: Connection to the neighbourhood and campus;
(h).2 Streetscape: Building façade to the neighbourhood;
(h).3 Vehicle Connection: Drop off; maintenance vehicles, and parking to the building;
(h).4 Landscape: Sustainability, ease of maintenance;
(h).5 Exterior Lighting: Directionality of lighting, light pollution, dark spots.

2.8.1.11(1)(i) Standardization:

(i).1 Floor plate flexibility: Structural systems, vertical shaft locations, consistency of location, sizes;

(i).2 Consistent Room stacking, service core locations: Consistency of location, number of shafts.

2.8.1.11(1)(j) Sustainability and LEED:

(j).1 Construction Activity Pollution: control plan addressing loss of soil during construction, sedimentation of storm sewers and streams, air pollution with construction dust;

(j).2 Alternative transportation: preferred options to reduce impacts from automobile use;

(j).3 Sustainably sourced materials and products: use of regionally sourced materials, materials with recycled content, rapidly renewable materials;

(j).4 Daylight and views: daylighting and access to views for spaces not located on the perimeter of the building;

(j).5 Additional credits: breakdown and details of targeted Innovation in Design and/or Exemplary Performance credits, if included on project scorecard.

2.8.1.12 Shop Drawings

2.8.1.12(1) Shop Drawings means drawings, diagrams, illustration, samples, schedules, performance charts, literature, brochures, and other data which are to be provided by the Design-Builder to illustrate details of a portion of the Work.

2.8.1.12(2) Submit fully detailed shop drawings, indicating materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, required backing or accessories including those to be provided by others, colour charts for selecting colour where applicable, design calculations, and other pertinent information necessary to complete the Work. Where items attach to other items, or to waterproof membranes, indicate that such items have been coordinated, regardless of Section under which such adjacent items are supplied and installed. Indicate cross references to the requirements of this Agreement.

2.8.1.12(3) Shop Drawings will be in metric measurements.

2.8.1.12(4) Review of Shop Drawings by the Authority is for the sole purpose of ascertaining conformance with the general design concept and for general arrangement only. This review does not mean approval of detail design inherit in Shop Drawings, responsibility for which remains with the Design-Builder. Such review does not relieve responsibility for meeting requirements of this Agreement, unless the Authority has accepted a deviation in writing.

2.8.1.12(5) Submit Shop Drawings per the following list

01 35 33 Infection Control Procedures
01 50 00 Temp Facilities & Controls
03 30 00 Cast-in-Place Concrete
03 53 00 Concrete Topping
04 21 00 Clay Unit Masonry Assemblies
04 22 00 Concrete Unit Masonry
05 10 00 Structural Steel
05 31 00 Steel Decking
05 45 00 Load Bearing Steel Studs (Metal Support Assemblies)
05 50 00 Metal Fabrications
05 59 63 Glazed Detention and Windscreen Enclosures
06 10 00 Rough Carpentry
06 20 00 Finish Carpentry
06 40 00 Architectural Woodwork
07 13 00 Below Grade Sheet Waterproofing
07 14 16 Cold Fluid Applied Waterproofing
07 16 16 Crystalline Waterproofing
07 18 13 Pedestrian Traffic Coatings
07 18 16 Vehicular Traffic Coatings
07 21 00 Building Insulation
07 21 19 Foamed in Place Polyurethane Insulation
07 21 29 Spray Applied Mineral Fibre Insulation
07 25 00 Weather Barriers
07 42 13 Metal Wall Panels
07 42 63 Zinc Wall Panel Assemblies
07 43 00 Composite Wall Panels
07 43 23 Ext Grade Wood Composite Panels
07 44 19 Terra Cotta Clay Wall Panel Assemblies
07 46 23 Wood Siding
07 46 43 Mineral Fibre Reinforced Composite Panels
07 52 16 SBS Membrane Roofing
07 61 13 Standing Seam Metal Roofing
07 62 00 Sheet Metal Flashing & Trim
07 81 00 Applied Fireproofing

07 81 23 Intumescent Fireproofing
07 84 00 Firestopping & Smoke Seals
07 92 00 Joint Sealants
08 11 00 Metal Doors & Frames
08 21 00 Wood Doors
08 31 00 Access Doors & Panels
08 33 00 Coiling Doors and Grilles
08 34 73 Sound Control Door Assemblies
08 35 13 Folding Security Grilles
08 41 13 Aluminum Framed Entrances and Storefronts
08 42 29 Automatic Entrances
08 44 13 Glazed Aluminum Curtain Walls
08 63 00 Metal Framed Skylights
08 71 00 Door Hardware
08 74 00 Access Control Hardware
08 81 00 Glass & Glazing
08 90 00 Louvres and Vents
09 21 16 Gypsum Board Assemblies
09 30 00 Ceramic Tiling
09 51 00 Acoustical Ceilings
09 65 00 Resilient Flooring
09 67 00 Fluid Applied Flooring
09 68 13 Tile Carpeting
09 84 00 Acoustic Room Components
09 90 00 Painting & Coating
10 11 00 Visual Display Surfaces
10 14 00 Signage
10 21 14 Toilet Compartments
10 21 23 Cubicle Curtain And Track
10 26 00 Wall and Door Protection
10 28 13 Toilet and Bath Accessories
10 44 00 Fire Protection Specialties
10 51 00 Metal Lockers
10 71 13 Exterior Sun Control Devices
11 24 23 Fall Arrest Equipment
11 40 00 Food Services Equipment
12 10 00 Art
12 24 00 Window Coverings
12 36 00 Countertops
12 48 16 Entrance Floor Grilles
12 50 00 Furniture
12 93 00 Site Furnishings
12 93 33 Manufactured Planters

13 12 13 Exterior Fountains
14 21 13 Electric Traction Elevators.
20 05 13 Motors Starters and Wiring
20 05 14 Adjustable Frequency Drives
20 05 16 Flex Connections, Expansion Joints, Anchors and Guides
20 05 18 Flow and Energy Meters
20 05 19 Indicating Gauges
20 05 23 Valves
20 05 29 Hangers and Supports
20 05 48 Vibration and Seismic Controls
20 05 49 Seismic Restraint Systems
20 05 53 Identification Equipment Insulation
20 07 19 Piping Insulation
20 08 01 Start-Up and Performance Testing Reporting
21 13 13 Wet Pipe Sprinkler System
21 13 16 Dry Pipe Sprinkler System
21 13 19 Preaction Sprinkler System
21 30 13 Packaged Fire Pump
22 10 10 Plumbing Pumps
22 11 16 Domestic Water Piping
22 33 13 Domestic Water Heaters
22 42 01 Plumbing Specialties
22 42 03 Plumbing Fixtures and Trim
22 63 13 Medical Gas Systems
23 11 13 Facility Fuel Oil Piping
23 11 33 Natural Gas Systems
23 13 13 Oil Storage Tanks
23 13 15 Fuel Oil Pumps
23.13.19 Fuel Filtration Systems
23 15 13 Fuel Management System
23 21 11 Water Specialties-Heating and Cooling
23 21 13 Steel Pipe and Fittings – Heating and Cooling
23 21 23 Pumps – Heating and Cooling
23 22 11 Steam Specialties
23 22 13 Steel Pipe and Fittings – Steam and Condensate
23 22 23 Central Plant Condensate Receiver
23 25 13 HVAC Water Treatment Systems
23 34 05 Fans
23 36 13 Terminal Boxes
23 37 13 Grilles, Registers and Diffusers
23 51 16 Fabricated Breeching and Accessories

23 51 19 Fabricated Stacks
23 51 33 Insulated Sectional Chimneys
23 52 16 Packaged Hot Water Boiler - Condensing
23 52 39 Packaged Boiler – Fire Tube
23 53 16 Deaerator
23 57 13 Heat Exchangers
23 61 09 Refrigerant Detection System
23 62 23 Process Cooling Package Chiller - Scroll
23 64 16 Packaged Chiller - Centrifugal
23 65 13 Cooling Towers
23 65 15 Indirect Air-Side Economizer Recirculation Cooling Unit
23 73 10 Air Handling Units
23 74 33 Makeup Air Unit
23 81 26 Ducted Split Air Conditioners
23 82 19 Electric Reheat Coils
23 82 39 Unit Heaters
23 84 13 Humidifiers
25 05 01 Emc General Requirements
31 00 00 Earthwork
31 23 01 Excavating Trenching & Backfiling
32 01 90.33 Tree Protection
32 11 16.1 Granular Subbase
32 11 23 Granular Base
32 12 13.2 Asphalt Prime
32 12 16 Asphalt Paving
32 13 13 Portland Cement Concrete Pavement
32 14 13 Precast Concrete Unit Paving
32 17 23 Painted Pavement Markings
32 18 16 Synthetic Resilient Surfacing
32 31 13 Chain Link Fences & Gates
32 80 00 Irrigation
32 91 13 Growing Medium Preparation
32 92 93 Sodding
32 93 00 Planting
33 11 01 Waterworks
33 30 01 Sanitary Sewers
33 40 01 Storm Sewers
33 44 01 Manholes and Catch basins

2.8.1.13 Samples

2.8.1.13(1) Submit samples of luminaires for review by the Authority. Each approved sample shall be retained on job site until final completion of project.

2.8.1.13(2) Luminaires which do not match quality and workmanship of standard sample will be rejected.

2.8.1.14 All equipment plans will show installation, removal and maintenance clearances.

2.8.2 Architectural Construction Documents

Percentage Complete at Submission Stages	30%	60%	95%	100%	As-Built
Drawing Content					
Site plans, context site plans, sections and details – includes coordination with civil works, hard landscape features and site servicing	✔	✔	✔	✔	✔
Title sheet, legends, drawing list, key plans and assembly listings	✔	✔	✔	✔	✔
Floor plans, penthouse and roof plans	✔	✔	✔	✔	✔
Reflected ceiling plans	✔	✔	✔	✔	✔
Exterior elevations	✔	✔	✔	✔	✔
Interior elevations	-	✔	✔	✔	✔
Building sections, transverse, longitudinal	✔	✔	✔	✔	✔
Wall sections	-	✔	✔	✔	✔
Large scale plans, lobbies, special purpose spaces, conference rooms, kitchens	✔	✔	✔	✔	✔
Large scale plans Patient Bedrooms and washrooms	✔	✔	✔	✔	✔
Plan and section details	-	✔	✔	✔	✔
Vertical movement – plans, sections and details, stairs, ramps, elevators	✔	✔	✔	✔	✔
Special elements, furnishings, signage, etcetera	-	✔	✔	✔	✔
Schedules, doors, windows, hardware, finishes, and etcetera.	-	✔	✔	✔	✔
Millwork – plans, sections, and details	-	✔	✔	✔	✔
Code Compliance - Fire Separations (vertical and horizontal), Exiting Travel Distance Plans, Occupant loads, and exit width capacities	✔	✔	✔	✔	✔
Code Compliance Report	✔	✔	✔	✔	✔
Specifications					
Table of Contents	-	✔	✔	✔	-
General Requirements	-	✔	✔	✔	-
Existing Conditions – if any	-	✔	✔	✔	-
Concrete	-	✔	✔	✔	-
Masonry	-	✔	✔	✔	-
Metals	-	✔	✔	✔	-
Wood, Plastics and Composites	-	✔	✔	✔	-
Thermal and Moisture Protection	-	✔	✔	✔	-
Openings	-	✔	✔	✔	-
Door Hardware; Door program and functioning started in coordination with requirements for Electronic Safety and Security	-	✔	✔	✔	-
Finishes	-	✔	✔	✔	-
Specialties	-	✔	✔	✔	-

Percentage Complete at Submission Stages	30%	60%	95%	100%	As-Built
Equipment	-	✔	✔	✔	-
Furnishings	-	✔	✔	✔	-
Special Construction – if any	-	✔	✔	✔	-
Conveying Equipment – Elevators	-	✔	✔	✔	-
Other					
Physical Model	-	-	-	✔	-
Colour Boards Master Colour Palette	-	✔	✔	✔	-
Sample boards	-	✔	✔	✔	-
Presentation to Patient	-	✔	✔	✔	-
Fly-Through's	✔	✔	✔	✔	-
3-Dimensional renderings	✔	✔	✔	✔	-
Room Data Sheets (including all mechanical, electrical and IMIT information)		✔	✔	✔	-

2.8.2.1 The Design-Builder will provide Construction Documents that include the following items as required to achieve the percentage of completion for the submissions.

2.8.2.2 The Design-Builder will clearly indicate:

2.8.2.2(1) Floor elevations (geodetic, on floor plans, sections and elevations) complete with floor level changes, stairs and ramps; and

2.8.2.2(2) Floor finishing tolerances, slopes for drainage, drain openings, etc. will be identified.

2.8.2.3 Code Construction Documents

2.8.2.3(1) Code Compliance Report will contain:

2.8.2.3(1)(a) BCBC Data Matrix including design considerations; and

2.8.2.3(1)(b) Fire and Life Safety Data Summary (may be illustrated graphically).

2.8.2.3(2) When applicable, alternative solutions will contain:

2.8.2.3(2)(a) All information required by the Authority Having Jurisdiction (AHJ);

2.8.2.3(2)(b) Any operational impacts of the Alternate Solution; and

2.8.2.3(2)(c) Any maintenance impacts of the Alternate Solution.

2.8.2.4 Plans, Sections and Elevations will contain:

2.8.2.4(1) The outlines of the exterior walls and partitions in relation to the structural framework complete with graphical representation of materials cross- references to partition types and dimensions;

2.8.2.4(2) Clearly indicated functions of each building material component and rain screen construction component (e.g., air barrier, vapour barrier, moisture barrier, acoustical barrier, security barrier, fire resistance, thermal resistance, etc.);

2.8.2.4(3) The location of doors and windows, and other openings complete with cross-references to door, window and hardware schedules;

2.8.2.4(4) The location of fixtures and equipment for washrooms, kitchens, conference rooms, equipment/mechanical/electrical/communications rooms complete with cross-references to equipment schedules, notes and dimensions;

2.8.2.4(5) Clearly indicated barrier-free access, path of travel, clearances complete with notes and dimensions;

2.8.2.4(6) Designate room name and number of interior space. Maintain Authority room reference number as stated in the Schedule of Accommodation. The As-built Drawings will include final room numbering as per Section 2.13 and as coordinated with and approved by the Authority;

2.8.2.4(7) Graphically represent construction and finish materials for walls and floors;

2.8.2.4(8) Illustrate built-in furniture, millwork and equipment;

2.8.2.4(9) Graphically illustrate fire separation(s), acoustic separation(s), security separation(s), etc; and

2.8.2.4(10) Gridlines and Gridlines dimensions.

2.8.2.5 Reflected Ceiling Plans will contain:

2.8.2.5(1) Graphical representation of ceiling finishes, equipment (such as ceiling mounted Patient lifts), luminaires complete with cross-reference to lighting, security, sprinkler, HVAC, fire alarm, and ceiling heights etc.;

2.8.2.5(2) Clearly indicated bulkheads complete with graphical representation of construction and materials, notes, ceiling heights and dimensions; and

2.8.2.5(3) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, security, etc. complete with cross-reference notes and dimensions.

2.8.2.6 Penthouse and Roof Plans will contain:

2.8.2.6(1) The location of fixtures and equipment for mechanical, electrical, maintenance, etc. complete with notes and dimensions;

2.8.2.6(2) Clearly indicated roof penetrations for equipment, hatches, access paver paths, fall arrest anchors, antennae supports/ties, etc.; and

2.8.2.6(3) Graphically represent construction and finish materials for roof.

2.8.2.7 Exterior Elevations will contain:

2.8.2.7(1) The location of doors and windows, borrowed lights, and other openings;

2.8.2.7(2) Graphical representation of construction and finish materials, including a legend and notations; and

2.8.2.7(3) Scuppers, downs spouts or drainage systems, hose bibs and electrical outlet and exterior light locations.

2.8.2.7(4) Landscape treatment proposed in relation to exterior and windows

2.8.2.8 Interior Elevations will contain:

2.8.2.8(1) The location of doors, windows, and other openings; all wall mounted equipment, mechanical, electrical, and IMIT devices, dimensions of vertical changes in material, room numbers;

2.8.2.8(2) Graphical representation of construction and finish materials including a legend and notations is to be provided: and

2.8.2.8(3) Clearly indicate wall finishes, colour choices and details.

2.8.2.9 Building Sections will contain:

2.8.2.9(1) Clearly indicated floor construction/assemblies, floor elevations, dimensions and ceiling lines; and

2.8.2.9(2) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, security, etc., complete with cross-reference notes and dimensions.

2.8.2.10 Wall Sections (scale 1:20) will contain:

2.8.2.10(1) Clearly indicated detail location tags and references; wall type notations; and critical dimensions; and

2.8.2.10(2) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, security, etc. complete with cross- reference notes and dimensions.

2.8.2.11 Large Scale Plans (scale 1:50 or larger) will include:

2.8.2.11(1) The following spaces, including all rooms related to them as shown in the Space Table in Appendix 1A [Clinical Specifications]:

2.8.2.11(1)(a) Large Multipurpose room; and

2.8.2.11(1)(b) Neurostimulation Clinic;

2.8.2.11(2) Consultation/Therapy room;

2.8.2.11(3) Clinical exam / Observation room;

2.8.2.11(4) Consult / Exam room (Clinical skills);

2.8.2.11(5) Patient Bedroom and Ensuite;

2.8.2.11(6) Dining Room/Lounge;

2.8.2.11(7) Lounge (Quiet);

2.8.2.11(8) Secure room and Secure Room Ante Room;

2.8.2.11(9) Exercise / Wellness Room;

2.8.2.11(10) Large Group Therapy Room;

2.8.2.11(11) Mechanical Rooms;

2.8.2.11(12) Electrical Rooms; and

2.8.2.11(13) Communication Rooms.

2.8.2.11(14) Provide interior elevations to 1:50 scale for the spaces listed above.

2.8.2.12 Vertical movement plans, sections and details will contain clearly indicated rise and run, headroom clearances, landing elevations, vertical and horizontal dimensions, railing and guards complete with barrier-free clearances, and notes.

2.8.2.13 Millwork plans, sections and details will clearly indicate millwork layout, section elevations, and details complete with material choices, notes and dimensions.

2.8.2.14 Special elements, furnishings, systems furniture, signage, etc. will contain:

2.8.2.14(1) Detailed graphical representations of furniture, systems furniture, signage, etc. in relation to exterior and interior walls, structural framework, material connections and interrelationships complete with cross-reference to schedules, notes, materials, and dimensions;

2.8.2.14(2) Detailed location of fixtures and equipment for telecommunications, IM/IT, security, etc. complete with cross- reference to equipment schedules, notes and dimensions; and

2.8.2.14(3) Base-building elements will be graphically distinct from special elements.

2.8.2.15 Schedules (Doors, Hardware, Windows, Room Finishes, Furniture, etc.) will contain:

2.8.2.15(1) Clearly indicated material, size, fire / thermal / acoustic / security resistance rating, colour, texture, pattern, etc.; and

2.8.2.15(2) Schedules maybe graphical and/or tabular in drawing or specification format.

2.8.3 Civil Construction Documents

Percentage of drawings completed	30%	60%	95%	100%	As-Built
Drawing Content					
Title sheet, typical sections and details used on this project	✔	✔	✔	✔	✔
Existing Conditions	✔	✔	✔	✔	✔
Erosion and Sediment Control	✔	✔	✔	✔	✔
Temporary Service during Construction	✔	✔	✔	✔	✔
Site Coordination Layout, turning templates for emergency and service vehicles	✔	✔	✔	✔	✔
Storm Water Drainage Plan	✔	✔	✔	✔	✔
Grading, site servicing, roads, parking lot(s), Hardscape and street lights	✔	✔	✔	✔	✔
Deep and Shallow Utilities Plan and profile, on and off site	✔	✔	✔	✔	✔
Retaining Walls Plan and Profile (< 1.0m High)	✔	✔	✔	✔	✔
Sections and details	✔	✔	✔	✔	✔
Pavement Marking and Signage Plans	✔	✔	✔	✔	✔
Constructing phasing	✔	✔	✔	✔	✔
Offsite Drawings	✔	✔	✔	✔	✔

Specifications					
Clearing, Grubbing & Stripping	✔	✔	✔	✔	-
Earthworks	✔	✔	✔	✔	-
Site Servicing	✔	✔	✔	✔	-
Water, Sanitary Sewer and Storm Sewer	✔	✔	✔	✔	-
Manholes and Catchbasins	✔	✔	✔	✔	-
Watermain Flushing, Pressure Testing & Disinfection Plan	✔	✔	✔	✔	-
Base and Sub Base Course Aggregates	✔	✔	✔	✔	-
Asphalt Paving	✔	✔	✔	✔	-
Exterior Improvements	✔	✔	✔	✔	-
Cast-in-Place Concrete	✔	✔	✔	✔	-
Pavement Markings	✔	✔	✔	✔	-

2.8.3.1 The Design-Builder will provide diagrams with their submission describing:

2.8.3.1(1) How general traffic works during Construction; and

2.8.3.1(2) How parking stall allocation works during Construction.

2.8.3.2 Existing Conditions Drawing will contain all pertinent topographic information, contours at appropriate interval with spot elevations in clear legible format, all underground utilities including inverts and depths, size and type, borehole and test pit locations and elevations, existing and new survey monuments.

2.8.3.3 Erosion and Sediment Control Drawings will contain existing topographic information, contours at appropriate intervals with spot elevations, calculations for sizing of erosion and sediment control facilities, design and layout of each facility, stormwater discharge connection and location, quality measurement point and details of erosion and sediment control facilities.

2.8.3.3(1) Site Coordination and Layout Drawing will contain:

2.8.3.3(1)(a) Horizontal and vertical control, the principal site elements to be constructed, survey monuments and/or nearby buildings or structures which may be used to show the relative location of the proposed structure of work, sufficient dimensions or coordinates that the exact location of proposed work is clearly identified, construction lay down area, relative locations of all below and above ground utilities (e.g., electrical, watermain, sanitary sewer, storm sewer, etc.), site removals;

2.8.3.3(1)(b) Demonstrated vehicle and pedestrian movements for all types of expected traffic to and from the Facility;

2.8.3.3(2) Grading Plan will contain the Building footprint and finished floor elevation, proposed grades with existing contours/grades provided in background in light font, drainage structures numbered, typical sections, dimensions and proposed site development features, including pavement/curb, sidewalk type, and street light locations;

2.8.3.3(3) Deep and Shallow Utilities plan and profile will contain horizontal location and vertical depths of new, existing, and temporary services; utilities; manholes; drainage structures; valves; roof leader tie in points; location of foundation drainage (if required); structure data table; pipe load and capacities per BCBC;

2.8.3.3(4) Site Servicing Plan will include phasing plan for watermain flushing, pressure testing and disinfecting the services to the new Facility. Plan to be submitted and reviewed by the AHJ for approval;

2.8.3.3(5) Storm Water Management Plan will contain catchment areas, existing storm sewer system, flow direction, calculations for pre-development and post-development flows, detention calculations, and best management practices; and

2.8.3.3(6) Offsite drawings will include all drawings and details required by the City of New Westminster to secure a Works and Services Agreement for the offsite works.

2.8.4 Structural Construction Documents

Percentage of Drawings Completed	30%	60%	95%	100%	As-Built
Drawing Content					
Title Sheet, General Notes	✔	✔	✔	✔	✔
Typical Details	✔	✔	✔	✔	✔
Slab, Column, and Beam Schedules	✔	✔	✔	✔	✔
Foundation Plans	✔	✔	✔	✔	✔
Floor and Roof Framing Plans	✔	✔	✔	✔	✔
Sections and Details	✔	✔	✔	✔	✔
Wall and Bracing Elevations	✔	✔	✔	✔	✔
Wall Sections	✔	✔	✔	✔	✔
Specifications					
Concrete (Division 03)	✔	✔	✔	✔	-
Masonry (Division 04)	✔	✔	✔	✔	-
Metals (Division 05)	✔	✔	✔	✔	-
Earthwork and Piling (Division 31)	✔	✔	✔	✔	-

2.8.4.1 Title Sheet, General Notes, will contain:

2.8.4.1(1) General description of the structure, its main components, gravity load resisting and lateral load resisting systems;

2.8.4.1(2) Codes and standards, with dates of issue, to which the design conforms;

2.8.4.1(3) Description of the lateral load resisting system will indicate values of Rd (ductility factor) and Ro (overstrength factor) used in the design;

2.8.4.1(4) Importance factors used in the design;

2.8.4.1(5) Design criteria indicating vertical design loads including dead and superimposed dead loads; occupancy live loads; snow loads (including drift); wind uplift loads; mechanical equipment loads; construction loads; Patient lift loads; special loading considerations;

2.8.4.1(6) Horizontal design loads indicated including seismic loads, wind loads, lateral earth pressures and hydrostatic pressures;

2.8.4.1(7) Loading plans showing area loads not covered by design criteria information such as planter and soil loads with an indication of maximum soil depth;

2.8.4.1(8) Geotechnical information used in the design including reference to geotechnical report, footing or pile bearing capacities, site classification and site coefficients;

2.8.4.1(9) Concrete mix requirements indicating application, exposure classification, minimum 28-day compressive strength, and maximum aggregate size; and

2.8.4.1(10) Concrete cover requirements, based on weather and soil exposure, fire resistance rating, or chloride penetration.

2.8.4.2 Schedules as required for items such as columns, beams, slabs, walls, foundations, baseplates, and embed plates.

2.8.4.3 Foundation plans, fully coordinated with other consultant's drawings, will contain:

2.8.4.3(1) Gridlines and gridline dimensions;

2.8.4.3(2) Foundation types, sizes and reinforcement, including strip footings, pad footings, rafts, piles and pile caps, soil anchors and grade beams. Foundations should be located relative to the supported structure. Indicatively show and detail steps in footings; indicate pile base and cut-off elevations. Indicate frost protection and adfreeze mitigation measures;

2.8.4.3(3) Interior slabs-on-grade including thickness, reinforcement, contraction joint requirements, and subgrade requirements including moisture barrier if required. Indicate step heights or top of slab elevations and ensure step conditions etc. are sufficiently detailed. Show pits for elevators and mechanical openings;

2.8.4.3(4) Concrete walls including thickness and reinforcement. Clearly indicate shear walls and, if detailed elsewhere, ensure adequate referencing. Ensure wall corners, openings, intersections control joints, and construction joints are sufficiently detailed. Provide full height wall sections as required;

2.8.4.3(5) Concrete columns, pedestals and pilasters including dimensions and reinforcement, including tie arrangement details;

2.8.4.3(6) Steel columns including size and base plate details; and

2.8.4.3(7) Load bearing masonry walls if applicable, including stud sizes and spacing, plywood sheathing thickness and nailing requirements, masonry unit dimensions, reinforcement and grouting. Provide sufficient details as required.

2.8.4.4 Floor and Roof Framing Plans, fully coordinated with other consultant's drawings, will contain:

2.8.4.4(1) Gridlines and gridline dimensions;

2.8.4.4(2) Concrete slabs including thickness, cambers and reinforcement. Show all openings coordinated with other consultants. Indicate step heights or relative elevations. Ensure step conditions, slab edge conditions, construction joints, delay strips, and such are sufficiently detailed;

2.8.4.4(3) Concrete walls including thickness and reinforcement. Clearly indicate shear walls and, if detailed elsewhere, ensure adequate referencing. Ensure wall corners, intersections, control and construction joints are sufficiently detailed. Provide full height wall sections as required;

2.8.4.4(4) Concrete columns, pedestals and pilasters including size and reinforcement, including tie and column rebar arrangement details. Ensure that columns starting, stopping and continuing are sufficiently detailed; ensure that offset column transitions are sufficiently detailed;

2.8.4.4(5) Concrete beams including dimensions and reinforcement. Elevate beams with complex reinforcement. Ensure beams are sufficiently detailed;

2.8.4.4(6) Detail concrete stairs, including throat thickness, reinforcement and sufficient details for cast in place stairs. For precast concrete stairs provide sufficient seating details;

2.8.4.4(7) Steel deck with or without concrete topping including thicknesses, deck type, connection to supporting structure, and shear transfer elements. Ensure sufficient deck edges, mechanical openings, ledger angles, framing around openings, and structural requirements for support of mechanical equipment are adequately detailed;

2.8.4.4(8) Steel beams, open web steel joists and steel trusses, including member sizes or depths, spacing, embed plates where connected to concrete and cambers. Ensure all design forces and moments are provided for use by connection designer, open web steel joist designer and truss designer. Ensure steel girts and ledgers between levels are clearly called up. Provide elevations for members between levels if required for clarity;

2.8.4.4(9) Steel columns including size, base plate, embed plate and cap plate details; and

2.8.4.4(10) Detail steel stairs, including stringer sizes and connection details.

2.8.4.5 Elevations, fully coordinated with other consultants' drawings, for the following items:

2.8.4.5(1) Concrete wall or shear wall elevations as required to convey information not detailed on plan including complex areas of reinforcement, openings, shear wall zones, headers and such;

2.8.4.5(2) Concrete beam elevations for beams with complex reinforcement;

2.8.4.5(3) Steel bracing elevations including member sizes, forces and sufficient information for connection designer; and

2.8.4.5(4) Any other elevations deemed necessary to convey sufficient structural information.

2.8.4.6 Sections and details will contain information for all structural conditions not dealt with completely on plans, elevations or schedules. Additional information includes, but is not limited to clarification of structural geometry, reinforcement, connection configurations and welding.

2.8.5 Mechanical Construction Documents

Percentage of drawings completed	30%	60%	95%	100%	As-Built
Drawing Content					

Legends, regulatory data, drawing list, key plans	✔	✔	✔	✔	✔
Fire suppression – plans, sections, details	✔	✔	✔	✔	✔
Plumbing – plans, sections, details	✔	✔	✔	✔	✔
Heating and Cooling (Hydraulic) – plans, sections, details	✔	✔	✔	✔	✔
HVAC – plans, sections, details	✔	✔	✔	✔	✔
Integrated Automation – plans, sections, details Schematics and schedules, air and water flow diagrams, equipment schedules, control schematics, sequence of operations, etc.	✔	✔	✔	✔	✔
Specifications					
General Requirements	✔	✔	✔	✔	-
Fire Suppression	✔	✔	✔	✔	-
Plumbing	✔	✔	✔	✔	-
Heating, Ventilating and Air Conditioning	✔	✔	✔	✔	-
HVAC Integrated Automation	✔	✔	✔	✔	-
Other					
Updated Energy Model and Report	✔	✔	✔	✔	-

2.8.5.1 Regulatory sheet – will contain (may be included on title sheet):

2.8.5.1(1) Design load assumptions and calculations.

2.8.5.2 Fire Suppression, plans, sections, details will contain:

2.8.5.2(1) Design calculations for water flow with water supply flow data, fire pump (if required), and smoke control;

2.8.5.2(2) Sprinkler zoning including indication of dry pipe and pre-action systems.

2.8.5.2(3) Provisions to accommodate security hazard classifications

2.8.5.2(4) Clearly indicated ceiling and slab elevations (geodetic) complete with level changes, bulkheads, beams, etc.;

2.8.5.2(5) The location of doors and windows, and other openings;

2.8.5.2(6) The location of “special fire hazard / load” conditions such as compact storage shelving, vaults, electronic data processing rooms, etc.;

2.8.5.2(7) The location of fixtures and equipment for washrooms, kitchens, conference rooms, equipment/mechanical/electrical/telecommunications rooms;

2.8.5.2(8) The designation (usually by room name and number) of interior spaces including sprinkler head type;

2.8.5.2(9) Graphic indication of fire separation(s), acoustic separation(s), security separation(s), etc.; and

2.8.5.2(10) Any specialist fire suppression elements required as part of an alternative solution.

2.8.5.3 Plumbing, plans, sections, details will contain:

2.8.5.3(1) Design calculations for water supply including pressure, hot water heating, sanitary waste sizing and roof drainage;

2.8.5.3(2) Riser diagrams with flows indicated for domestic hot and cold water lines, waste and vent lines; and

2.8.5.3(3) Plumbing fixture schedule.

2.8.5.4 Heating and Cooling (Hydronic), plans, sections, details will contain:

2.8.5.4(1) Design calculations for water supply including pressure, hot water heating, glycol solution and chilled water;

2.8.5.4(2) Riser diagrams with flows indicated for hot, steam and chilled water lines; and

2.8.5.4(3) Equipment schedule.

2.8.5.5 Heating, cooling and ventilation (HVAC) plans, sections, details will contain:

2.8.5.5(1) Design calculations for block loads for heating and refrigeration, system load and supply air calculations including minimum outside air to be admitted, system pressure static analysis at peak and minimum block loads, acoustical calculations, building heating, cooling and ventilation loads, flow and head calculations for pumping systems, sizing of fuel storage, distribution and vibration isolation;

2.8.5.5(2) HVAC piping layouts including valves complete with locations where temperature, pressure, flow, contaminant/combustion gases, vibration gauges and remote sensing is required;

2.8.5.5(3) HVAC duct layouts and true sizes (double line) including fire dampers and volume control dampers;

2.8.5.5(4) Layout of equipment rooms showing mechanical equipment including space for maintenance (filter replacement, valve adjustments, etc.) and removal / replacement of mechanical equipment (coils, heat exchangers, pumps, boilers, chiller tube bundles, etc.);

2.8.5.5(5) Roof plan with roof-mounted equipment and penthouses complete with indication of servicing and maintenance access;

2.8.5.5(6) HVAC outside air intake and exhaust air discharge including louver sizes and locations relative to each other, ensuring security and acoustic concerns have been taken into considerations;

2.8.5.5(7) HVAC riser diagram(s), schematic flow and riser diagrams including airflow and water flow quantities and balancing for heating and cooling equipment, flow energy measuring devices for water and air systems. Clear indication of penetrations through rated wall, floor and roof assemblies complete with details;

2.8.5.5(8) Automatic temperature control diagram(s) including control flow diagrams showing sensors, valves and controllers, sequence of operation of systems, diagram showing control signal interface with sequence of operation, locations and connections of energy metering devices for major equipment;

2.8.5.5(9) Equipment schedule including but not limited to chillers, boilers, pumps, air handling units, fans, terminal units, diffusers and grilles;

2.8.5.5(10) Clear indication of seismic restraints for HVAC systems and equipment;

2.8.5.5(11) Integrated automation plans, sections, details will contain:

2.8.5.5(11)(a) Design calculations.

2.8.5.5(11)(b) Integrated automation layout.

2.8.5.5(12) Schematic and schedules will contain:

2.8.5.5(12)(a) Clearly indicated type, flow, head, speed, class, BHP, electrical, etc.

2.8.5.5(12)(b) Schedules maybe graphical and/or tabular in drawing and/or specification format.

2.8.5.6 Energy Modeling:

2.8.5.6(1) Using ASHRAE 140 compliant software, as detailed in the BC Hydro New Construction Energy Modeling Guideline, demonstrate that the proposed Design meets the energy use provisions of this Schedule as detailed in Part 7.

2.8.5.6(2) Provide updated energy model report which will include the following information as a minimum:

2.8.5.6(2)(a) Executive Summary.

2.8.5.6(2)(b) Building information, including but not limited to the location, weather file used, total floor area, outdoor design temperatures and humidity.

2.8.5.6(2)(c) Building envelope inputs for both reference building and proposed building, including but not limited to roof assembly U-value, wall assembly U-value, fenestration overall U-value, window to wall ratio, shading coefficient, internal and external shading devices.

2.8.5.6(2)(d) Internal loads inputs per room for both reference building and proposed building, including but not limited to lighting power density, lighting control, plug loads, occupants.

2.8.5.6(2)(e) Indoor design conditions per room for both reference building and proposed building, including but not limited to occupancy schedules, indoor design temperatures, indoor design humidity levels, ventilation air.

2.8.5.6(2)(f) Mechanical systems for both reference building and proposed building, including but not limited to system description, fan control, fan power, outdoor air, exhaust air, heat recovery system, equipment efficiencies.

2.8.5.6(2)(g) Facility energy plant for both reference building and proposed building, including but not limited to heating type and efficiencies, cooling type and efficiencies, service water heating type and efficiencies.

2.8.5.6(2)(h) Utility rates for all types of fuel.

2.8.5.6(2)(i) Energy modelling results for both reference building and proposed building, including but not limited to energy

summary by end use, energy type, energy use and energy intensity, energy use savings and energy cost savings.

2.8.5.6(2)(j) List of recommended energy conservation measures, including but not limited to annual estimated savings, incremental capital costs, life expectancy, and life cycle cost analysis.

2.8.6 Electrical Construction Documents

Percentage drawing completion	30%	60%	95%	100%	As-Built
Drawing Content					
Legends, regulatory data, drawing list, key plans	✔	✔	✔	✔	✔
Site plans	✔	✔	✔	✔	✔
Power Single Line Diagram	✔	✔	✔	✔	✔
Power Riser Diagram	✔	✔	✔	✔	✔
Large Scale - Electrical room equipment layouts	✔	✔	✔	✔	✔
Large Scale - Electrical room 3-D equipment layouts including equipment dimensions.	-	✔	✔	✔	✔
Grounding Riser Diagram	✔	✔	✔	✔	✔
Grounding Details	-	-	✔	✔	✔
Lightning Protection Riser, Plans	✔	✔	✔	✔	✔
Lightning Protection Details	-	-	✔	✔	✔
Lighting Control Riser	✔	✔	✔	✔	✔
Lighting Control Details	-	-	✔	✔	✔
Clock System Riser	✔	✔	✔	✔	✔
Other Systems Risers	-	✔	✔	✔	✔
Fire Alarm and Voice Communication System Riser	✔	✔	✔	✔	✔
Lighting and Lighting Control:					
Plans	✔	✔	✔	✔	✔
Circuiting	-	✔	✔	✔	✔
Power:					
Plans	✔	✔	✔	✔	✔
Circuiting	-	✔	✔	✔	✔
Fire Alarm and Voice Communication Systems Plans	✔	✔	✔	✔	✔
Other Systems Plans	✔	✔	✔	✔	✔
Switchgear/switchboard/unit substation, elevations and schedules	-	✔	✔	✔	✔
Fire Alarm and Voice Communication Systems schedules	-	✔	✔	✔	✔
Site Service details	-	✔	✔	✔	✔
Miscellaneous details	-	-	✔	✔	✔
All other drawings	-	-	✔	✔	✔
Specifications					
Table of Contents: listing all sections	✔	✔	✔	✔	-
General Requirements	✔	✔	✔	✔	-

Electrical	✔	✔	✔	✔	-
Branch Circuit Panelboard Schedules	-	-	✔	✔	-
Luminaire Schedules	-	✔	✔	✔	-
Lighting Control Schedules	-	-	✔	✔	-
Communications (clock system and interval timers)	-	✔	✔	✔	-
Electronic Safety and Security	✔	✔	✔	✔	-
Other					
Total load calculations (utility electric service)	✔	✔	✔	✔	-
Total load calculations (generator power)	✔	✔	✔	✔	-
Load calculations (transformer loadings)	-	✔	✔	✔	-
Load calculations (generator loadings)	-	✔	✔	✔	-
Load calculations (UPS power)	-	✔	✔	✔	-
Power system ground grid calculations	-	✔	✔	✔	-
Voltage drop calculations	-	✔	✔	✔	-
Short circuit calculations	-	✔	✔	✔	-
Arc flash calculations	-	-	✔	✔	-
Co-ordination study	-	-	✔	✔	-
EMF study	-	-	✔	✔	-
Lighting calculations	-	✔	✔	✔	-
Lightning: grounding resistivity calculations	-	-	✔	✔	-
Cable tray calculations	-	-	✔	✔	-

2.8.6.1 Regulatory data – will contain design load assumptions and calculations to demonstrate code compliance.

2.8.6.2 Site plans will include:

2.8.6.2(1) Property limits,

2.8.6.2(2) Public roadways,

2.8.6.2(3) Driveways,

2.8.6.2(4) Parking lots,

2.8.6.2(5) Electric utility services,

2.8.6.2(6) Electrical site services,

2.8.6.2(7) Site lighting,

2.8.6.2(8) Exterior building lighting,

2.8.6.2(9) Parking control systems,

2.8.6.2(10) Maintenance hole locations with sump pump circuits as applicable,

2.8.6.2(11) Hand holes, pull pits,

2.8.6.2(12) Lightning protection ground grid.

2.8.6.3 Power Single Line Diagram will include:

2.8.6.3(1) The entire electrical system from the utility service to and including distribution panels, motor control centers, chillers, motors over 150 HP,

2.8.6.3(2) Ratings of transformers, generators, breakers, load break switches, fuses, transfer switches, switchgear, switchboards,

2.8.6.3(3) Plus ratings of grounding resistors, zig-zag grounding transformers, fuses, bus ducts, feeders, splitters, safety switches, panelboards, power factor correction units, etc., for 60%, 95% and 100% submissions,

2.8.6.3(4) Transformer and generator winding arrangements,

2.8.6.3(5) Calculated maximum fault levels, symmetrical and asymmetrical, and protective device interrupting ratings, symmetrical and asymmetrical, at each protective device location, for 60%, 95% and 100% submissions,

2.8.6.3(6) Calculated arc Flash hazard level at each protective device and switching device location, for 95% and 100% submissions,

2.8.6.3(7) Interlock schemes,

2.8.6.3(8) Potential and current transformers,

2.8.6.3(9) Protective and control relays on high voltage breakers including transfer switches,

2.8.6.3(10) Utility metering, for 60%, 95% and 100% submissions,

2.8.6.3(11) Metering, for 60%, 95% and 100% submissions,

2.8.6.3(12) Equipment names, following a consistent equipment naming methodology.

2.8.6.4 Power Riser Diagram will include:

2.8.6.4(1) The entire electrical system from the utility service to and including lighting/receptacle/lab panels, motor control centers, chillers, motors over 150 HP,

2.8.6.4(2) Equipment shown in elevation relative to their actual size,

2.8.6.4(3) Equipment shown on the floor level where they will be installed,

2.8.6.4(4) A two dimensional relative representation of where the equipment will be located,

2.8.6.4(5) Feeders to equipment,

2.8.6.4(6) A two dimensional representation of the routing of the feeders,

2.8.6.4(7) Equipment names, following a consistent equipment naming methodology.

2.8.6.5 Large Scale - Electrical Room Equipment Layouts will include:

2.8.6.5(1) All electrical rooms drawn to a scale of not less than 1:50,

2.8.6.5(2) All equipment in the room shown to scale,

2.8.6.5(3) Dimensions of equipment shown, for 60%, 95% and 100% submissions,

2.8.6.5(4) Widths of access aisles dimensioned, for 60%, 95% and 100% submissions,

2.8.6.5(5) Extent of drawout equipment indicated and dimensioned, for 60%, 95% and 100% submissions,

2.8.6.5(6) Equipment door swings indicated,

2.8.6.5(7) Room doors shown,

2.8.6.5(8) Room names and numbers,

2.8.6.5(9) Three dimensional drawing files provided, for 60%, 95% and 100% submissions.

2.8.6.6 Grounding Riser Diagram and Details will include:

2.8.6.6(1) The entire electrical grounding system from the ground grid to each electrical room, generator room, electrical closet, IT room etc.,

2.8.6.6(2) Ground rods, buried cables, ground buses, ground cables,

2.8.6.6(3) Equipment shown in elevation,

2.8.6.6(4) Equipment shown on the floor level where they will be installed,

2.8.6.6(5) A two dimensional relative representation of where the equipment will be located,

2.8.6.6(6) A two dimensional representation of the routing of the cables,

2.8.6.6(7) Ground bus names, following a consistent naming methodology, for 60%, 95% and 100% submissions,

2.8.6.6(8) Equipment sizing,

2.8.6.6(9) Details of ground bus design and mounting, for 95% and 100% submissions.

2.8.6.7 Lightning Protection Riser, Plans and Details will include:

2.8.6.7(1) The entire lightning protection system from the ground grid to the lightning rods and roof top equipment connected to the system,

2.8.6.7(2) Ground rods, buried cables, riser cables, horizontal cables,

2.8.6.7(3) Equipment shown in elevation,

2.8.6.7(4) Equipment shown on the floor level where they will be installed,

2.8.6.7(5) A two dimensional relative representation of where the equipment will be located,

2.8.6.7(6) A two dimensional representation of the routing of the riser cables,

2.8.6.7(7) Equipment sizing,

2.8.6.7(8) Details of:

2.8.6.7(9) Lightning rod parapet mounting,

2.8.6.7(10) Lightning rod roof mounting,

2.8.6.7(11) Roof penetrations,

2.8.6.7(12) Rod to cable connections,

2.8.6.7(13) Cable to cable connections,

2.8.6.7(14) Bonding straps for other equipment,

2.8.6.8 Lighting Control Riser and Details will include:

2.8.6.8(1) The entire lighting control system,

2.8.6.8(2) Equipment shown on the floor level where they will be installed,

2.8.6.8(3) A two dimensional relative representation of where the equipment will be located,

2.8.6.8(4) Wiring runs to equipment,

2.8.6.8(5) A two dimensional representation of the routing of the wiring runs,

2.8.6.8(6) Equipment names, following a consistent equipment naming methodology.

2.8.6.9 Clock System Riser will include:

2.8.6.9(1) The entire clock system,

2.8.6.9(2) Equipment shown on the floor level where they will be installed,

2.8.6.9(3) A two dimensional relative representation of where the equipment will be located,

2.8.6.9(4) Wiring runs to equipment,

2.8.6.9(5) Equipment names, following a consistent equipment naming methodology,

2.8.6.9(6) Details of integration with other systems.

2.8.6.10 Other Systems Riser will include:

2.8.6.10(1) The entire system,

2.8.6.10(2) Equipment shown on the floor level where they will be installed,

2.8.6.10(3) A two dimensional relative representation of where the equipment will be located,

2.8.6.10(4) Wiring runs to equipment,

2.8.6.10(5) A two dimensional representation of the routing of the wiring runs,

2.8.6.10(6) Equipment names, following a consistent equipment naming methodology.

2.8.6.11 Fire Alarm and Voice Communications System Riser Diagram will include:

2.8.6.11(1) The entire fire alarm and voice communication system,

2.8.6.11(2) Equipment shown on the floor level where they will be installed,

2.8.6.11(3) A two dimensional relative representation of where the equipment will be located,

2.8.6.11(4) Communication wiring between the head end and local panels, and between local panels,

2.8.6.11(5) A two dimensional representation of the routing of the wiring between the head end and the local panels and between the local panels,

2.8.6.11(6) Each detection loop out of a local panel, including every isolation module used in the loop,

2.8.6.11(7) Indication of each detection zone,

2.8.6.11(8) Indication of each monitoring zone,

2.8.6.11(9) Indication of each signal zone,

2.8.6.11(10) A typical representation of the detection, monitoring and control devices installed on each segment of a loop (i.e. between isolation modules),

2.8.6.11(11) Each signal circuit out of a local panel,

2.8.6.11(12) A typical representation of the signal devices installed on each signal circuit,

2.8.6.11(13) Interconnections with other systems,

2.8.6.11(14) Equipment names, following a consistent equipment naming methodology.

2.8.6.12 Lighting and Lighting Control Plans will include:

2.8.6.12(1) Reflected ceiling plans to scale showing all luminaires, including emergency lighting and exit signs, in their relative locations,

2.8.6.12(2) An indication of the luminaire types, corresponding to the luminaire schedules,

2.8.6.12(3) Circuiting of each luminaire,

2.8.6.12(4) Lighting control devices, in their relative locations,

2.8.6.12(5) Control panels, in their relative locations,

2.8.6.12(6) Lighting control zoning,

2.8.6.12(7) Lighting panelboards, in their relative locations,

2.8.6.12(8) Room names and numbers, doors and windows, corridor names.

2.8.6.13 Power Plans will include:

2.8.6.13(1) Floor plans to scale showing all;

2.8.6.13(1)(a) receptacles,

2.8.6.13(1)(b) outlets,

2.8.6.13(1)(c) safety switches,

2.8.6.13(1)(d) transfer switches,

2.8.6.13(1)(e) dry type transformers,

2.8.6.13(1)(f) feeders,

2.8.6.13(1)(g) splitters,

2.8.6.13(1)(h) distribution panels,

2.8.6.13(1)(i) lighting/receptacle/lab panels,

2.8.6.13(1)(j) switches controlling receptacles or outlets,

2.8.6.13(1)(k) timers,

2.8.6.13(1)(l) clocks,

2.8.6.13(1)(m) contactors,

2.8.6.13(1)(n) switchgear,

2.8.6.13(1)(o) switchboards,

2.8.6.13(1)(p) power factor correction units,

2.8.6.13(1)(q) transformers,

2.8.6.13(1)(r) generators,

2.8.6.13(1)(s) UPS equipment,

2.8.6.13(1)(t) motor control centers,

2.8.6.13(1)(u) chillers,

2.8.6.13(1)(v) motors over 150 HP,

2.8.6.13(1)(w) automatic door controls,

2.8.6.13(1)(x) control equipment (other than lighting control),

2.8.6.13(1)(y) etc., shown in their relative locations,

2.8.6.13(1)(z) An indication of the equipment types, corresponding to the Legend,

2.8.6.13(1)(aa) Circuiting of each item of equipment,

2.8.6.13(1)(bb) Room names and numbers, doors and windows, corridor names.

2.8.6.14 Fire Alarm and Voice Communications System Plans will include:

2.8.6.14(1) Reflected ceiling plans to scale showing all detection devices, signal devices, control devices, monitoring devices, isolation modules, in their relative locations,

2.8.6.14(2) An indication of the equipment types, corresponding to the Legend,

2.8.6.14(3) Annunciators, head end equipment, local panels, battery cabinets, paging stations, control centers, in their relative locations,

2.8.6.14(4) Identification of each zone boundary,

2.8.6.14(5) Circuiting of items requiring power, for 60%, 95% and 100% submissions,

2.8.6.14(6) Room names and numbers, doors and windows, corridor names,

2.8.6.14(7) Zone numbers,

2.8.6.14(8) Fire walls, fire separations.

2.8.6.15 Other Systems Plans will include:

2.8.6.15(1) Floor plans or reflected ceiling plans as required to show any equipment not shown on other plans.

2.8.6.16 Switchgear/switchboard/unit substation, elevations and schedules will include:

2.8.6.16(1) The elevation of each item of switchgear, each switchboard and each unit substation showing protective devices, switching devices, bus arrangements, protective relays, control relays, metering, labelling, surge protective devices,

2.8.6.16(2) Schedules identifying each protective device, switching device, transformer, bus, showing the ratings of these plus the settings of each protective device, including:

2.8.6.16(2)(a) Long time pickup,

2.8.6.16(2)(b) Long time delay,

2.8.6.16(2)(c) Short time pickup,

2.8.6.16(2)(d) Short time delay,

2.8.6.16(2)(e) Instantaneous (if required),

2.8.6.16(2)(f) Ground fault pickup,

2.8.6.16(2)(g) Ground fault delay,

2.8.6.16(2)(h) Etc, as applicable.

2.8.6.17 Fire Alarm and Voice Communications Systems Schedules will include:

2.8.6.17(1) All detection, monitoring and control zone designations,

2.8.6.17(2) All signal zone designations,

2.8.6.17(3) A description of the area or equipment involved,

2.8.6.17(4) An indication of the system operation related to that zone,

2.8.6.17(5) All paging zone designations,

2.8.6.17(6) A description of the area involved for each paging zone.

2.8.6.18 Site Service Details will include:

2.8.6.18(1) Maintenance holes and hand holes,

2.8.6.18(2) Cable racking inside maintenance holes,

2.8.6.18(3) Cable pulling provisions inside maintenance holes,

2.8.6.18(4) Built in ladders inside maintenance holes,

2.8.6.18(5) Means of draining maintenance holes including gravity drainage and sump pump systems,

2.8.6.18(6) High water alarms for maintenance holes,

2.8.6.18(7) Lighting and power provisions inside maintenance holes,

2.8.6.18(8) Cross sections of each duct bank,

2.8.6.18(9) Cross sections of any direct buried cables,

2.8.6.18(10) Bases for lighting standards,

2.8.6.18(11) Bases for bollards,

2.8.6.18(12) Bases for other equipment,

2.8.6.18(13) Snow melting details,

2.8.6.18(14) Roof and gutter deicing details.

2.8.6.19 Miscellaneous Details will include:

2.8.6.19(1) All details required for the full description of the project not included on other drawings.

2.8.6.20 All other drawings will include:

2.8.6.20(1) Drawings as required for the full description of the project not included on other drawings.

2.8.6.21 As Built Drawings will include:

2.8.6.21(1) Drawings included in the 100% submission plus any changes made and any drawings added up to the completion of construction,

2.8.6.21(2) Updating of each drawing to the final “as built” condition,

2.8.6.21(3) Final locations of duct banks, maintenance holes, hand holes, conduit, outlets, panels, branch wiring, system wiring, pull boxes, bus ducts, and equipment,

2.8.6.21(4) Dimensions from column lines or edge of roadways to the location of buried services,

2.8.6.21(5) Project surveyor’s information on the site services as-built drawings.

2.8.6.22 Electrical Specifications will include:

2.8.6.22(1) Sections in sufficient detail to unequivocally describe each material and each item of equipment to be used on the electrical scope of work for the project,

2.8.6.22(2) The method of installation, testing, commissioning and documenting for each material, item of equipment, and system that is part of the electrical scope of work for the project,

2.8.6.22(3) Identification of the codes and standards that the materials, equipment and systems will be provided in accordance with.

2.8.6.23 Branch Circuit Panelboard Schedules will include:

2.8.6.23(1) A separate schedule for each panelboard,

2.8.6.23(2) Panelboard ratings, voltage and ampacity,

2.8.6.23(3) Main breaker ratings (where applicable),

2.8.6.23(4) Maximum number of branch breaker poles that the panelboard can accommodate,

2.8.6.23(5) The rating and number of poles for each branch breaker,

2.8.6.23(6) The phase that each breaker pole is connected to,

2.8.6.23(7) The name of the load supplied by each branch breaker,

2.8.6.23(8) The anticipated circuit loading in Amperes,

2.8.6.23(9) Spare breakers,

2.8.6.23(10) Breaker spaces,

2.8.6.23(11) The interrupting rating of the circuit breakers,

2.8.6.23(12) Circuits equipped with breaker “lock-on” devices.

2.8.6.24 Lighting Control Schedules will include:

2.8.6.24(1) A separate schedule for each control panel,

2.8.6.24(2) Lighting control zone designations,

2.8.6.24(3) Circuits and sub-circuits controlled,

2.8.6.24(4) Designation of each control relay,

2.8.6.24(5) Rating of each control relay,

2.8.6.24(6) A description of the type of control,

2.8.6.24(7) A listing of “scenes” allocated to the zone,

2.8.6.24(8) Interfaces with other panels, head end equipment, other systems.

2.8.6.25 Communications Specifications Sections will include:

2.8.6.25(1) Sections in sufficient detail to unequivocally describe each material and each item of equipment to be used on the clock system and interval timers under the electrical scope of work for the project,

2.8.6.25(2) The method of installation, testing, commissioning and documenting for each material, item of equipment, and system that is part of the electrical scope of work for the project,

2.8.6.25(3) Identification of the codes and standards that the materials, equipment and systems will be provided in accordance with.

2.8.6.26 Electronic Safety and Security Specifications Sections will include:

2.8.6.26(1) Sections in sufficient detail to unequivocally describe each material and each item of equipment to be used on the fire alarm and voice communication system, fuel leakage detection systems and water detection systems, under the electrical scope of work for the project,

2.8.6.26(2) The method of installation, testing, commissioning and documenting for each material, item of equipment, and system that is part of the electrical scope of work for the project,

2.8.6.26(3) Identification of the codes and standards that the materials, equipment and systems will be provided in accordance with.

2.8.6.27 Calculations will be:

2.8.6.27(1) Published, hand written calculations will not be submitted,

2.8.6.27(2) Fully detailed to allow review of each step of the calculations,

2.8.6.27(3) With power demand and diversity factors identified,

2.8.6.27(4) With all assumptions clearly stated.

2.8.6.28 Total Load Calculations (utility electric service) will include:

2.8.6.28(1) Calculation of the annual peak demand load, in kW and kVA, expected for the Campus,

2.8.6.28(2) Calculation of the annual peak demand load, in kW and kVA, on each utility service under typical operating conditions, indicating the spare capacity on each service,

2.8.6.28(3) Calculation of the annual peak demand load, in kW and kVA, on each utility service with one utility service shutdown.

2.8.6.29 Total Load Calculations (generator power) will include:

2.8.6.29(1) Calculation of the annual peak demand load on the generating system, in kW and kVA, expected for the Campus,

2.8.6.29(2) Calculation of the annual peak demand load, in kW and kVA, on each generator under typical operating conditions, indicating the spare capacity on each generator,

2.8.6.29(3) Calculation of the annual peak demand load, in kW and kVA, on each generator with one generator out of service,

2.8.6.29(4) Calculation of the annual peak demand load, in kW and kVA, on each generator with one generator bus (i.e. two generators) out of service.

2.8.6.30 Load Calculations (transformer loadings) will include:

2.8.6.30(1) Calculation of the annual peak demand load, in kW and kVA, on each transformer under typical operating conditions,

2.8.6.30(2) Calculation of the annual peak demand load, in kW and kVA, on each transformer with one transformer out of service, the transformer out of service to be one that causes substation load to be transferred to the transformer for which the load calculation is being performed (i.e. it's twin),

2.8.6.30(3) Calculation of the anticipated future load growth on each transformer,

2.8.6.30(4) Calculation of the spare capacity provided for in each transformer.

2.8.6.31 Load Calculations (generator loadings) will include:

2.8.6.31(1) Calculation of the annual peak demand load, in kW and kVA, on each generator under typical operating conditions,

2.8.6.31(2) Calculation of the annual peak demand load, in kW and kVA, on each generator with one generator out of service, the generator out of service

to be one that causes load to be transferred to the generator for which the load calculation is being performed (i.e. it's twin),

2.8.6.31(3) Calculation of the anticipated future load growth on each generator,

2.8.6.31(4) Calculation of the spare capacity provided for in each generator.

2.8.6.32 Load Calculations (UPS power) will include:

2.8.6.32(1) Calculation of the annual peak demand load, in kW and kVA, on each UPS system under typical operating conditions,

2.8.6.32(2) Calculation of the anticipated future load growth on each UPS system,

2.8.6.32(3) Calculation of the spare capacity provided for in each UPS system,

2.8.6.32(4) Calculation of the battery support time of each UPS system, based on:

2.8.6.32(5) full load operation,

2.8.6.32(6) with the redundant system not available,

2.8.6.32(7) with the battery capacity derated to the actual ambient room temperature, and

2.8.6.32(8) with the batteries at "end of life".

2.8.6.33 Power System Ground Grid calculations will include:

2.8.6.33(1) Identification of soil resistivity based on site testing, two level resistivity if applicable,

2.8.6.33(2) Calculation of the GPR, step and touch potentials, in accordance with ANSI/IEEE #80.

2.8.6.34 Voltage Drop calculations will include:

2.8.6.34(1) Calculations of the steady state voltage drop from the utility service though to every power utilizing device,

2.8.6.34(2) Provided that 3% voltage drop is allowed for each branch circuit then the voltage drop calculations can end at the final lighting/receptacle/lab panelboard and MCC,

2.8.6.34(3) Calculations based on a load equal to 80% of the breaker or fuse rating protecting the circuit, unless the load is fixed and known (eg: a single motor) in which case the fixed known load can be used,

2.8.6.34(4) Calculations based on a power factor of 90% unless a different power factor is known to apply in which case the known power factor is to be used.

2.8.6.35 Short Circuit calculations will include:

2.8.6.35(1) Calculations of symmetrical and asymmetrical values of fault currents, based on the calculated X/R ratio of the system,

2.8.6.35(2) Calculations of the maximum three phase fault current, the maximum line to line fault current, the maximum line to ground fault current and the minimum line to ground fault current at every protective device and switching device in the electrical system, excluding local switches on branch circuits,

2.8.6.35(3) The maximum fault currents based on the utility supply in parallel with the generator supply, where closed transition transfer switches are used,

2.8.6.35(4) The utility ultimate design fault levels,

2.8.6.35(5) Motor contribution,

2.8.6.35(6) Actual transformer impedances, but until actual impedances are available, worst case (low) impedances.

2.8.6.36 Arc Flash calculations will include:

2.8.6.36(1) Calculations of the arc flash level at every protective device and every switching device in the system, excluding local switches on branch circuits.

2.8.6.37 Coordination Study will include:

2.8.6.37(1) Graphs of each portion of the electrical system on log-log paper showing:

2.8.6.37(1)(a) The operating characteristics of each protective device,

2.8.6.37(1)(b) Full load ratings of transformers,

2.8.6.37(1)(c) Full load ratings of individual generators and generators in parallel,

2.8.6.37(1)(d) The maximum and minimum fault level at each protective device and each switching device,

2.8.6.37(1)(e) Transformer inrush current,

2.8.6.37(1)(f) Motor starting current,

2.8.6.37(1)(g) Cable damage curves,

2.8.6.37(1)(h) Transformer damage curves,

2.8.6.37(1)(i) Full load ratings of generators,

2.8.6.37(1)(j) Generator damage curves,

2.8.6.37(1)(k) Generator decrement curves for individual generators and paralleled generators,

2.8.6.37(1)(l) Full load ratings of UPS systems,

2.8.6.37(1)(m) UPS system fault levels,

2.8.6.37(1)(n) UPS system maintenance bypass fault levels,

2.8.6.37(1)(o) A single line diagram of the portion of the system involved including the equipment names, ratings and settings,

2.8.6.37(2) No more than five time current curves of protective devices on each graph,

2.8.6.37(3) Graphs showing operation on utility power,

2.8.6.37(4) Graphs showing operation on generator power,

2.8.6.37(5) Graphs showing operation on UPS power,

2.8.6.37(6) A sufficient number of graphs to depict the entire electrical system including the utilities protective devices and the generators down to feeders to lighting/receptacle/lab panels, splitters, motor control centers, chillers, motors of 150 HP and larger,

2.8.6.37(7) Separate graphs for phase currents,

2.8.6.37(8) Separate graphs for ground currents,

2.8.6.37(9) Schedules showing each protective device that is equipped with an adjustable trip unit, showing the device frame size, CT ratios and the detailed settings of its trip unit,

2.8.6.37(10) Identification of areas where equipment protection is not adequate,

2.8.6.37(11) Identification of areas where full co-ordination is not achieved.

2.8.6.38 EMF study will include:

2.8.6.38(1) Computer modelling of the proposed Facility to identify the magnetic field intensity emanating from the electrical distribution equipment.

2.8.6.38(2) Mitigation measures that will be employed to reduce the magnetic field strength to within the required levels.

2.8.6.39 Lighting calculations will include:

2.8.6.39(1) Calculation of the average illumination in each area and room,

2.8.6.39(2) Calculation of the max to min ratio in each area and room,

2.8.6.39(3) Identification of the light loss factors and dirt depreciation factors used in the calculations, and the supporting justification for them,

2.8.6.39(4) Identification of the floor, wall and ceiling reflectance values used and the source of these values,

2.8.6.39(5) Dimensions of each space and the source of these values.

2.8.6.40 Lightning System Ground Grid calculations will include:

2.8.6.40(1) Identification of soil resistivity based on site testing,

2.8.6.40(2) Calculation of the grounding resistivity of the lightning protection system.

2.8.6.41 Cable Tray calculations will include:

2.8.6.41(1) Calculation of the free area within the cable tray,

2.8.6.41(2) Calculation of the maximum cable fill based on the cable sizes that will be installed,

2.8.6.41(3) Calculation of the spare capacity provided in the cable tray,

2.8.7 Electrical Shop Drawings

2.8.7.1 Submit shop drawings for the following:

2.8.7.1(1) Co-ordination drawings,

2.8.7.1(2) Detailed installation drawings,

2.8.7.1(3) Documents supporting LEED application,

2.8.7.1(4) Single line diagrams,

2.8.7.1(5) Fire alarm riser diagram,

2.8.7.1(6) Fire alarm zoning plans,

2.8.7.1(7) Nameplate wording,

2.8.7.1(8) Warning signs,

2.8.7.1(9) Labels,

2.8.7.1(10) Access doors,

2.8.7.1(11) Fire stopping:

- 2.8.7.1(11)(a) Technical data,
- 2.8.7.1(11)(b) ULC or cUL listing,

2.8.7.1(12) Water stopping: technical data,

2.8.7.1(13) Supports and bases,

2.8.7.1(14) Insert drawings,

2.8.7.1(15) Paint: technical data,

2.8.7.1(16) Plywood backboards: technical data,

2.8.7.1(17) High voltage cables,

2.8.7.1(18) High voltage cable terminators,

2.8.7.1(19) Bus ducts,

2.8.7.1(20) Plug-in busways,

2.8.7.1(21) Low voltage cables,

2.8.7.1(22) Grounding:

- 2.8.7.1(22)(a) System design,
- 2.8.7.1(22)(b) Materials,

2.8.7.1(23) Splitters and cabinets,

2.8.7.1(24) Junction boxes with L, W or H larger than 600,

2.8.7.1(25) Cable tray,

2.8.7.1(26) Wireways,

2.8.7.1(27) Duct banks:

- 2.8.7.1(27)(a) Design
- 2.8.7.1(27)(b) Materials
- 2.8.7.1(27)(c) Spacers

2.8.7.1(28) Vibration isolation and seismic restraint:

- 2.8.7.1(28)(a) Design,
- 2.8.7.1(28)(b) Materials,

2.8.7.1(29) Maintenance holes,

2.8.7.1(30) Hand holes,

2.8.7.1(31) Pull pits,

2.8.7.1(32) Pad mounted transformer bases,

2.8.7.1(33) Lighting control systems:

- 2.8.7.1(33)(a) System description,
- 2.8.7.1(33)(b) Schematic diagrams,
- 2.8.7.1(33)(c) Wiring diagrams,
- 2.8.7.1(33)(d) Components,
- 2.8.7.1(33)(e) Ratings,
- 2.8.7.1(33)(f) Operating schedules,

2.8.7.1(34) High voltage switchboards:

- 2.8.7.1(34)(a) Design,

2.8.7.1(34)(b) Ratings,

2.8.7.1(34)(c) Schematics,

2.8.7.1(34)(d) Three wire diagrams,

2.8.7.1(34)(e) Subassemblies (eg: circuit breakers, relays, metering units)

2.8.7.1(34)(f) Batteries,

2.8.7.1(34)(g) Battery calculations,

2.8.7.1(34)(h) Battery charger,

2.8.7.1(34)(i) Controls,

2.8.7.1(34)(j) Enclosures,

2.8.7.1(35) Pad mounted transformers:

2.8.7.1(35)(a) Design,

2.8.7.1(35)(b) Ratings,

2.8.7.1(35)(c) Schematics,

2.8.7.1(35)(d) CSA nameplates,

2.8.7.1(35)(e) Accessories,

2.8.7.1(35)(f) Enclosures,

2.8.7.1(36) Dry type transformers:

2.8.7.1(36)(a) Design,

2.8.7.1(36)(b) Ratings,

2.8.7.1(36)(c) Schematics,

2.8.7.1(36)(d) CSA nameplates,

2.8.7.1(36)(e) Accessories,

2.8.7.1(36)(f) Enclosures,

2.8.7.1(36)(g) High resistance grounding systems,

2.8.7.1(37) Low voltage switchboards:

2.8.7.1(37)(a) Design,

2.8.7.1(37)(b) Ratings,

2.8.7.1(37)(c) Schematics,

2.8.7.1(37)(d) Three wire diagrams,

2.8.7.1(37)(e) Subassemblies (eg: circuit breakers, trip units, metering units, grounding systems)

2.8.7.1(37)(f) Controls,

2.8.7.1(37)(g) Enclosures,

2.8.7.1(38) Panelboards:

2.8.7.1(38)(a) Design,

2.8.7.1(38)(b) Ratings,

2.8.7.1(38)(c) Breaker complement,

2.8.7.1(38)(d) Breaker ratings,

2.8.7.1(38)(e) Spares and spaces,

2.8.7.1(38)(f) Accessories,
(f).1 Enclosures,

2.8.7.1(39) Wiring devices,

2.8.7.1(40) Disconnect switches,

2.8.7.1(41) Patient service units:

2.8.7.1(41)(a) Design,

2.8.7.1(41)(b) Materials,

2.8.7.1(41)(c) Device complement,

2.8.7.1(41)(d) Devices,

2.8.7.1(41)(e) Spaces for future devices,

2.8.7.1(41)(f) Accessories,

2.8.7.1(41)(g) Enclosures,

2.8.7.1(41)(h) Wiring and piping,

2.8.7.1(42) Contactors,

2.8.7.1(43) Motor Starters,

2.8.7.1(44) Motor control centers:

2.8.7.1(44)(a) Design,

2.8.7.1(44)(b) Ratings,

2.8.7.1(44)(c) Schematics,

2.8.7.1(44)(d) Subassemblies (eg: starters, metering units, transformers, panelboards)

2.8.7.1(44)(e) Controls,

2.8.7.1(44)(f) Enclosures,

2.8.7.1(45) Harmonic filters:

2.8.7.1(45)(a) Design,

2.8.7.1(45)(b) Ratings,

2.8.7.1(45)(c) Schematics,

2.8.7.1(45)(d) Harmonic current mitigation performance,

2.8.7.1(45)(e) Enclosures,

2.8.7.1(46) Snow melting system:

2.8.7.1(46)(a) Components,

2.8.7.1(46)(b) Controller,

2.8.7.1(47) Roof and gutter deicing:

2.8.7.1(47)(a) Components,

2.8.7.1(47)(b) Controller,

2.8.7.1(48) Electric pipe heating:

2.8.7.1(48)(a) Components,

2.8.7.1(48)(b) Controller,

2.8.7.1(49) Electric space heating,

2.8.7.1(50) Diesel generators:

2.8.7.1(50)(a) Design,

2.8.7.1(50)(b) Ratings,

2.8.7.1(50)(c) Schematics,

2.8.7.1(50)(d) Three wire diagrams,

2.8.7.1(50)(e) Subassemblies (eg: engine, radiator, alternator, voltage regulators, governor, base, heaters, fuel pumps, fuel filters, fuel coolers, vibration isolators, controls, metering units, circuit breakers, silencers, starting battery, battery charger)

2.8.7.1(50)(f) Paralleling controls,

2.8.7.1(50)(g) Load Management Controls,

2.8.7.1(50)(h) Overall assembly,

2.8.7.1(51) UPS systems:

2.8.7.1(51)(a) Design,

2.8.7.1(51)(b) Ratings,

2.8.7.1(51)(c) Schematics,

2.8.7.1(51)(d) Single line diagrams,

2.8.7.1(51)(e) Equipment,

2.8.7.1(51)(f) Modules,

2.8.7.1(51)(g) Static bypass,

2.8.7.1(51)(h) Maintenance bypass,

2.8.7.1(51)(i) Metering,

2.8.7.1(51)(j) Batteries,

2.8.7.1(51)(k) Battery racks,

2.8.7.1(51)(l) Input and output transformers,

2.8.7.1(51)(m) Controls,

2.8.7.1(51)(n) Interlocks,

2.8.7.1(51)(o) Communications systems,

2.8.7.1(51)(p) Drip hoods,

2.8.7.1(51)(q) Enclosures,

2.8.7.1(52) Harmonic cancellation transformers:

2.8.7.1(52)(a) Design,

2.8.7.1(52)(b) Ratings,

2.8.7.1(52)(c) Schematics,

2.8.7.1(52)(d) Harmonic current mitigation performance,

2.8.7.1(52)(e) CSA nameplates,

2.8.7.1(52)(f) Accessories,

2.8.7.1(52)(g) Enclosures,

2.8.7.1(53) Power factor correction units:

2.8.7.1(53)(a) Design,

2.8.7.1(53)(b) Ratings,

2.8.7.1(53)(c) Schematics,

2.8.7.1(53)(d) Harmonic current mitigation performance,

2.8.7.1(53)(e) Subassemblies (eg: tanks, harmonic filters, automatic controller, metering),

2.8.7.1(53)(f) Accessories,

2.8.7.1(53)(g) Enclosures,

2.8.7.1(54) Transfer switches:

2.8.7.1(54)(a) Design,

2.8.7.1(54)(b) Ratings,

2.8.7.1(54)(c) Schematics,

2.8.7.1(54)(d) Three wire diagrams,

2.8.7.1(54)(e) Subassemblies (eg: circuit breakers, relays, metering units)

2.8.7.1(54)(f) Controls,

2.8.7.1(54)(g) Interlocks,

2.8.7.1(54)(h) Enclosures,

2.8.7.1(55) Lightning arrestors,

2.8.7.1(56) Lightning protection:

2.8.7.1(56)(a) System design,

2.8.7.1(56)(b) Materials,

2.8.7.1(56)(c) Components,

2.8.7.1(57) Surge protective devices:

2.8.7.1(57)(a) Design,

2.8.7.1(57)(b) Ratings,

2.8.7.1(57)(c) Schematics,

2.8.7.1(57)(d) Alarm contacts, meters and indicators,

2.8.7.1(57)(e) Enclosures,

2.8.7.1(58) Lighting:

2.8.7.1(58)(a) each type of luminaire,

2.8.7.1(58)(b) each type of illuminated sign,

2.8.7.1(59) Battery lighting equipment:

2.8.7.1(59)(a) Design,

2.8.7.1(59)(b) Illumination levels,

2.8.7.1(59)(c) Batteries,

2.8.7.1(59)(d) Battery capacity,

2.8.7.1(59)(e) Alarm contacts, and indicators,

2.8.7.1(59)(f) Lighting heads and remote heads,

2.8.7.1(59)(g) Enclosures,

2.8.7.1(60) Clock System:

2.8.7.1(60)(a) System design,

2.8.7.1(60)(b) Components,

2.8.7.1(60)(c) Accessories,

2.8.7.1(61) Interval timers,

2.8.7.1(62) Fire alarm system:

2.8.7.1(62)(a) System design,

2.8.7.1(62)(b) Riser diagram,

2.8.7.1(62)(c) Schematics,

2.8.7.1(62)(d) Components,

2.8.7.1(62)(e) Batteries,

2.8.7.1(62)(f) Battery calculations (support time),

2.8.7.1(62)(g) Power supply calculations,

2.8.7.1(62)(h) Amplifier calculations,

2.8.7.1(62)(i) Wiring,

2.8.7.1(62)(j) Zoning,

2.8.7.1(62)(k) Zone isolation,

2.8.7.1(62)(l) Enclosures,

2.8.7.1(62)(m) Accessories,

2.8.7.1(63) Fuel leakage detection,

2.8.7.1(64) Water leakage detection.

2.8.8 Electrical Samples and Mock-ups

2.8.8.1 Submit samples of the following:

2.8.8.1(1) Each luminaire type,

2.8.8.1(2) Each type of illuminated sign,

2.8.8.2 Prepare mock-ups of the following:

2.8.8.2(1) Each type of Patient service unit.

2.8.9 Electrical Studies

2.8.9.1 Submit documentation of the following studies:

2.8.9.1(1) RF study of the property,

2.8.9.1(2) Short circuit studies,

2.8.9.1(3) Protective device Co-ordination studies,

2.8.9.1(4) Arc flash studies.

2.8.10 Electrical Reports

2.8.10.1 Submit reports for the following:

2.8.10.1(1) Operating and Maintenance Manuals,

2.8.10.1(2) Training session records,

2.8.10.1(3) Panelboard loading test results,

2.8.10.1(4) Transformer loading test results,

2.8.10.1(5) Motor control centre loading test results,

2.8.10.1(6) Motor control centre performance testing,

2.8.10.1(7) Seismic restraints,

2.8.10.1(8) Testing of Patient care areas to CSA standard Z32,

2.8.10.1(9) Illumination level measurements,

2.8.10.1(10) Factory witness testing,

2.8.10.1(11) Site acceptance (pre-service) testing,

2.8.10.1(12) Ground resistance measurements,

2.8.10.1(13) Lightning protection grounding resistance,

2.8.10.1(14) UPS battery testing,

2.8.10.1(15) UPS performance testing,

2.8.10.1(16) Generator testing,

2.8.10.1(17) Transfer switch testing,

2.8.10.1(18) Transformer testing,

2.8.10.1(19) High voltage cable testing,

2.8.10.1(20) Switchgear/switchboard testing,

2.8.10.1(21) Distribution system dynamic performance verification,

2.8.10.1(22) EMF levels in sensitive areas,

2.8.10.1(23) Clock system signal coverage.

2.8.11 Electrical Certificates and Verifications

2.8.11.1 Submit the following certificates and verifications:

2.8.11.1(1) Manufacturers' letters verifying that the equipment has been installed in accordance with their instructions for the following:

2.8.11.1(1)(a) Fire stopping,

2.8.11.1(1)(b) Fire rated wiring,

2.8.11.1(1)(c) Lighting control systems,

2.8.11.1(1)(d) Clock system,

2.8.11.1(1)(e) Automatic transfer switches,

2.8.11.1(1)(f) Diesel generators,

2.8.11.1(1)(g) UPS systems,

2.8.11.1(1)(h) UPS batteries,

2.8.11.1(1)(i) Power factor correction units,

2.8.11.1(1)(j) Snow melting systems,

2.8.11.1(1)(k) Pipe heating systems,

2.8.11.1(1)(l) Roof and gutter deicing systems,

2.8.11.1(2) Wiring in Patient care areas (Z32),

2.8.11.1(3) Seismic certifications:

2.8.11.1(3)(a) Transformers,

2.8.11.1(3)(b) Diesel generators,

2.8.11.1(3)(c) Transfer switches,

2.8.11.1(3)(d) Switchgear/switchboards,

2.8.11.1(4) Seismic restraints,

2.8.11.1(5) Fire alarm system verification,

2.8.11.1(6) Radio licence for clock system,

2.8.11.1(7) Request for final review,

2.8.11.1(8) Equipment warranties.

2.8.12 Telecommunications Construction Documents

2.8.12.1 The term “Documents” refers to submittals, technical manuals, supporting materials, warranties and Design-Builder produced technical drawings, details and illustrations which are to be provided by the Design-Builder to the Authority pursuant to this Schedule of Requirements.

2.8.12.2 The term “Drawings” refers to the graphic and pictorial portion of the Contract Documents showing the design location and dimensions of the Services, generally including plans, elevations, sections, details, schedules and diagrams.

2.8.12.3 Telecommunications drawings shall be identified as “T” series (Telecommunications) drawings in the approved construction drawings, separated from “E” (Electrical) drawings. The T-series drawings at a minimum shall include:

Percentage of drawings completed	30%	60%	95%	100%	As-Built
Drawing Content					
Legends, drawing list, key plans	✔	✔	✔	✔	✔
Location, Site – plans, sections and details	✔	✔	✔	✔	✔
Floor Layouts	✔	✔	✔	✔	✔
Communications Room Layouts and	✔	✔	✔	✔	✔
Equipment Rack Layouts	✔	✔	✔	✔	✔
Communications Room Wall Layouts	✔	✔	✔	✔	✔
Telecommunications Bonding and	✔	✔	✔	✔	✔
Intra-Building Backbone Pathways	✔	✔	✔	✔	✔
Intra-Building Backbone Cabling Subsystem	✔	✔	✔	✔	✔
Public Address Plans, Sections and Details	✔	✔	✔	✔	✔
Audio Visual (Multimedia Room Layouts, Elevations and Reflected Ceiling Plans)	✔	✔	✔	✔	✔
Nurse Call Riser	✔	✔	✔	✔	✔
Nurse Call	✔	✔	✔	✔	✔
Nurse Call	✔	✔	✔	✔	✔
Specifications					
Communications (Division 27)	✔	✔	✔	✔	-

2.8.12.4 Construction Drawings

2.8.12.4(1) All drawings, specifications, submittals and construction documents will be produced and reviewed and stamped by the RCDD employed by the Design-Builder.

2.8.12.4(2) The Authority’s Construction Standard Drawings (C-STD) and details can be referenced in Appendix 1I(IIII) [HSSBC Communications Infrastructure Standards and Specifications].

2.8.12.4(3) The drawings will use industry standard symbols and legends. Refer to Appendix 1I(III) {HSSBC Communications Infrastructure Standards and Specifications] for Authority approved symbols.

2.8.12.4(4) Floor Layouts will indicate:

2.8.12.4(4)(a) The locations of all Communications Rooms and their associated serving zone boundaries

2.8.12.4(4)(b) All telecommunications outlets identifying types of cables, label details and number of cable drops per outlet.

2.8.12.4(4)(c) Locations, quantity and sizes of all low voltage conduits, raceways, cable tray, sleeves, junction boxes and pull boxes.

2.8.12.4(4)(d) Backbone cabling routes including the routes of the telecommunications grounding backbone.

2.8.12.4(5) Communications Room layouts will be provided in 2D and 3D.

2.8.12.4(5)(a) Layouts will be to scale providing detail plan views, reflected ceiling plans and elevations of all communications and low voltage components and equipment, racks and enclosures.

2.8.12.4(5)(b) Layout will include:

(b).1 Maintenance and operational clearances.

(b).2 Non-telecom related materials, equipment, devices and structures (all dimensions are to be included). This includes, but is not limited to electrical distribution (panels and receptacles) and lighting fixtures, locations and sizes of all pathways (sleeves, conduits, entrance ducts, cable tray), grounding busbar, backboards, mechanical ducting and equipment, fire detection and suppression systems and security, nurse call, BMS, overhead paging and audio visual/video conferencing equipment.

(b).3 High voltage gear situated adjacent to Communications Rooms with clearance elements of telecom items from all such objects.

2.8.12.4(6) Detailed elevation drawings of equipment layout in each floor or wall mounted equipment rack and cabinet in Communications Rooms. Elevation drawings will include vertical and horizontal wire managers, fiber and copper patch panels, hardware such as shelves and all active equipment regardless of the supplier.

2.8.12.4(7) Elevation drawings of all walls of each Communications Room, clearly showing the layout of all termination hardware, grounding & bonding components, horizontal pathway penetrations, and wall mounted equipment cabinets.

2.8.12.4(8) Telecommunications schematic drawings shall be provided for the following elements:

2.8.12.4(8)(a) Telecommunications Bonding and Grounding System.

2.8.12.4(8)(b) Intra-Building backbone pathway system including the Service Entrance Facilities identifying quantity and sizes of conduits, trays and sleeves.

2.8.12.4(8)(c) Intra-Building Backbone Cabling Subsystem identifying cross connect locations and type, size, sheath, gauge, length and strand or copper pair count of each cable installed.

2.8.12.4(9) Public Address plans, sections, details will contain:

2.8.12.4(9)(a) Reflected Ceiling Plans showing locations of all speakers.

2.8.12.4(9)(b) Complete point to point wiring details, schematic diagrams and other information required to demonstrate that the system has been properly designed and coordinated to meet the requirements of the Authority.

2.8.12.4(9)(c) Layouts of equipment and appurtenances and their relationship to other parts of the work including clearances for maintenance and operation.

2.8.12.4(10) Audio Visual

2.8.12.4(10)(a) Floor layouts of each multimedia room identifying quantities and types of cables, endpoint locations, pathways, floorbox locations.

2.8.12.4(10)(b) Elevation layouts of each multimedia room identifying locations of all power/data outlets, wall backing for equipment mounts, locations for display screens, control panels and switches, source connection patch panels, cameras, speakers and other AV components.

2.8.12.4(10)(c) Reflected ceiling plans of each multimedia room identifying location of ceiling mounted AV equipment including projectors, motorized screens, speakers, microphones and other ceiling devices including sprinkler heads, lighting fixtures, sensors, vents, grilles.

2.8.12.4(11) Nurse Call drawings will include:

2.8.12.4(11)(a) Floorplans showing zoning, and locations and types of all devices, panels and equipment to be installed as part of the Nurse Call System.

2.8.12.4(11)(b) Complete wiring details illustrating how each device will connect back to the main panels (including tie in to Fire Alarm System), and the cable type to be used for each connection.

2.8.12.4(11)(c) Network interface with other systems

2.8.12.5 Submittals

2.8.12.5(1) The purpose of shop drawing submittals is to demonstrate the Design-Builder's understanding of the design intent. This understanding is demonstrated by articulating which equipment and material is required, and by what methods of fabrication and installation shall be utilized.

2.8.12.5(2) Before installation of any cable, structured cabling component, pathway, firestop assembly or related material, equipment or hardware, the Design-builder will submit shop drawings and product data sheets for each component supplied to the Authority for review and approval.

2.8.12.5(3) Shop drawings and product data sheets shall indicate operating characteristics for each required item and design conditions.

2.8.12.5(4) Shop drawing and product data will include, but is not limited to the following:

2.8.12.5(4)(a) Copper Cabling

2.8.12.5(4)(b) Fiber Cabling

2.8.12.5(4)(c) Coaxial Cabling

2.8.12.5(4)(d) Fiber Connector Housings

2.8.12.5(4)(e) Faceplates

2.8.12.5(4)(f) Floorboxes

2.8.12.5(4)(g) Jacks/Inserts

2.8.12.5(4)(h) Patch Panels

2.8.12.5(4)(i) (AV) Source Connection Panels

2.8.12.5(4)(j) 110 Punch Block System (Gigabix)

2.8.12.5(4)(k) Fiber Connectors

2.8.12.5(4)(l) Equipment Racks, Cabinets and Enclosures

2.8.12.5(4)(m) Vertical and Horizontal Cable Management

2.8.12.5(4)(n) Cable Tray

2.8.12.5(4)(o) Firestop Details (Product and System Number)

2.8.12.5(4)(p) Telecommunications Bonding and Grounding System Materials

2.8.12.5(4)(q) UPS and ePDUs

2.8.12.5(4)(r) CATV/Broadband Distribution System Cable, Components and Connectors

2.8.12.5(4)(s) Overhead Paging System Cable, Equipment (paging amplifiers, speakers, power supplies and other support equipment) and Connectors

2.8.12.5(4)(t) Intercommunication Systems Cable, Components and Connectors

2.8.12.5(4)(u) Nurse Call System Devices, Components and Equipment

2.8.12.5(5) The submittals shall be reviewed for general compliance and not for dimensions, quantities, etc. The submittals that are returned shall be used for procurement. The responsibility of correct procurement remains solely with the Design-Builder. The submittal review shall not relieve the Design-Builder of responsibility for errors or omissions and deviations from the Contract requirements.

2.8.12.5(6) Equipment and material substitutions are prohibited. If the submittal shows variations from the requirements of the Contract Documents for

any reason, the Design-Builder shall provide written detail of each variation in the letter of transmittal.

2.8.12.5(7) Shop Drawings shall be submitted in an electronic format on USB Memory Key. The file format shall be Adobe portable data file (.pdf) or provide software to enable viewing of files of the other formats at no additional cost to the Authority.

2.8.12.6 As-Built Documentation

2.8.12.6(1) At a minimum, the as-built drawing package supplied by the Design-Builder will include all information detailed in Section 2.8.12.4.

2.8.12.6(2) The Design-Builder will provide Maintenance Manual at a minimum contain the following:

2.8.12.6(2)(a) Set of final reviewed Shop Drawings.

2.8.12.6(2)(b) A copy of all as-built drawings.

2.8.12.6(2)(c) Digital photos of all Communications Rooms showing each wall and rack elevations.

2.8.12.6(2)(d) Circuit Spreadsheets for horizontal cabling and fiber backbone. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

2.8.12.6(2)(e) Manufacturer Warranty documents for equipment and workmanship.

2.8.12.6(2)(f) Copper Warranty Certification test result printouts.

2.8.12.6(2)(g) Optical fiber power meter/light source test result printouts.

2.8.12.6(2)(h) Fire-stop design and records documentation as per Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

2.8.12.6(2)(i) Names, addresses, phone numbers and facsimile numbers of the Design-Builder, Design-Builder's RCDD, sub-contractors and suppliers used on the Work together with a specification reference of the portion of the Work they undertook.

2.8.12.6(3) In addition to the applicable requirements in this Agreement, the Design-Builder will submit the following:

2.8.12.6(3)(a) Full size set of As-Built drawings

2.8.12.6(3)(b) (3) USB Memory Keys of As-Built drawings.

2.8.12.6(3)(c) PDF (all files combined into a single document).

2.8.12.6(3)(d) Maintenance Manual in a hard back D-ring commercial binder.

2.8.12.6(3)(e) Maintenance Manual will be in a suitably labelled, hard back, D-Ring type commercial binders, each complete with an index and tabbed title sheets for each section. All binder pages will have self-adhesive reinforcing rings at each binder ring.

2.8.12.6(3)(f) All maintenance manual data will be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. Drawings will be printed on 11" x 17". Each manual will have a title sheet which is labelled "Operation & Maintenance Manual with an associated Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.

2.8.12.6(3)(g) Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Key.

2.8.13 Electronic Security Construction Documents

2.8.13.1 The term "Documents" refers to submittals, technical manuals, supporting materials, warranties and Design-Builder produced technical drawings, details and illustrations which are to be provided by the Design-Builder to the Authority pursuant to this Schedule of Requirements.

2.8.13.2 The term "Drawings" refers to the graphic and pictorial portion of the Contract Documents showing the design location and dimensions of the Services, generally including plans, elevations, sections, details, schedules and diagrams.

Percentage of drawings completed	30%	60%	95%	100%	As-Built
Drawing Content					
Legends, drawing list, key plans	✔	✔	✔	✔	✔
Location, Site – plans, sections and details	✔	✔	✔	✔	✔
Floor Layouts & Zoning	✔	✔	✔	✔	✔

Equipment Rack Layouts & Elevations	✔	✔	✔	✔	✔
Intra-Building Connections	✔	✔	✔	✔	✔
Specifications					
Electronic Security (Division 28)	✔	✔	✔	✔	-

2.8.13.3 Construction Drawings

2.8.13.3(1) The Authority's Construction Standard Drawings (C-STD) and details can be referenced in Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

2.8.13.3(2) The drawings will use industry standard symbols and legends. Refer to Appendix 1I(III) {HSSBC Communications Infrastructure Standards and Specifications] for Authority approved symbols.

2.8.13.3(3) Floor Layouts and Site Plans will indicate:

2.8.13.3(3)(a) Locations, quantity and types of all devices, components and equipment required for the Electronic Security Systems.

2.8.13.3(3)(b) Security zoning (interior and exterior).

2.8.13.3(3)(c) Locations, quantity and sizes of all low voltage conduits, raceways, cable tray, sleeves, junction boxes and pull boxes.

2.8.13.3(3)(d) Location of head-end equipment and storage.

2.8.13.3(4) Overall system riser wiring diagram identifying control units, circuits, terminations, terminal numbers, conductors and raceways.

2.8.13.3(5) Detailed elevation drawings of equipment installed in racks and cabinets. Elevation drawings will include vertical and horizontal wire managers, fiber and copper patch panels, hardware such as shelves and all active equipment regardless of the supplier.

2.8.13.3(6) Control layout, including interconnections between Electronic Security Systems as well as the Authority Network.

2.8.13.3(7) Typical electrified door hardware diagrams, indicating hardware devices, conduit, controllers, junction boxes and the responsibility of various trades to ensure operability.

2.8.13.3(8) Schematic drawings shall be provided for the following elements:

2.8.13.3(8)(a) Intra-Building connections to existing Electronic Security Systems identifying quantity and sizes of conduits, trays and sleeves.

2.8.13.4 Submittals

2.8.13.4(1) The purpose of shop drawing submittals is to demonstrate the Design-Builder's understanding of the design intent. This understanding is demonstrated by articulating which equipment and material is required, and by what methods of fabrication and installation shall be utilized.

2.8.13.4(2) Before installation of any device, cable, component, pathway, or related material, equipment or hardware, the Design-builder will submit shop drawings and product data sheets for each component supplied to the Authority for review and approval.

2.8.13.4(3) Shop drawings and product data sheets shall indicate operating characteristics for each required item and design conditions.

2.8.13.4(4) Shop drawing and product data will include, but is not limited to the following

2.8.13.4(4)(a) Access Controls
- (a).1 All devices and components
- (a).2 Door controllers
- (a).3 Field panels
- (a).4 Power Supplies
- (a).5 Interface to existing system

2.8.13.4(4)(b) Video Surveillance
- (b).1 All devices and components
- (b).2 Cameras
- (b).3 Power Supplies
- (b).4 Encoders
- (b).5 Monitors, keyboards and controllers
- (b).6 Storage
- (b).7 Interface to existing DVMS

2.8.13.4(4)(c) Intrusion Detection
- (c).1 All devices and components
- (c).2 Panels
- (c).3 Keypads
- (c).4 Interfaces to other systems

2.8.13.4(4)(d) Panic/Duress System

(d).1 All devices and components
(d).2 Pendants
(d).3 Transmitters/receivers/transceivers
(d).4 Fixed buttons & station
(d).5 Panels
(d).6 Interface to other systems

2.8.13.4(5) The submittals shall be reviewed for general compliance and not for dimensions, quantities, etc. The submittals that are returned shall be used for procurement. The responsibility of correct procurement remains solely with the Design-Builder. The submittal review shall not relieve the Design-Builder of responsibility for errors or omissions and deviations from the Contract requirements.

2.8.13.4(6) Equipment and material substitutions are prohibited. If the submittal shows variations from the requirements of the Contract Documents for any reason, the Design-Builder shall provide written detail of each variation in the letter of transmittal.

2.8.13.4(7) Shop Drawings shall be submitted in an electronic format on USB Memory Key. The file format shall be Adobe portable data file (.pdf) or provide software to enable viewing of files of the other formats at no additional cost to the Authority.

2.8.13.5 As-Built Documentation

2.8.13.5(1) At a minimum, the as-built drawing package supplied by the Design-Builder will include all information detailed in Section 2.8.13.4.

2.8.13.5(2) The Design-Builder will provide Maintenance Manual at a minimum contain the following:

2.8.13.5(2)(a) Set of final reviewed Shop Drawings.

2.8.13.5(2)(b) A copy of all as-built drawings.

2.8.13.5(2)(c) Digital photos of all Electronic Security System equipment installed in racks or cabinets.

2.8.13.5(2)(d) Manufacturer Warranty documents for equipment and workmanship.

2.8.13.5(2)(e) Testing and commissioning results.

2.8.13.5(2)(f) Fire-stop design and records documentation as per Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

2.8.13.5(2)(g) Names, addresses, phone numbers and facsimile numbers of the Design-Builder, sub-contractors and suppliers used on the Work together with a specification reference of the portion of the Work they undertook.

2.8.13.5(3) In addition to the applicable requirements in this Agreement, the Design-Builder will submit the following:

2.8.13.5(3)(a) Full size set of As-Built drawings

2.8.13.5(3)(b) (3) USB Memory Keys of As-Built drawings.

2.8.13.5(3)(c) PDF (all files combined into a single document).

2.8.13.5(3)(d) Maintenance Manual in a hard back D-ring commercial binder.

2.8.13.5(3)(e) Maintenance Manual will be in a suitably labelled, hard back, D-Ring type commercial binders, each complete with an index and tabbed title sheets for each section. All binder pages will have self-adhesive reinforcing rings at each binder ring.

2.8.13.5(3)(f) All maintenance manual data will be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. Drawings will be printed on 11" x 17". Each manual will have a title sheet which is labelled "Operation & Maintenance Manual with an associated Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.

2.8.13.5(3)(g) Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Key.

2.8.14 Landscape Construction Documents

Percentage of drawings completed	30%	60%	95%	100%	As-Built
Drawing Content					
Layout and Site Grading Plan	✔	✔	✔	✔	✔
Green roofs/Secured Outdoor Space Plan	✔	✔	✔	✔	✔
Irrigation Plan	-	✔	✔	✔	✔
Planting Plan	-	✔	✔	✔	✔
Landscape Details and Specifications	-	✔	✔	✔	✔

Sun/Shade Gardens	✔	✔	✔	✔	✔
Garden Enlargement Plans	-	✔	✔	✔	✔
Specifications					
General Requirements	✔	✔	✔	✔	-
Equipment	-	✔	✔	✔	-
Furnishings	-	✔	✔	✔	-
Planting*	-	✔	✔	✔	-
Landscape Establishment Maintenance	-	✔	✔	✔	-
Sample Board/Presentation					
Colour Boards Illustrating Planting Material	-	✔	✔	✔	-
Sample Boards	-	✔	✔	✔	-
Presentation to Patient	-	✔	✔	✔	-

* Planting specifications to include planting of trees, shrubs and groundcover, topsoil and finish grading, mulch, seeding, sodding.

2.8.14.1 The 30% submission will include scalable, digitally produced, colour rendered, form and character drawings which illustrate the following:

2.8.14.1(1) Outline of existing and proposed building(s) with existing trees or treed areas;

2.8.14.1(2) Parking layout and surface treatment;

2.8.14.1(3) Soft landscape treatment (trees, hedges, planting beds, vines, lawn etc.), including vegetation within public road right-of-way;

2.8.14.1(4) Tree retention, removal, and replacement Plan, showing preliminary civil site grading design

2.8.14.1(5) Landscape structures (fences, trellis, arbours, retaining walls, lighting etc.);

2.8.14.1(6) Location and size of amenity areas (if applicable);

2.8.14.1(7) Location and size of outdoor spaces;

2.8.14.1(8) Location of garbage enclosure;

2.8.14.1(9) A preliminary grading information sufficient to determine special treatment or provisions to retaining elements;

2.8.14.1(10) A sun/shade study for the Secure Outdoor Spaces;

2.8.14.1(11) Garden and deck enlargement plans; and

2.8.14.1(12) BCSLA landscape schedules of assurance will be supplied by a Landscape Architect registered in British Columbia.

2.8.14.2 The 60% drawing submittal will have resolved the layout and grading of the site, with:

2.8.14.2(1) 60% of the irrigation and planting Design complete. Standard details will be incorporated, with site specific details underway;

2.8.14.2(2) Water conservation and irrigation plan prepared by a qualified professional inclusive of a hydro zone plan, landscape water conservation irrigation report (landscape water budget) and an irrigation Design;

2.8.14.2(3) A preliminary plant list of trees, shrubs, perennials and ground covers including quantities, botanical and common names, planting sizes, and on center spacing;

2.8.14.2(4) Location and species of boulevard trees (if proposed); and preliminary construction drawings; and

2.8.14.2(5) Not used;

2.8.14.2(6) Location, material and height of garbage enclosure (detailed elevation drawings required).

2.8.14.3 The 95% drawing submittal will include completed layout and grading, irrigation and planting Design. All details will be completed. Submittal will incorporate Authority input received at previous submissions.

2.8.15 LEED Documentation

2.8.15.1 The 30% submission will include the LEED Letter Template, with The Team, Responsibility and Project Info tabs filled out. A separate project checklist scorecard will be submitted indicating all of the credits targeted to be achieved. This project checklist is to be updated and re-submitted at each following review stage.

2.8.15.2 The 100% submission will include a complete documentation package with the updated LEED Letter Template, and required documentation for all pre-design or detailed design credits being pursued.

2.8.15.3 Upon completion of the project, to the Authority satisfaction, the Design-Builder will submit an electronic copy of all LEED certification submissions, including the final LEED Letter Template fully updated and containing a final updated project checklist, and any supporting documentation.

2.8.16 Time Schedule

2.8.16.1 The Design-Builder will provide documentation in accordance with Appendix 1F [Time Schedules].

2.8.17 Fire Safety Plans

2.8.17.1 The Design-Builder will retain a professional fire safety consultant to provide Fire Safety Plans and all related documentation as required by the Authority Having Jurisdiction and coordinate in further consultation with the Authority to ensure such documentation meets all applicable Authority standards for Fire Safety Plans and related documentation.

2.9 Mock Up Rooms and Prototypes

2.9.1 The Design-Builder will, at its cost and as part of the user consultation and design review process described in Schedule 2 [Review Procedure], provide and make available to the Authority for review the “mock-ups” and “prototype” rooms described in this Section.

2.9.2 The Design-Builder will include dates on the Submittal Schedule for construction of and for Authority review of mock-ups. The time periods for Authority review and comments on Submittals set out in Schedule 2 [Review Procedure] will apply to mock-ups.

2.9.3 For Multimedia and Telecommunication room mock up requirements refer to Section 7.9

2.9.4 By the date set out in the Submittal Schedule, the Design-Builder will provide 1:1 scale mock-ups (using either paper, tape markings on the floor or similar) of the Energy Centre Control Room indicating the dimensions and sizing of the room and location and configuration of millwork, services, equipment and furniture. Millwork and equipment will be built either in cardboard or plywood. Furniture will be actual 1:1 pieces.

2.9.5 By the date set out in the Submittal Schedule, the Design-Builder will provide fully constructed mock-ups of the following rooms (at a location either within the Facility as it is under construction or at another location provided by Design-Builder near the Facility), including all actual materials, finishes, millwork, services, equipment and furniture included in the design of the room so that the Authority and the User Consultation Group can experience all features of the Design and make Design decisions:

2.9.5.1 Care Team Base;

2.9.5.2 Patient Bedroom and Ensuite.

2.9.5.3 Medication room;

2.9.5.4 Staff Conference room;

2.9.5.5 ECT Treatment room and Recovery room in the Neurostimulation Clinic; and

2.9.6 During construction, Design-Builder will construct an in-situ 'prototype' of the following rooms, and make the prototype available to the Authority at appropriate stages of construction so that the Authority and the User Consultation Group can review the prototype room (including all materials, services, millwork, finishes, equipment and furniture) in its actual location within the Facility at various stages of construction, and consider whether any design adjustments are necessary:

2.9.6.1 Care Team Base;

2.9.6.2 Patient Bedroom and Ensuite.

2.9.6.3 Medication room;

2.9.6.4 Staff Conference room; and

2.9.6.5 ECT Treatment room and Recovery room in the Neurostimulation Clinic

2.9.7 Equipment and furniture may be actual pieces or replicas, but must accurately represent the actual physical dimensions.

2.9.8 Design-Builder will modify the mock-ups as may be required as the Design develops based on feedback from the User Consultation Group and the Authority.

2.9.9 The purpose of the mock-up is to illustrate the Design. Design-Builder will update all Design documentation to reflect the mock-ups and prototypes, and any input from the Authority, including User Consultation Groups, and will submit all such updated Design documentation to the Authority for review under Schedule 2 [Review Procedure].

2.9.10 The Design-Builder will provide a site acceptable to the Authority for the mock-ups.

2.10 Indicative Design

2.10.1 The Authority's architectural and engineering consultants undertook an indicative design for the Facility (the "**Indicative Design**"). The Indicative Design was based on a preliminary draft of the Clinical Specifications and also reflects preliminary consultations with potential Facility Users. Drawings describing the Indicative Design have been made available to The Design-Builder. In addition, a "history and critique" of the Indicative Design has been made available to the Design-Builder for reference.

2.10.2 The Design-Builder may use the Indicative Design as a basis for its design, but the Authority makes no representation as to the accuracy or completeness of any aspect of the Indicative Design.

2.10.3 The Design-Builder will be completely responsible for all aspects of the Design and Construction whether or not it uses all or any part of the Indicative Design, and The Design-Builder will independently verify the accuracy of any information contained in or inferred from the Indicative Design if the Design-Builder uses any of such information in its design.

2.11 Requirements During Construction

2.11.1 Good Neighbour Policy

2.11.1.1 The Design-Builder will cooperate with the City and work with them to minimize disruption and impacts during construction of the Facility.

2.11.1.2 The Design-Builder will work with the Authority and the City to establish hours of work on the Site, especially during the daylight hours of summer months.

2.11.1.3 The Design-Builder will comply, in addition to the applicable requirements in this Schedule, with the City of New Westminster Good Neighbour Protocol.

2.11.2 Site Access During Construction

2.11.2.1 The Design-Builder will prepare a Site Plan showing clearly the concept of accessing all entries on the Site during Construction.

2.11.2.2 The Design-Builder will provide security and facilities as required to protect the Work from unauthorized entry, vandalism or theft.

2.11.3 Protection of Property

2.11.3.1 The Design-Builder will:

2.11.3.1(1) protect the Authority's property (and any third party's property) from damage caused by the Construction, including buildings, roadways, drainage systems, landscaping, surfaces, services and infrastructure; and

2.11.3.1(2) promptly repair any damage to property caused by the Design-Builder in undertaking the Construction, including any damage caused by site settlement or ground vibration.

2.11.3.2 The Design-Builder acknowledges that Construction-caused settlement of existing buildings and structures on the Existing Hospital and Construction-caused ground vibration may disrupt the operation of medical equipment (including laboratory and diagnostic imaging equipment in the adjacent buildings), requiring the equipment to be shut-down and re-calibrated, and may disrupt utility services to RCH. The Design-Builder will co-operate with the Authority and take all reasonable steps to avoid disrupting such equipment and services, including meeting with the

Authority's staff and equipment suppliers in advance of Construction to develop a Work Plan describing measures that the Design-Builder will take to minimize any potential disruption or interference, and implementing the Work Plan, all in accordance with this Schedule. The Design-Builder will monitor site settlement and ground vibration during Construction and take additional steps as may be required to avoid equipment or service disruptions as the Construction progresses. In addition to its obligations to promptly repair any damage to property as required by this Schedule, if any vibration exceeds the tolerances established and if medical equipment is disrupted as a result of Construction-caused settlement or ground vibration outside the established tolerances, The Design-Builder will, at its cost, arrange for the Authority's equipment suppliers to re-calibrate the equipment and return it to service as quickly as possible. The Design-Builder will not be responsible for recalibration as part of regular maintenance of equipment.

2.11.4 Survey and Monitoring

2.11.4.1 The Design-Builder will:

2.11.4.1(1) prior to start of any Construction, conduct pre-condition surveys of all RCH buildings, residential houses and properties, infrastructure, roadways (including all underground services and installations) within a radius required by the Authority and in a form and detail satisfactory to the Authority, acting reasonably, which will without limitation include field observations and photographs of existing conditions, with spot elevations by a British Columbia Land Surveyor (BCLS) registered surveyor at locations that will be accessible throughout and following construction for ongoing settlement monitoring, and deliver a copy of the pre-construction survey report to the Authority; and

2.11.4.1(2) conduct post-condition surveys of the spot elevations at regular intervals throughout the Construction Period to determine ongoing long-term settlement effects, and deliver monitoring surveys to the Authority in a form and detail satisfactory to the Authority, acting reasonably, including the post-condition survey conducted after Substantial Completion as indicated in Section 13 of the DBA.

2.11.4.2 The monitoring will include monitoring of all locations to be further identified by the Authority in the user consultation process described in Schedule 2 [Review Procedure] with limitations on settlement. The Design-Builder will appoint a registered British Columbia Land Surveyor to carry out the settlement monitoring.

2.11.5 Control of Vibration

2.11.5.1 The Design-Builder will discuss with the Authority any expected ground vibration from the Design-Builder's Construction activities in advance of those activities (as vibration may result in damage to Existing Hospital and residential buildings or affect Existing Hospital installations, infrastructure, operations, and function of sensitive medical equipment or the use and enjoyment of the Existing Hospital and residential buildings and properties), and without limiting the previous sentence the Design-Builder will:

2.11.5.1(1) carry out its Construction activities so that:

2.11.5.1(1)(a) To prevent cosmetic building damage, ground vibrations from the Design-Builder's Construction activities, including all demolition, ground improvement, and general construction activities, do not exceed 7.5 mm/s peak particle velocity when measured on any Existing Hospital building or neighbouring residential building at any time of day, and any day of the week;

2.11.5.1(1)(b) To avoid daytime disturbance/annoyance of Patients and staff within Existing Hospital buildings and of residents within neighbouring residential buildings, ground vibrations do not exceed 1.0 mm/sec peak particle velocity when measured on any Existing Hospital building or neighboring residential building between the hours of 8 am to 7 pm Monday through Friday, and between 8am and 5 pm on weekends;

2.11.5.1(1)(c) To avoid nighttime disturbance/annoyance of Patients within Existing Hospital buildings and residents within neighbouring residential buildings, ground vibrations do not exceed 0.3 mm/s peak particle velocity when measured on any Existing Hospital building or neighbouring residential building between 7 pm and 8 am, Monday through Friday, and between 8 am and 5 pm on weekends outside the hours outlined above or during certain times of the day and certain days of the week as determined by the Authority, acting reasonably; and

2.11.5.1(1)(d) Vibration transfer to Existing Hospital buildings does not adversely affect Existing Hospital operations, including in particular diagnostic operations and equipment in the adjacent buildings.

2.11.5.1(2) Complete a vibration monitoring program as follows:

2.11.5.1(2)(a) The Design-Builder will retain a qualified independent third-party vibration monitor to complete vibration monitoring during the Construction activities to confirm that the vibrations caused by the Construction activities do not exceed the limits specified in this Schedule.

2.11.5.1(2)(b) The Design-Builder will undertake preliminary vibration monitoring at the Site during the initial stages of all Construction activities that are expected to cause vibrations in order to determine magnitude and dissipation rate of the vibrations for each activity and provide a mitigation procedure to prevent exceeding the vibration limits specified in this Schedule. The Design-Builder will complete initial vibration related Construction activities at a significant distance away from other Existing Hospital buildings. The qualified independent third-party vibration monitor will provide the Authority and the Design-Builder with a report outlining the vibration results from each Construction activity. The Authority will review the preliminary vibration monitoring report and without relieving the Design-Builder of its responsibilities, may require the Design-Builder to comply with additional vibration monitoring requirements for each Construction activity prior to commencement of the Construction activity.

2.11.5.1(2)(c) The Design-Builder will install vibration monitoring stations on Existing Hospital buildings (and on adjacent residential buildings) when vibration generating construction work is taking place within 25 m of the buildings. The vibration monitoring stations will be installed at each existing building corner and at the “third points” along the length of the most directly exposed façade of the building – that is, four vibration monitoring locations per building. The Design-Builder will submit typical detail of monitoring stations for the Authority’s review prior to installation.

2.11.5.1(2)(d) The qualified independent third-party vibration monitor will conduct vibration monitoring during all Construction activity that occurs within 25 m of existing buildings, and as determined by the results of the preliminary vibration monitoring report. The qualified independent third-party vibration monitor is to immediately alert within 5 minutes

to the Authority (or designate) and the Design-Builder if vibrations exceed the limits specified in this Schedule. The Design-Builder will cease within 5 minutes the activity causing the vibration.

2.11.5.1(2)(e) The qualified independent third-party vibration monitor will provide the Authority and the Design-Builder with a report no later than the 5th day of each month detailing the results of the monitoring for the previous month.

2.11.6 Control of Noise

2.11.6.1 The Design-Builder will discuss with the Authority any expected noise from the Design-Builder's Construction activities in advance of those activities (as noise may affect Existing Hospital operations and Patient care). Without limiting the foregoing, the Design-Builder will:

2.11.6.1(1) prior to commencement of Construction activities, submit a noise control plan to the Authority. At a minimum, the plan will include the following:

2.11.6.1(1)(a) tentative schedule of activities likely to produce high sound levels (for the duration of the Construction);

2.11.6.1(1)(b) planned hours of work for activities expected to produce high noise levels;

2.11.6.1(1)(c) descriptions of planned specific noise abatement measures including enhanced hoarding adjacent to the Existing Hospital buildings;

2.11.6.1(1)(d) intended staging locations and routes to be used for minimization of noise disturbance; and

2.11.6.1(1)(e) the approach to selection of construction equipment to be on the Site;

2.11.6.1(2) on a weekly basis, provide a brief report to the Authority, including a graph of the logged hourly noise levels for the previous week (A-weighted Leq, L10, and L1) and a graph of the daily (24-hour long) A-weighted Leq, L10, and L1 since commencement of Construction;

2.11.6.1(3) include in the weekly report any updates to the noise control efforts and also a schedule of upcoming, noise and vibration producing activities;

2.11.6.1(4) carry out its Construction activities so that:

2.11.6.1(4)(a) sound level in the Operating Rooms and Labour and Delivery Rooms from the Design-Builder's Construction activities does not exceed 65dBA (Lmax) (except with prior written approval from the Authority);

2.11.6.1(4)(b) Between the hours of 7:00 p.m. and 8:00 a.m. Construction activities near the Inpatient Units and Labour and Delivery Rooms will not generate noise levels of more than 40dBA (Leq) as measured indoors in the relevant rooms of such Units;

2.11.6.1(4)(c) sound transfer to Existing Hospital buildings does not adversely affect Existing Hospital operations; and

2.11.6.1(5) complete a sound monitoring program for the Operating Rooms and Labour and Delivery Rooms as follows:

2.11.6.1(5)(a) The Design-Builder will complete sound monitoring during the Construction activities to confirm that the sound levels caused by the Construction activities do not exceed the limits specified in this Schedule within the Operating Rooms and Labour and Delivery Rooms;

2.11.6.1(5)(b) The Design-Builder will undertake preliminary sound monitoring at the Site during the initial stages of all Construction activities that are expected to cause noise in order to determine magnitude and dissipation rate of the noise for each activity and provide a mitigation procedure to prevent exceeding the sound limits specified in this Schedule. The sound level monitor will provide the Authority and the Design-Builder with a report outlining the noise results from Construction activity. The Authority will review the preliminary sound monitoring report and without relieving the Design-Builder of its responsibilities, may require the Design-Builder to comply with additional sound monitoring requirements for each Construction activity prior to commencement of the Construction activity;

2.11.6.1(5)(c) The Design-Builder will install a sound level monitoring station within the Operating Rooms and Labour and Delivery Rooms. The sound level monitoring station will be installed within the Operating Rooms and Labour and Delivery Rooms along the building wall closest to the

Construction area. The sound level meter will have the following minimum capabilities:

(c).1 logging of A-weighted Leq, L10, and L1 sound levels on an hourly basis; and

(c).2 remote access via computer to upload logged sound level data; and

2.11.6.1(5)(d) The sound level monitor will conduct sound monitoring during all Construction activity that affects the Operating Rooms and Labour and Delivery Rooms, and as determined by the results of the preliminary sound level monitoring report. The sound level monitor is to alert within 5 minutes to the Authority (or designate) and the Design-Builder if noise exceed the limits specified in this Schedule or the Design-Builder is otherwise not in compliance with this Schedule. The Design-Builder will cease within 5 minutes the activity causing the noise.

2.11.7 Infection Control and Control of Dust and Noxious Odours

2.11.7.1 The Design-Builder will:

2.11.7.1(1) take all reasonable steps (including any specific steps reasonably required by the Authority) to minimize dust and noxious odours (including diesel exhaust) from the Construction (including demolition and preparation of the Site) and to mitigate any adverse effects on the existing Hospital;

2.11.7.1(2) clean all adjacent buildings, roadways, pathways, and other areas directly affected by the Construction at regular intervals to the satisfaction of the Authority to prevent buildup of dirt and dust caused by the Construction and maintain them in the same condition as found and determined by the pre-condition surveys; and

2.11.7.1(3) without limiting the Design-Builder's obligation under the Section above:

2.11.7.1(3)(a) The Design-Builder will retain a qualified independent third-party Infection Control professional to complete Infection Control monitoring and compliance by the Design-Builder with CSA Z317.13 (Infection Control during Construction, Renovation or Maintenance of Health Care Facilities);

2.11.7.1(3)(b) comply with CSA Z317.13 (Infection Control during Construction, Renovation or Maintenance of Health Care Facilities); and

2.11.7.1(3)(c) monitor compliance with CSA Z317.13 and the Authority's Infection Prevention & Control Manual on a daily basis during the Construction (including demolition and preparation of the Site) and deliver to the Authority no later than the 5th day of each month, a performance report for the previous month that:

(c).1 describes the steps taken by the Design-Builder to comply with CSA Z317.13 and the Authority's Infection Prevention & Control Manual; and

(c).2 confirms that the Design-Builder complied with CSA Z317.13 and the Authority's Infection Prevention & Control Manual or identifies any failure by the Design-Builder to comply.

2.11.8 Waste Management-Hazardous and Non-Hazardous:

2.11.8.1 The Design-Builder will comply with territorial and municipal Standards with respect to waste management programs on construction sites.

2.11.8.2 The Design-Builder will manage waste generated from the Site in accordance with City standards.

2.11.8.3 Take an active role in implementing environmentally sound business practices and producing goods and services that lessen the burden on the environment in production, use and final disposition. Implement reduction, reuse and recycling strategies and the use of environmentally sound products.

2.11.8.4 For the removal and disposal of special waste and hazardous waste in the Existing Hospital, as applicable, the Design-Builder will only retain contractors pre-approved by the Authority. Removal and disposal of all other special waste and hazardous waste will be by trained personnel or a specialty contractor, as retained by the Design-Builder.

2.11.8.5 Designate an area or areas for location of bins and source separation of materials. Keep the area(s) clean and organized. If comingled bins are to be used, ensure that off-site sorting company will remain committed to a required waste diversion rate.

2.11.8.6 Store and dispose of hazardous waste materials in a manner which is in full accordance with all applicable federal and City Standards.

2.11.8.7 Implement waste reduction by reducing or eliminating excessive packaging practices.

2.11.8.8 Use, where appropriate, combination of packaging materials such as re-usable containers, blanket wrap or cushioning material provided that all reasonable requirements of materials handling, transportation and storage are observed.

2.11.9 Adjacent Facilities Interference

2.11.9.1 Construction work and related equipment or machinery will not interfere with normal operations of adjacent existing facilities, including the existing heliport.

2.11.10 Existing Heliport

2.11.10.1 The Authority is constructing a new temporary heliport on the roof of the Columbia Tower as the flight paths and drop zones to the existing heliport will interfere with the construction of the Building and Energy Centre.

2.11.10.2 The Authority expects that the new temporary heliport (which will not interfere with the construction of the Facility) will receive certification to become operational in June 30, 2017. Until the temporary heliport becomes operational, the Design-Builder must abide by the existing heliport flight paths and drop zones as illustrated on the following diagram.

2.11.10.3 Existing heliport flight path and drop zone


625 m
15% DIVERGENCE
APPROACH/TAKE-OFF PATH (SLOPE 12% TYP.)
74 deg
APPROACH/TAKE-OFF PATH (SLOPE 12% TYP.)
625 m
15% DIVERGENCE

2.11.10.4 The Design-Builder must ensure that there is no uncoordinated shutdown of the heliport up until the new temporary heliport becomes operational. The Design-Builder must develop a contingency plan within the Project Management Plan in the event that the certification of the new temporary heliport takes longer than envisioned for June 30, 2017. This contingency plan must consider:

2.11.10.5 The use of alternate crane types that would not interfere with the defined flight path and drop zone of the existing heliport;

2.11.10.6 A partial shutdown of the existing flight path contingent upon approval by the Authority and subject to the requirement that the heliport must remain operational at all time.

2.11.10.7 Coordination of equipment and cranes within the flightpath with, and to the satisfaction of the Authority so that equipment and cranes are moved out of the flight path before helicopters arrive at the heliport.

2.11.10.8 The Design Builder acknowledges it is their responsibility to abide by Transport Canada regulations regarding interference with the existing heliport's flight path and drop zone and both the Authority and the Design-Builder may be subject to fines if these regulations are not abided by. Transport Canada must be advised in advance of flight path shutdowns, equipment moving through the flight path, and all obstructions that do move through the flight path must be suitably marked and lit per Transport Canada requirements.

2.11.10.9 All communication with Transport Canada must flow through the Authority's Representative.

2.11.11 Systems Shut Downs and Interruptions

2.11.11.1 The Design-Builder will submit for review by the Authority, at the same time the Time Schedule is required, a schedule of all the required systems shut downs and interruptions.

2.11.11.2 During the construction of the Work the Design-Builder will also notify the Authority of all required systems shut downs and interruptions as follows:

2.11.11.2(1) Major impacts of systems shut downs and interruptions will be requested 60 calendar days in advance;

2.11.11.2(2) Medium impacts of systems shut downs and interruptions will be requested 30 calendar days in advance;

2.11.11.2(3) Minor impacts of systems shut downs and interruptions will be requested 14 calendar days in advance.

2.11.12 Phased Construction

2.11.12.1 Energy Centre

2.11.12.1(1) The Design-Builder will handover an operational Energy Centre to the Authority that services the existing Royal Columbian Hospital (RCH) campus and Campus Communications Hub (CCH) two (2) full months prior to the Substantial Completion of the Facility. This does not include handover of the Building, which will occur at Substantial Completion of the Facility. Details regarding the scope and requirements associated with the commissioning of the Energy Centre and connection to the existing RCH campus are contained in Schedule 1[Statement of Requirements].

2.11.12.1(2) The Design-Builder will ensure their Project Management Plan allows for a stabilization period for the Energy Centre. The duration of the stabilization period will be no less than one full month and will

commence prior to the Energy Centre being handed over to the Authority.

2.11.12.1(2)(a) The Design-Builder remains responsible, as set out in Section 6.2 of the Agreement, for all power necessary for the performance of the Work. If in other steps leading to the handover described in Sections 2.11.12.1(1) and 2.11.12.1(2), the Authority requires the Design-Builder to use power in excess to what is otherwise required for the performance of the Work, which may at some points in time include some or all energy provided to the existing campus load, the Authority will be responsible for the reasonably allocated cost of such excess energy.

2.11.12.1(3) Prior to the commencement of the stabilization period, the following general conditions will be met:

2.11.12.1(3)(a) mechanical and electrical plant and associated building systems required to service the existing Royal Columbian Hospital campus and CCH will be installed, commissioned and performing in accordance with the Authority's project requirements and specifications;

2.11.12.1(3)(b) Operations and Maintenance staff will be trained and equipped with required documentation to operate and maintain the completed Energy Centre in accordance with the Authority's project requirements and specifications; and

2.11.12.1(3)(c) all the Authority's wired and wireless Information Technology (IT) and communications infrastructure required to commission the Energy Centre and integrate it to the existing RCH campus as well as enable the Operations and Maintenance staff to operate the Energy Centre will be installed, commissioned and performing in accordance with the Authority's project requirements and specifications. The Authority will provide their related scope of work in a timely manner to align with this requirement.

2.11.12.1(4) The Design-Builder will not employ temporary workarounds, modifications, alterations, configurations or operating procedures in order to meet its obligation to provide an operational Energy Centre or to cutover the existing RCH campus to the Energy Centre within the timeline prescribed in Sections 2.11.12.1(1) and 2.11.12.1(2). This

clause does not restrict methods or procedures employed by the Design-Builder prior to the timeline prescribed in Sections 2.11.12.1(1) and 2.11.12.1(2).

2.11.12.1(5) The specific list of conditions required to provide an operational Energy Centre and successfully implement the cutover of the existing RCH campus are dependent on the specifics of the final plant design and require input from multiple stakeholders. The Design-Builder and the Authority will work collaboratively to define the specific list of conditions and develop the associated implementation plans and schedules by the completion of the Design Development process. Iterative plans, schedules and associated details will be provided to the Authority for review by the Design-Builder as part of each formal Design Development submittal issued during the Design Development process, starting at the preliminary design development submittal.

2.11.12.2 Campus Communications Hub (CCH) Early Access

2.11.12.2(1) Early Access to the CCH and its critical adjacencies (the Entrance Facility, Tech Room and UPS Room) enables the Authority to populate, activate, commission and integrate network hardware and infrastructure in the CCH.

2.11.12.2(2) Completion of the Authority's work in the CCH and its critical adjacencies is required to achieve the full operation of the Energy Center as defined in Section 2.11.12.1(1), integrate the new Facility into the existing RCH campus and provide the new capabilities and services required by the Building.

2.11.12.2(3) The CCH and its adjacencies must be sufficiently complete to allow the Authority to commence its work. At a minimum, this means the following items have to be completed by the Design-Builder at the time of Early Access:

2.11.12.2(3)(a) Campus Communications Hub
- (a).1 Interior Finishes
- (a).2 Fit-out
  - (a).2.1 Equipment Racks
  - (a).2.2 Server Cabinets
  - (a).2.3 ePDUs
  - (a).2.4 Iso Bases
  - (a).2.5 Heat Containment Pods
  - (a).2.6 Raceways
  - (a).2.7 Telecommunications Bonding and Grounding System

(a).2.8 DCIM Infrastructure – Environmental, Branch Circuit and Leak Detection infrastructure installed (DCIM system is not commissioned or active at the time of Early Access)

(a).3 Room clean to the standard specified in Appendix 1B(II) [Campus Communications Hub], Section 1.9.

(a).4 Data Cabling System (Refer to Appendix 1B(II) [Campus Communications Hub], Drawing T208) – Minimum Requirement:

(a).4.1 DAS Racks to Campus Fiber Racks (Core 1 – Rack 11.2) – 72F Singlemode

(a).4.2 DAS Racks to Campus Fiber Racks (Core 1 - Rack 11.4) – 72F Singlemode

(a).4.3 DAS Racks to Authority Rack in Entrance Facility Room – 24F Singlemode

(a).4.4 Campus Fiber Racks (Core 1) to Data Centre Racks (A side) – 24F Singlemode / 24F Multimode

(a).4.5 Campus Fiber Racks (Core 1) to Data Centre Racks (B side) – 24F Singlemode / 24F Multimode

(a).4.6 Campus Fiber Racks (Core 1) to Authority Rack in Entrance Facility Room – 48F Singlemode / 24F Multimode

(a).4.7 Data Centre Racks (A side) to Data Centre Racks (B side) - 96F Multimode

(a).4.8 A minimum of four server cabinets in POD A have to be wired to both Data Centre Racks (A & B side) with 24F Multimode

(a).4.9 Horizontal Category 6A wiring to telecommunications outlets within the room.

(a).4.10 Category 3 wiring between the CCH Gigabix Wall and Rack 9.6 and 11.3.

(a).5 Lighting

(a).6 UPS Power + Distribution - Back-up generation will not be available at the time that Early Access is granted.

(a).7 Convenience (Generator Protected) Power – Outlets will be on normal power as back-up generation will not be available at the time that Early Access is granted.

(a).8 Surge Protection

(a).9 Heating and Cooling

(a).9.1 Ducting complete.

(a).9.2 HVAC - Indirect Evaporative Cooling Units installed, all duct connections complete and cleaned. These units will be commissioned and operational by month two of FHA occupancy.

(a).9.3 Heating/cooling (Make-up air and Electric Reheat coils) will be functional via temporary units during month one of early occupancy

(a).9.4 Until the permanent cooling solution is operational, the Design-Builder will provide temporary cooling capable of handling the heat load of the CCH with a standard of air filtration equal to the IEC units.

(a).10 Life Safety

(a).10.1 Fire Protection - via Sapphire system if this option is selected, would require temp annunciation connectivity. If a double interlock pre-action system is utilized, the Design-Builder will install the piping and test the system (wet and air) prior to Early Access. However, the system would not be operational at the time of Early Access.

(a).10.2 At the time of Early Access, Fire Detection will be achieved by the Design-Builder through implementation of a 24hr Fire Watch.

(a).10.3 Fire Extinguishers will be installed.

(a).11 Security – At the time of Early Access, the Design-Builder will provide physical security until such time that requisite Security Systems are complete and operational.

2.11.12.2(3)(b) Entrance Facility Room

(b).1 Interior Finishes

(b).2 Fit-out

(b).2.1 Raceways

(b).2.2 Telecommunications Bonding and Grounding System

(b).3 Room clean to standard specified in Appendix 1B(II) [Campus Communications Hub], Section 1.9.

(b).4 Horizontal CAT6a wiring to telecommunications outlets within the room.

(b).5 Lighting

(b).6 Generator Protected Power Panel + Distribution – This panel and associated distribution will be energized on normal power as back-up generation will not be available at the time that Early Access is granted.

(b).7 Convenience (Generator Protected) Power – Outlets will be on normal power as back-up generation will not be available at the time that Early Access is granted.

(b).8 Heating and Cooling

(b).8.1 Ducting complete.

(b).8.2 HVAC – Ducted split AC units will be installed and connected. These units will be commissioned and operational by month two of FHA occupancy.

(b).8.3 Heating/cooling (Make-up air and Electric Reheat coils) will be functional via temporary units during month one of early occupancy

(b).8.4 Until the permanent cooling solution is operational, the Design-Builder will provide temporary cooling capable of handling the heat load of the CCH with a standard of air filtration equal to the IEC units.

(b).9 Life Safety

(b).9.1 Fire Protection – The Design-Builder will test the double interlock pre-action system (wet and air) prior to Early Access.

(b).9.2 At the time of Early Access, Fire Detection will be achieved by the Design-Builder through implementation of a 24hr Fire Watch.

(b).10 Security – At the time of Early Access, the Design-Builder will provide physical security until such time that requisite Security Systems are complete and operational.

2.11.12.2(3)(c) Tech Room

(c).1 Interior Finishes

(c).2 Fit-out

(c).2.1 Furniture

(c).2.2 Storage cage and shelving

(c).3 Horizontal CAT6a wiring to telecommunications outlets within the room.

(c).4 Lighting

(c).5 Convenience (Generator Protected) Power – Outlets will be on normal power as back-up generation will not be available at the time that Early Access is granted.

(c).6 Heating and Cooling

(c).6.1 Heating/cooling (Make-up air and Electric Reheat coils) will be functional via temporary units during month one of early occupancy

(c).6.2 Until the permanent cooling solution is operational, the Design-Builder will provide temporary cooling capable of handling the heat load of the CCH with a standard of air filtration equal to the IEC units.

(c).7 Life Safety

(c).7.1 Fire Protection – The Design-Builder will test the double interlock pre-action system (wet and air) prior to Early Access.

(c).7.2 At the time of Early Access, Fire Detection will be achieved by the Design-Builder through implementation of a 24hr Fire Watch.

(c).8 Security – At the time of Early Access, the Design-Builder will provide physical security until such time that requisite Security Systems are complete and operational.

2.11.12.2(4) The Design-Builder will meet the conditions of Early Access to the CCH and its critical adjacencies as defined in Section 2.11.12.2(3) four (4) full months prior to the earliest of any one of the following events in the Project Management Plan:

2.11.12.2(4)(a) The commencement of any form of system commissioning where the Authority's or its service providers' networks are required to commission a system, remotely access a system or validate the interaction between systems within the new Facility or between the existing RCH campus and the new Facility.

2.11.12.2(4)(b) Any requirement to provide wired or wireless network connectivity or communications for purposes other than

system commissioning within the new Facility or between the existing RCH campus and the new Facility.

2.11.12.2(5) The CCH and its critical adjacencies will be considered in production at the same time the Energy Center is operational and servicing the existing RCH campus. Prior to the cutover of the existing RCH campus to the Energy Centre, any work (installation and commissioning) remaining incomplete in the CCH and its critical adjacencies after Early Access is granted to the Authority will be finished by the Design-Builder so that these rooms can be operated and maintained according to the Authority's project requirements, specifications and operational needs as defined in Schedule 1 [Statement of Requirements] and its Appendices.

2.11.12.2(6) If any physical work, commissioning or testing conducted by the Design-Builder in the CCH and its critical adjacencies places the Authority's or its service provider's network equipment, cabling or related infrastructure at risk then the Design-Builder will implement the necessary measures to protect these assets from damage or contamination. The measures implemented by the Design-Builder must meet the approval of the Authority.

2.11.12.2(7) The Authority will be flexible and reasonable in working with the Design-Builder to permit those outages that are necessary to complete the project up until the CCH and its critical adjacencies are considered in production as long as the frequency and duration of the outages do not materially impact the Authority's ability to meet its project's commitments. After the CCH and its critical adjacencies are in production, outages will need to be scheduled in accordance with the Authority's standard operational procedures and policies. When the CCH and its critical adjacencies are ready for the Authority and its service providers to commence installation of outside plant fiber and copper cables and network equipment, the Design-Builder shall provide the Authority and its contractors and service providers with access to the construction site and elevators to move equipment into the Facility as required. The Authority and its contractors and service providers shall wear Personal Protective Equipment while on the construction site and complete site safety training and orientation before accessing the site as required by the Design-Builder.

2.11.12.3 Campus Perimeter Pathway System (CPPS)

2.11.12.3(1) The CPPS will be completed a year in advance of the Substantial Completion of the Facility. This completion timeframe is needed to provide sufficient time for the Authority and other third parties to install

and commission the outside plant fiber and copper facilities that will connect the CCH to the rest of the RCH campus and to the Authority's regional healthcare network.

2.12 Move In

2.12.1 As the construction phase nears completion, the Design-Builder will coordinate with the Authority the date for the move of staff personnel and Patients to the Building. The exact timing and sequencing of this phase will involve coordination with the Authority.

2.12.2 The Design-Builder is required to schedule the move in date and agree to this with the Authority at least three months in advance of any move.

2.12.3 As applicable, the Design-Builder will also assist with the planning and coordination of the move of all other equipment, furniture, fixtures and fittings with the Authority's moving company, participating in move planning meetings, keeping the Authority appraised of construction progress and setting firm dates for when the move can occur, relative to the completion of the Facility and Work;

2.12.4 The new Facility will have reached Substantial Completion prior to the move. Once the completion dates have been agreed and put in place, the Authority will rely on this information in order to plan and execute the move;

2.12.5 The Design-Builder is responsible for all damages to furniture, equipment and building finishes incurred during the move of any items moved by the Design-Builder.

2.13 Wayfinding and Signage Requirements

2.13.1 The Design-Builder will design the wayfinding system and signage to be fully integrated with the design of the Facility and to be site specific. Refer to Appendix 1R [Wayfinding and Signage] for Authority requirements.

2.13.2 The Design-Builder will coordinate in consultation with the Authority to determine any additional wayfinding standards and wayfinding language that the Design-Builder will have to follow.

2.13.3 In addition to the provisions in Appendix 1R [Wayfinding and Signage], the Design-Builder will:

2.13.3.1 locate major destinations, such as department entrances, directly off of entry spaces and/or along primary circulation paths for easy access, make waiting areas as open as possible to circulation routes without requiring wayfinders to pass through waiting areas;

2.13.3.2 provide significant recognizable, easily named and identified elements in key and easily found locations that will become 'meeting points' for Patients and visitors; and

2.13.3.3 design public elevator and stair lobbies and public circulation routes to be distinct from service routes and other non-public routes.

2.13.4 The Design-Builder will provide all signage required for the Facility including, but not limited to:

2.13.4.1 elevator floor directories at all elevator lobbies. They will include floor level listing of departments;

2.13.4.2 administrative space signage with a pocket to insert specific information such as name of occupant. Room signage for utility rooms will be designed to be less evident than general room signage. Blade signs may be used to identify vending areas and waiting areas;

2.13.4.3 small door tags for all door frames;

2.13.4.4 Patient areas of the Building, Patient room signage with a pocket to insert information, and Patient care department directories; and

2.13.4.5 overhead directional signage, which must either be suspended from a ceiling or bulkhead or be mounted directly over doors. No directional signage will be incorporated into flooring.

Part 3. DESIGN GUIDELINES AND PRINCIPLES

3.1 Project Design Principles and Objectives

3.1.1 The Design-Builder will apply the design principles described in this Part 3, the guiding principles as set out in the Clinical Specifications (collectively, the "**Project Design Principles**"), and Appendix 1L [RCH Campus Design Standards] in undertaking the Design.

3.1.2 In addition to the descriptions of these principles in this Part 3, specific requirements related to these principles are included in Parts 4 – 8 of this Schedule.

3.1.3 The Project Design Principles are integrated principles and the Design-Builder will apply them on an integrated basis throughout the Design and Construction.

3.2 Evidence Based Design

3.2.1 The Design-Builder will apply Evidence Based Design methodologies in undertaking the Design.

3.2.2 "**Evidence Based Design**" means that decisions about the design of the Facility will be based on credible research, information derived from comparable projects, and information about Authority operations, in order to achieve the best possible outcomes. The goal of Evidence Based Design is to deliver measurable improvements (for example in the Authority's Patient and workflow outcomes, productivity, economic performance, and customer satisfaction).

3.3 Lean Design

3.3.1 The Design-Builder will design the Facility:

3.3.1.1 to facilitate the delivery of efficient and effective workflow and processes;

3.3.1.2 to eliminate waste, within both clinical and non-clinical service delivery processes;

3.3.1.3 to recognize the value to the Authority of Lean healthcare (or equivalent methodologies) in supporting the delivery of Authority activities, and accordingly allow the findings from such methodologies to play a key role in influencing design decisions;

3.3.1.4 to include safe and efficient design features throughout all spaces that specifically facilitate the physical activities of staff and Patients, including, for example, appropriate millwork, lighting, Patient lift devices, and Patient assist or equipment manoeuvring space; and

3.3.1.5 to support innovative and collaborative methods of working, to help incorporate the Authority's new and emerging technologies, to respond to diverse work styles (such as hoteling and job-sharing), and to optimize flexibility and space utilization. A key element to the development of an integrated workplace is the provision of physical environments that support varied workplace strategies. Accordingly, the Design-Builder will design workplaces to:

3.3.1.5(1) include standardized spaces, systems furniture and casework where appropriate;

3.3.1.5(2) provide floor lay-outs that accommodate teams as well as individuals, and that support mobile employees who require flexibility and use portable technology; and

3.3.1.5(3) include co-location options, space saving strategies, and lay-outs and furniture that facilitate change.

3.4 Healing Environment

3.4.1 The Design-Builder will design the Facility:

3.4.1.1 to promote a safe, healing and wellness environment for Patients and their families. The environment will be welcoming for the community of users and provide non-clinical spaces to relax and de-stress;

3.4.1.2 to promote and enhance Patient Centred Care. "**Patient Centred Care**" is a standard of care that emphasizes the individual needs of each Patient and treats them with respect and dignity, enabling them to participate integrally in their own care process within an environment that recognizes and respects the essential role of the Patient's family or supporters;

3.4.1.3 to provide an environment that supports excellence and innovation in the delivery of safe, high quality healthcare and where employees, physicians and others will be working together collaboratively in promoting health and wellness;

3.4.1.4 to include elements that have been proven to create a therapeutic and low stress environment;

3.4.1.5 to create a comfortable, functional environment for employees, physicians, Patients, Patients' families and others, by including, as tools for creating an environment that will support Patients of all ages and their families:

3.4.1.5(1) design elements that minimize noise, maximize natural light while providing light control, and use natural materials, colours and lighting colour ranges that are therapeutic;

3.4.1.5(2) design elements that maximize connection to the outdoors, views of the exterior environment in all Patient Bedrooms, meeting rooms, Staff Lounges, Consultation/Therapy Rooms, and similar locations;

3.4.1.5(3) design elements that allow for maximum family interaction;

3.4.1.5(4) design features such as sound and music, color, pattern, air quality, nature;

3.4.1.6 to provide access to views to create a visually pleasing environment, including:

3.4.1.6(1) maintaining existing views and encouraging new views where possible through the use of view corridors, the terracing of building forms and the creation of appropriate public spaces;

3.4.1.6(2) situating the Building to utilize "near views" of public spaces, natural and landscaped areas on-Site and off-Site as well as Site specific views; and

3.4.1.6(3) minimizing negative visuals such as views to parkades or parking lots, blocking views, and creating unwanted sun shadows.

3.5 Elderly Friendly

3.5.1 The Design-Builder will design the Facility to create an elderly friendly environment as described in Appendix 1A [Clinical Specifications].

3.6 Standardization

3.6.1 The Design-Builder will design the Facility:

3.6.1.1 to, wherever appropriate, apply standardization to reduce errors and improve quality of service delivery (for example to assist caregivers in quickly accessing rooms and equipment, Patient treatment modules will contain a number of standard room types and room details, including controls and control locations); and

3.6.1.2 so that rooms in the Building that have the same function will be designed and constructed to be as similar as possible, subject to any different requirements set out in the Clinical Specifications.

3.7 Sustainability

3.7.1 The Design-Builder shall achieve all necessary prerequisites, credits and points required to obtain LEED Gold certification for the Facility as stated in this Agreement, including credits required as mandatory, not permitted and preferred per the EES Design Guidelines for New Construction and Major Renovations. In addition, the Design-Builder will:

3.7.1.1 design the Facility using design methods, building materials, operational practices, energy and life cycle considerations that promote environmental quality, social benefits and economic vitality throughout the Construction and Operating Periods, including by minimizing the Authority's operating costs (for example in relation to utilities);

3.7.1.2 design the Facility:

3.7.1.2(1) to give priority to efficient use of resources, protection of health and indoor environmental quality;

3.7.1.2(2) to take advantage of efficiencies and innovations that may be possible through integration of systems to minimize operational costs for the Authority (for example in relation to utilities);

3.7.1.2(3) to take advantage of alternative sources of energy such as passive solar, and on site power generation and opportunities for recovering waste heat and the development of biomass cogeneration; and

3.7.1.2(4) to apply a total systems approach to minimize energy consumption and incorporate energy consumption management techniques that are targeted to stabilize and optimize energy flows.

3.7.1.2(5) To meet the percentage improvement as stated in the EES Design Guidelines for New Construction and Major Renovations, compared to the baseline building performance as defined by the methodology outlined in the ASHRAE 90.1 standard. This energy performance target is directly linked to the LEED Optimize Energy Performance credit and must be established no later than the schematic design phase.

3.7.1.2(6) The Design-Builder will not include any points or credits which require any action by or on behalf of the Authority without the Authority's prior written consent, which may be granted or withheld in the Authority's discretion. If the Authority consents to the inclusion of points or credits which require any action by the Authority, the Authority will take reasonable steps, consistent with the nature of the Facility, to cooperate with the Design-Builder in respect of its achievement of such LEED points and credits, provided that such cooperation will not require that the Authority incur any liability, cost or expense.

3.7.2 Use the following standards and guidelines as references in undertaking the sustainable Design and Construction initiatives:

3.7.2.1 LEED Canada Reference Guide for Green Building Design and Construction:

3.7.2.2 The Green Guide for Health Care;

3.7.2.3 Green Globes – Environment Assessment for New Buildings;

3.7.2.4 BOMA (Building Owners and Managers Association) Go Green Program;

3.7.2.5 ASHRAE Green Healthcare Construction Guidance Statement;

3.7.2.6 ASHRAE 90.1-2010 Energy Standards for Buildings

3.7.2.7 Sustainable Healthcare Architecture – by Robin Guenther and Gail Vittori;

3.7.2.8 Canadian Building Green Hospitals Checklist – Canadian Coalition for Green Healthcare;

3.7.2.9 Natural Resources Canada Energy Innovators Initiative;

3.7.2.10 Building Materials for the Environmental Hypersensitive, CMHC;

3.7.2.11 EES Design Guidelines for New Construction and Major Renovations; and

3.7.2.12 BC Hydro New Construction Energy Modeling Guidelines

3.8 Technology

3.8.1 The Design-Builder will design the Facility so that it utilizes technology to improve cost effectiveness, integrates services and achieves better health and security outcomes.

3.9 Adaptability and Flexibility

3.9.1 In addition to the requirements in Section 5.1 the Design-Builder will design the Facility:

3.9.1.1 to meet the needs of Patients, visitors, employees, physicians, volunteers, learners, researchers and teachers now and into the future;

3.9.1.2 to accommodate the rapid cycle of innovation and change to support development and implementation of new clinical and non-clinical work processes and technological changes;

3.9.1.3 to accommodate program, service, work and equipment changes with minimized utility infrastructure and Facility impacts, including down time;

3.9.1.4 to support loose fit design to optimize functionality within a given floor area, and multi-use adaptable space;

3.9.1.5 with an infrastructure that incorporates excess systems capacity and includes systems and components that support future expansion with minimized disruption and allows for upgrades in Authority technology or technological progression; and

3.9.1.6 utilizing open planning principles to create flexible soft zones responsive to rapid change and growth by use of modular fit out.

3.10 Accessible Design

3.10.1 The Design-Builder will incorporate the following philosophies in the Design to address barriers to equitable access to healthcare such as cultural diversity, physical capability and gender:

3.10.1.1 Equitable use – the Design will be easy to use by people with diverse abilities;

3.10.1.2 Flexibility in use – the Design will accommodate a wide range of individual preferences and abilities;

3.10.1.3 Simple and intuitive – the Design will be easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level;

3.10.1.4 Perceptible information – the Design will communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities;

3.10.1.5 Tolerance for error – the Design will minimize hazards and the adverse consequences of accidental or unintended actions;

3.10.1.6 Low physical effort – the Design is capable of being used efficiently and comfortably and with a minimum of fatigue; and

3.10.1.7 Size and space for approach and use – the Design will provide appropriate size and space for approach, reach, manipulation, and use regardless of user's body size, posture or mobility. The Design-Builder will design and construct the Facility to ensure that all public areas and Patient-occupied spaces are designed for access by Persons with Disabilities and assistance by clinical staff.

3.11 Respect for Aboriginal Cultures Values

3.11.1 The Design-Builder will demonstrate respect for cultural values represented by Aboriginal Cultures of British Columbia throughout the development and design of the Facility.

3.11.2 The Design-Builder will incorporate visible representations of Aboriginal Cultures into the design of the Facility and Site.

3.11.3 Not used.

3.11.4 not used.

3.11.5 Design features such as spaces and locations to display art that reflect Aboriginal Cultures of British Columbia, community history and values, and incorporate the work of local artists.

3.11.6 Design features that are sensitive to regional population diversity including Aboriginal Cultures using finishes that respect their cultural heritage such as stone, wood, color from nature, textures and plantings;

3.12 Reference to Local History and Heritage

3.12.1 The Design-Builder will design the Facility:

3.12.1.1 in a manner that demonstrates respect for the local history and heritage, as applicable; and

3.12.1.2 to include design elements and display opportunities that will identify, reinforce and educate visitors to the Building of the unique history and heritage of the community.

3.13 Use of Natural Light and Access to Views

3.13.1 Recognizing the widely known evidence of healing effects of ample natural light, it is essential that the design provides access to direct quality day light to rooms. Refer to Appendix 1N [Daylighting Matrix]

3.13.2 For the purpose of this project, 'quality daylight' in a space shall be understood as being a minimum of 250 lux and a maximum of 5,000 lux in a clear sky condition on March 21st or September 21st at 9:00am and 3:00pm to the midpoint of the room. Areas outside that range do not comply.

3.13.3 The form of Vision Glazing provided will take the shape and the use of the room into account with respect to sill height, header height and window width related to the room width. The design of the glazing area should yield day lighting that supports the activities within the specific type of room.

3.13.4 Vision glazing exposed to direct sunlight, oriented in the South, East and West direction, will be provided with devices to control solar heat gain and glare during winter when the sun is low in the sky such as building overhangs, brise-soleil or other shading devices as follows:

3.13.4.1 South vision glazing: Shading devices to fully shade window between 11 am and 1 pm on June 21st, and

3.13.4.2 East and West vision glazing: Shading devices.

3.13.4.3 Skylights and clerestory glazing: Automated shading devices.

3.13.5 The Facility shall utilize lightwells, skylights, clerestory, light tubes, concourse or equivalent atrium type areas and devices as strategies for maximizing daylight penetration into the building and circulation areas.

3.13.6 Architectural elements, such as light shelves and interior finishes/treatments such as translucent interior glazing or transparent interior glazing with shades, shall be selected to facilitate light penetration into the building.

3.13.7 not used

3.14 Family Participation

3.14.1 The Facility Design will support and encourage family participation in the Patient's life and care.

3.14.2 The wayfinding system in the Facility will be intuitive and easy to navigate.

3.14.3 The care areas of the Facility will be easily accessible for families to engage in a variety of activities with Patients.

3.15 Wood First Act

3.15.1 The Design-Builder will incorporate wood products into the Design as required by Appendix 1H [Wood First Matrix].

3.16 Design Decision Matrices and Owner Project Requirements (OPRs)

3.16.1 The Design-Builder will, without limitation to all other Appendices in this Schedule, refer to the following Appendices to understand, resolve, and prioritize design issues otherwise not addressed in this Schedule and its Appendices:

3.16.1.1 Appendix 1K [Risk Assessment Matrix]; and

3.16.1.2 Appendix 1N [Daylighting Matrix].

3.16.2 The Design-Builder will refer to the OPRs as a guideline to understand, resolve, and prioritize design issues or requirements otherwise not addressed in this Schedule and its Appendices. The OPRs will be made available to the Design-Builder through the Data Room.

Part 4. SITE DEVELOPMENT REQUIREMENTS

4.1 Master Planning

4.1.1 The Design-Builder will design the Facility:

4.1.1.1 to have a strong presence and a distinctive architectural character, reflecting the Authority's values and for health objectives in the community;

4.1.1.2 to support community access and include a visible main entry and lobby for the Building;

4.1.1.3 to reflect logical planning principles and demonstrate clarity of circulation systems; and

4.1.1.4 In accordance with Appendix 1L [RCH Campus Design Standards].

4.1.1.5 In accordance with all applicable design guidelines of the City of New Westminster.

4.1.2 The Design-Builder will ensure all design decisions enhance the Site and its context.

4.2 Master Site Plan

4.2.1 The Design-Builder will develop and submit to the Authority a master site plan ("**Master Site Plan**") for the Site, based on the master planning principles described in Section 4.1 and the Site development requirements described in Section 4.3.

4.2.2 The Master Site Plan will illustrate the Site context and development opportunities to validate the Facility siting.

4.2.3 The Master Site Plan will:

4.2.3.1 ensure that each component of the Facility as described in Section 2.2 is an integrated part of the Site, facilitating the delivery of clinical and non-clinical support services (for example though efficient physical links and service connections between buildings), enhancing the ability of these to function in a cohesive manner;

4.2.3.2 indicate the access provisions needed for replacing major components required for the Facility, as well as for adding major components at a future date;

4.2.4 The Master Site Plan for the Facility will:

4.2.4.1 include direct and logical pedestrian and vehicular connections between the interface pathways and the Facility entrances.

4.3 Urban Design and Site Development

4.3.1 General

4.3.1.1 Minimize the impact of Site development and Facility placement on adjacent neighbours and land uses. Preserve, to the extent possible, visual privacy and sunlight for adjacent properties and buildings.

4.3.1.2 Minimize the adverse micro-climatic effects arising from the location and configuration of walkways and buildings, including effects of entrance orientation on Patient, staff and visitor comfort and safety. Provide smooth transitions between green space and public sidewalks.

4.3.1.3 Reinforce the physical relation of the structures to foster a strong sense of place and identity and to ease increased vehicular and pedestrian movement into the Site.

4.3.1.4 Design for maximum access to the Facility. Provide a distinct passenger-side drop-off area at the entrance to the Building with enough length to comfortably accommodate at the same time a minimum of three (3) Patient transfer vehicles (a Patient transfer vehicle is the largest ambulance serving the Existing Hospital). Provide distinct and appropriately sized lay-bys for service vehicles to serve the Energy Centre along the alley and Allen street.

4.3.1.5 Provide weather protection to the drop-off areas as indicated in Section 5.3.2.1.

4.3.1.6 Mitigate the nearby noise from adjacent roadways through the use of appropriate exterior glazing and other acoustic screening.

4.3.1.7 Create meaningful open spaces for the benefit of Patients, visitors and staff which provide opportunities for recreation and contribute to a cohesive, healthy community; capitalize on opportunities for outdoor areas of respite and repose to aid in providing a healing environment.

4.3.1.8 In accordance with Appendix 1L [RCH Campus Design Standards].

4.3.2 Pedestrian and Vehicular

4.3.2.1 Create a high-quality, vibrant, pedestrian-friendly environment, including by tying the sidewalks and pathways to existing sidewalks and pathways adjacent to the Site.

4.3.2.2 Design for the functional separation of uninterrupted routes for emergency vehicles, visitors, staff and service vehicles, and to minimize public and service vehicle traffic interference with emergency vehicle access to the Site.

4.3.2.3 Integrate vehicular circulation with layout of pedestrian and bicycle zones to provide visible connections, promote safe travel, and to minimize conflict between vehicles and other modes of travel. Design the driveways to provide connections between the surrounding roads and the main entrances to the Facility. Design vehicular service entrances so that they are integrated into the building design with minimal visual impact.

4.3.2.4 Provide safe pedestrian crossings that are clearly designated using pavement markings and signage. In areas where a high volume of pedestrian crossings is expected, provide for changes in surface material (such as from asphalt to Portland cement, for example).

4.3.2.5 Create access for the mobility impaired (including people with baby strollers) by providing paths of travel minimum 3.0m wide to allow for two people walking side by side and someone passing and for wheelchairs / scooters.

4.3.2.6 Provide pedestrian routes that are fully accessible by Persons with Disabilities. The public open space, all pedestrian walkways, routes and entrances to the Facility must be accessible by Persons with Disabilities and be elderly friendly with maximum slope of 5%. Design features which segregate circulation / areas / uses for Persons with Disabilities from typical public usage are discouraged, except where required due to reasons of safety or due to space limitations.

4.3.2.7 Provide curb let-downs in appropriate locations to facilitate convenient and direct access for people with disabilities. Align curb-let-downs to pedestrian crossings and to the Facility entrances.

4.3.2.8 Provide clear, direct pedestrian routes that are unimpeded by parked or moving vehicles.

4.3.2.9 Use traffic calming measures (e.g. curb bulges) to minimize roadway pavement width at pedestrian crosswalks.

4.3.2.10 Pathways will incorporate landscape treatments with trees and benches, lighting (including pedestrian-scale lighting), distinct paving where appropriate to further identify and enhance the pedestrian movement, and tactile strips for the visually impaired wherever required.

4.3.2.11 All walkways and other paved areas must have positive drainage to shed rain water quickly to a storm drainage facility.

4.3.2.12 Vehicular access/exit, drop-off areas, and lay-by areas on Brunette Avenue will not be permitted.

4.3.2.13 The existing service lane between the Site and the existing Health Care Centre will be maintained to operate for service and emergency vehicles serving the Facility and the Campus as required.

4.3.2.14 Flooding/ponding are not permitted onsite except in designated stormwater detention facilities designed with an overflow to a storm system with adequate capacity.

4.3.2.15 Access to the Sally-Port of emergency vehicles such as, but not limited to, police cars and the largest ambulance, will be provided with all required clearances (height, width, and length) for these vehicles, whether the Sally-Port is in a level at grade, above grade, or in an underground level. The minimum Ceiling Height in the Sally-Port and to access the Sally-Port will be 3700mm. Inside the Sally-Port the minimum clearance all around the vehicle will be sufficient so that a stretcher, in its fully stretched position with clinical staff around it, can be maneuvered between the closest Sally-Port enclosure (e.g., walls, doors, windows) and the doors of the vehicle in their fully open position.

4.3.3 Public Realm and Open Space

4.3.3.1 Design and construct the Facility ensuring the legibility, quality and consistency of the overall treatment of the public realm, including public open space, pedestrian corridors and streets, to achieve the design objective for a unified and attractive built environment.

4.3.3.2 Provide a hierarchy of open spaces as follows:

4.3.3.2(1) public open spaces;

4.3.3.2(2) private open spaces; and

4.3.3.3 Achieve segregation between different open spaces through landscape barriers such as hedges and planting.

4.3.4 Community Noise Protection

4.3.4.1 Orientate building's entrances on the Site so that the noise impact of emergency and service vehicles, and new traffic routes will be minimized.

4.3.4.2 Strategically locate and / or silence mechanical and electrical equipment, outside air intake and discharge openings, as well as operable windows in relation to high traffic streets (i.e. Brunette Ave).

4.3.5 Site Wayfinding and Exterior Signage

4.3.5.1 Provide a signage master-plan for review by the Authority.

4.3.5.2 Arrange pedestrian pathways to ease wayfinding and create an amenable environment for pedestrians through the use of coordinated methods of wayfinding which inform people of routes through the Site to specific buildings and entries or to the major street and transit nodes. Encourage pedestrians to avoid unsafe vehicle roads by providing well-signed alternative pedestrian routes.

4.3.5.3 Provide visually connected pathways to facilitate wayfinding.

4.3.5.4 Provide external directional signage that:

4.3.5.4(1) clearly identifies the Facility and its components including the main entry, and main entry drop off area; and all other entries to the Facility;

4.3.5.4(2) clearly indicates points of access for the public, parking areas and restrictions for various vehicle types and restrictions to 'after-hours' access;

4.3.5.4(3) is well illuminated, backlit, reflective or high contrast and easily visible at night; and

4.3.5.4(4) minimizes light spillage.

4.3.5.5 Wayfinding must start at the Site property line with freestanding illuminated exterior signage located at each prominent Site entry location. Supplement these entry signs with free standing signage structures located to give overall direction

within the Site. These illuminated exterior signs must have an overall site plan and have some weather protection for standing viewers.

4.3.5.6 Overall parking signage is required to follow consistent design intent for the Site.

4.3.5.7 Provide all necessary exterior illuminated signage to direct traffic from the access streets. Design and construct such signage so that it is visible for drivers of vehicles to identify at a far enough distance so that they will safely slow down and follow the signage to enter the Facility and the parking areas.

4.3.6 Site Lighting

4.3.6.1 Provide LED lighting for public outdoor spaces that creates an unobtrusive, human scale lighting concept, with a hierarchy of fixture types designed according to functional and security needs (including CPTED), and reflecting the hierarchy of pedestrian corridors.

4.3.6.2 Lighting on pedestrian paths will illuminate not just the path but also the surrounding area adjacent to the path particularly en-route to transit connections to facilitate ease and safety of pedestrian.

4.3.6.3 Lighting will be strategically placed as to not disrupt Patient sleep and will be dark-sky compliant.

4.3.6.4 Refer to Section 8.2.

4.3.7 Site Safety Through Design

4.3.7.1 Design the exterior of the Site so that there are opportunities for people to easily view what is happening around them during the course of their everyday activities.

4.3.7.2 Eliminate entrapment spots. Incorporate barriers that permit visual access without loss of privacy such as glazing in lobby doors and stairwells.

4.3.7.3 Promote the “eyes on the street” concept by using windows, doors and activity generators such as seating or fountains. Windows will be visible from the exterior and not hidden by vegetation or other items to the extent possible, except in those locations as indicated in Appendix 1A [Clinical Specifications].

4.3.7.4 Incorporate CPTED principles in the design of all exterior areas of the Site.

4.4 Parking

4.4.1 The Design-Builder will provide underground parking in accordance with the requirements of this Schedule and all applicable standards.

4.4.2 Parking Design Principles

4.4.2.1 Walls and ceilings must be painted to enhance or reflect light. The design and operation of the underground parking will create convenient and safe usage.

4.4.2.2 Provide underground parking that is capable of being secured and locked when not in use. A powered overhead security gate with exit sensors will be provided at the underground parking entrance/exit.

4.4.2.3 Provide adequate provision for ingress and egress to all parking spaces to ensure ease of mobility, ample manoeuvring clearances, and safety of vehicles and pedestrians.

4.4.2.4 The entry to the underground parking must be located at a sufficient distance from the public street to prevent parking queues from extending onto the street. At the exit of underground parking, a minimum distance of two car lengths must be provided between the exit and the street edge to accommodate cars waiting to enter the traffic stream. Exact location to be approved by the City and access to and exit from the underground parking will not be allowed on Brunette Avenue.

4.4.2.5 Apply CPTED principles.

4.4.2.6 Provide painted numbering system on the floors for all parking stalls. Colour, size, and style will be further coordinated in consultation with the Authority.

4.4.2.7 Reduce opportunities for graffiti through the use anti-graffiti coatings.

4.4.2.8 Parking Equipment Layout and Appearance Signage will be approved, supplied, installed and commissioned by the Authority Parking, Access & Commuter Services (PACS) including payment, wayfinding, instructional and directional wall graphics. The Design-Builder, in consultation with the Authority, will provide all necessary infrastructure to support these systems;

4.4.2.9 Set parking layouts in an orderly and logical design to minimize confusion and excessive internal circulation.

4.4.2.10 Parking allocation, occupancy mix and dynamics between public, staff, short and long term parking segmentation will be determined in consultation with the Authority.

4.4.2.11 Parking areas will be provided with adequate drainage to avoid accumulation of liquids in accordance with the minimum slopes to drains as specified elsewhere in this Schedule.

4.4.2.12 Parking areas will have a minimum clear height (i.e., no obstructions or protrusions of any type below the stated dimension) of 2400mm AFF unless otherwise required in this Schedule, or by code, or by minimum equipment and vehicles clearances as applicable.

4.4.3 Parking Stall Requirements

4.4.3.1 Provide a minimum of 450 vehicle parking stalls in accordance with the following:

4.4.3.1(1) The required number of parking stalls for compact cars will comply with the City of New Westminster off-street parking by-law.

4.4.3.1(2) The required number of parking stalls for Persons with Disabilities will be a ratio of 4% of the total count. This ratio has been initially agreed upon with the City of New Westminster. The Authority will be responsible for further confirmation and agreement with the City of New Westminster on this ratio.

4.4.3.1(3) All parking stalls will be designed in a 90 degree (straight) orientation.

4.4.4 Parking Stall Sizes

4.4.4.1 Parking stalls and drive isle dimensions will comply with the City of New Westminster off-street parking by-law.

4.4.5 Parking Payment System

4.4.5.1 The Design-Builder will design and construct underground parking so as to accommodate unattended automated payment system via Pay by Stall or Pay by License Plate via real time PCI compliant coin/credit card pay stations. Optional parking ambassador position that will be subject to demand and user sensitivities will be further coordinated with the Authority.

4.4.5.2 Not used.

4.4.5.3 The Design-Builder will provide all infrastructure necessary to support six (6) pay devices in the underground parking located at close proximity to the elevator lobbies. Minimum infrastructure requirements and final locations will be further coordinated with the Authority through the user consultation process described in Schedule 2 [Review Procedure].

4.4.6 Bicycle Parking

4.4.6.1 Provide long term and short term bicycle parking in accordance with the City of New Westminster by-law.

4.4.6.2 Secure Bicycle Storage: Provide and Install new covered secure bike storage area as required to meet LEED strategy and City of New Westminster Bylaws.

4.4.6.3 Short term bicycle parking must be situated in well-lit locations, clearly visible from principal building entries and/or public roads.

4.4.6.4 Bicycle racks will be made of sturdy, theft-resistant material and be secured to the floor or ground. Design the bicycle racks so that they secure the bicycle frame, not the wheels, and allow both the frame and front wheel to be locked to the rack with a U-style lock.

4.4.7 Lighting

4.4.7.1 Provide LED luminaires suitable for parking garage with low glare and a maximum colour temperature of 4000K.

4.4.7.2 Provide minimum illumination levels in accordance with CSA Z317.5

4.4.7.3 In indoor general parking and pedestrian areas provide a minimum maintained illumination level of 50 lux (5fc) with a luminance ratio of 3 to 1, average to minimum in driving areas, and 4 to 1 in other areas.

4.4.8 Electric Vehicles

4.4.8.1 Provide 5 electric vehicles charging stations and infrastructure for 5 future electric vehicles charging stations. Locations will be further coordinated in consultation with the Authority during the user consultation process as described in Schedule 2 [Review Procedure].

4.4.9 Parking demarcations

4.4.9.1 Use lead free yellow or white paint for all demarcations on the floor such as, but not limited to, stall stripes, numbers, and traffic markings,

4.5 Site Infrastructure

4.5.1 The Design-Builder will provide, as necessary, adequate and reliable infrastructure and necessary municipal services to the Facility.

4.5.1.1 General

4.5.1.1(1) All on-site works required for excavation, exposing, backfill and surface restoration of all proposed water, storm and sanitary sewer, as well as the connection of each service to the municipal system, will be the responsibility of the Design-Builder.

4.5.1.1(2) All off-site works required for the design and construction of all storm drainage, sanitary sewers and water infrastructure will be the responsibility of the Design-Builder.

4.5.1.1(3) All off-site works shall be designed and constructed in accordance with the City of New Westminster's Subdivision & Development Control Bylaw No.7142.2007.

4.5.1.1(4) All on-site works shall be designed and constructed in accordance with the latest edition of the Master Municipal Construction Documents.

4.5.1.1(5) All on-site works shall be designed and constructed in accordance with the latest edition of the BCBC.

4.5.1.2 Potable Water – Off-Site

4.5.1.2(1) The Facility requires two sets of separate fire and domestic water connections, including valves, metering and backflow prevention.

4.5.1.2(1)(a) The primary set of fire and domestic water service connections will be from the lane.

4.5.1.2(1)(b) The secondary set of fire and domestic water service connections will be from Allen Street.

4.5.1.2(2) The extent to which provision for on-Site pumping from the primary and secondary water connections will be required (to suit either domestic demand or fire-fighting demand, or both) and will be determined, in part, by the final building floor area and building height.

4.5.1.2(3) The Design-Builder will ensure that City access to municipal fire hydrants is not encumbered at any time. All existing hydrants must remain active during the Construction. Temporary construction water will be provided by a new connection to the City's water system that is approved by the City.

4.5.1.2(4) Off-site water system upgrades will be required in accordance with the requirements of the City of New Westminster

4.5.1.2(4)(a) Upgrade the existing 150mm diameter watermain along Keary Street to 200mm diameter between the lane and Brunette Avenue. Tie in to the existing 300mm watermain on Brunette Avenue.

4.5.1.2(4)(b) Upgrade the existing 150mm diameter watermain along Allen Street to 200mm diameter between the lane and Brunette Avenue. Tie in to the existing 150mm diameter watermain on Brunette Avenue.

4.5.1.2(4)(c) Loop and install a new 300mm diameter watermain along the lane connecting the water system on Keary Street and Allen Street.

4.5.1.3 Sanitary Sewer – Off- Site

4.5.1.3(1) Sanitary sewer video inspections will be required upon installation.

4.5.1.3(2) The Facility requires one sanitary service connection from the lane, including cleanout/manhole access for maintenance 1.0m from the Facility.

4.5.1.3(3) Off-site sanitary sewer upgrades will be required in accordance with the requirements of the City of New Westminster

4.5.1.3(3)(a) Abandon and fill with lightweight concrete the existing 450mm combined sewer underneath the existing Laundry and Maintenance building at Sherbrooke Street.

4.5.1.3(3)(b) For abandoned section of combined sewer, install 300mm diameter sanitary sewer diversion east on Sherbrooke Street and tie into new sanitary sewer in the lane. Refer to Section 4.5.2.2(5).

4.5.1.4 Storm Drainage – Off- Site

4.5.1.4(1) The Design-Builder must employ On-Site storm water management strategies to comply with the City of New Westminster's stormwater management requirement.

4.5.1.4(2) Storm Sewer video inspections will be required upon installation.

4.5.1.4(3) The Facility requires one storm service connection from the lane, including cleanout/manhole access for maintenance 1.0m from the Facility.

4.5.1.5 Roadworks – Off-Site

4.5.1.5(1) Offsite roadwork upgrades shall be designed and constructed in accordance with the following requirements of the City of New Westminster:

4.5.1.5(1)(a) Allen Street

(a).1 Reconstruction of half width of Allen Street road frontage based on Benkelman Beam testing complete with new sidewalk, trees, landscape

boulevard complete with irrigation, street lighting, curb and gutter. The design of the sidewalk and landscape boulevard will be in accordance with all applicable requirements in this Schedule and Section 9 of the City of New Westminster Design Criteria.

(a).2 If Benkelman Beam testing proves pavement structure as suitable, minimum requirement shall be full depth asphalt removal and pave.

(a).3 The Design-Builder will install a concrete sidewalk clear of obstructions and separated from the curb with a landscape boulevard. The minimum width of the concrete sidewalk will be in accordance with Appendix 1L RCH [Campus Design Standards].

(a).4 The Design-Builder will provide a corner truncation at Allen Street and Brunette Avenue. Dimensions to be determined by designing to accommodate an SU-9 design vehicle's turning radius.

(a).5 Redesign the intersection of Allen Street and the private lane to provide a complete corner (e.g. curbs, sidewalk, landscape, etc.) suitable for the proposed Design.

4.5.1.5(1)(b) Keary Street

(b).1 Reconstruction of half width of Keary Street road frontage based on Benkelman Beam testing complete with new sidewalk, trees, landscape boulevard complete with irrigation, street lighting, curb and gutter. The design of the sidewalk and landscape boulevard will be in accordance with all applicable requirements in this Schedule and Section 9 of the City of New Westminster Design Criteria.

(b).2 If Benkelman Beam testing proves pavement structure as suitable, minimum requirement shall be full depth asphalt removal and pave.

(b).3 The Design-Builder will install a concrete sidewalk clear of obstructions and separated from the curb with a landscape boulevard. The minimum width of the concrete sidewalk will be in accordance with Appendix 1L RCH [Campus Design Standards].

(b).4 The Design-Builder will provide a corner truncation at Keary Street and Brunette Avenue. Dimensions to be determined by designing to accommodate a WB-20 design vehicle's turning radius.

4.5.1.5(1)(c) Brunette Avenue

(c).1 Provide new sidewalk, trees, landscaping complete with irrigation, street lighting and curb and gutter. The design of the sidewalk and landscape boulevard will be in accordance with all applicable requirements in this Schedule and Section 9 of the City of New Westminster Design Criteria.

(c).2 The Design-Builder will install a concrete sidewalk clear of obstructions and separated from the curb with a landscape boulevard. The minimum width of the concrete sidewalk will be in accordance with Appendix 1L RCH [Campus Design Standards].

4.5.1.6 Street Lighting – Off-Site

4.5.1.6(1) Design-Builder to review existing street lighting and if necessary, provide street lighting in accordance with City of New Westminster Design Criteria and the American National Standard Practice for Roadway Lighting, IES RP-8-14 on all frontages.

4.5.1.7 Electrical – Off-Site

4.5.1.7(1) Design-Builder to underground existing overhead utility lines on Keary Street and Sherbrooke Street. Works shall be designed and constructed in accordance with the City of New Westminster requirements and standards.

4.5.1.8 Future Enabling Civil Works

4.5.1.8(1) Additional offsite utility upgrades shall be designed and constructed in accordance with the following requirements of the City of New Westminster:

4.5.1.8(1)(a) Storm Drainage – Off-Site

(a).1 Extend the existing 1200mm diameter storm sewer north along East Columbia Street

between Keary Street to the north side of Sherbrooke Street.

4.5.1.8(1)(b) Watermain – Off Site

(b).1 Upgrade the existing 150mm diameter watermain along Sherbrooke Street to 300mm diameter between East Columbia Street to the Lane.

(b).2 Upgrade the existing 150mm diameter watermain along Keary Street to 200mm diameter between East Columbia Street to the Lane.

4.5.1.8(1)(c) Watermain – On Site

(c).1 Install new 300mm diameter watermain in the lane connecting the 300mm diameter watermain on Sherbrooke to Allen Street.

4.5.1.8(2) Buried Duct Bank System for Campus Distribution

4.5.1.8(2)(a) Complete the encirclement of the electrical duct bank system around the campus by installing ducts along the balance of E. Columbia St (to the corner of Sherbrooke St.) and down Sherbrooke St. from Columbia to the Lane). Minimize disruption on the hospital site by sequencing the construction of the electrical duct bank system and the Perimeter Pathway System to be concurrent, such that the excavation and construction of all below-grade infrastructure in any part of the site is completed concurrently.

4.5.1.8(2)(b) Provide physically separated maintenance holes along each buried concrete-encased duct bank system including at locations required for power connections to future buildings along Sherbrooke Street.

4.5.1.8(2)(c) Concrete-encased duct bank system including maintenance holes will be compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

4.5.1.8(2)(d) The proposed location of the future buildings will receive two physically separated concrete-encased duct bank systems, each consisting of 4 x 103mm ducts terminated in a pre-cast maintenance hole.

4.5.1.8(2)(e) Maintenance holes to be minimum 4.2m long x 2.4m wide x 2.25m high with cast-iron covers

4.5.2 On-Site Services Infrastructure

4.5.2.1 General

4.5.2.1(1) Design and construct all on-Site servicing to meet or exceed the design and quality requirements for the corresponding municipal off-Site services, and to meet the needs of the Facility.

4.5.2.2 Sanitary Sewers – On-Site

4.5.2.2(1) Provide sanitary sewers of a diameter, grade and depth to safely convey all effluent from the Facility.

4.5.2.2(2) Provide one or more lift stations, consisting of redundant grinder pumps, which discharge sanitary drainage from the Facility to the municipal sewer system via force main.

4.5.2.2(2)(a) The lift stations will be heated and ventilated according to applicable codes and standards.

4.5.2.2(3) The sanitary sewer system will include the pipes, manholes and all other required appurtenances to comply with applicable municipal and provincial standards.

4.5.2.2(4) Sanitary sewer video inspections will be required upon installation.

4.5.2.2(5) Provide a 300mm diameter sanitary sewer in the lane between Sherbrooke Street and Keary Street, reconnect all existing combined and sanitary service connections to new sewer.

4.5.2.2(6) Remove existing 450mm diameter combined sewer between Sherbrooke Street and Keary Street.

4.5.2.3 Storm Sewers and Drainage – On-Site

4.5.2.3(1) Provide storm sewers, storm sewer management strategies and drainage network (minor and major):

4.5.2.3(1)(a) where “minor system” refers to a piped storm conveyance system and “major system” refers to the combination of piped systems, channels, retention or detention basins, roadways and overland flow routes;

4.5.2.3(1)(b) of a size, grade and depth to safely manage and convey all storm water on-Site to the receiving system;

4.5.2.3(1)(c) which, at minimum, maintain the pre-Construction discharge flow rates;

4.5.2.3(1)(d) which, at a minimum, are capable of managing the difference in pre-Construction vs. post-Construction discharge rates and volumes;

4.5.2.3(1)(e) which include storm water/oil and grit separation devices or other water quality treatment devices, capturing and treating runoff from all road and parking area surfaces;

4.5.2.3(1)(f) which provide grit separation treatment for roof water run-off before it enters the piped on-Site conveyance network. Oil/water separation is not required for roof water;

4.5.2.3(1)(g) where storm sewer video inspections will be required upon installation; and

4.5.2.3(1)(h) which provide best management practices for the capture, treatment and retention of storm water runoff.

4.5.2.3(2) Provide a stormwater management plan to comply with applicable municipal and/or LEED requirements. The Design-Builder will ensure that neighbouring properties are protected from flooding and nuisance runoff issues and existing municipal system capacities are not exceeded.

4.5.2.3(3) Provide adequately sized water quality/sediment control components, before discharging to the on-Site retention systems, groundwater recharge facilities or the off-Site drainage system.

4.5.2.3(4) Provide a 450mm diameter storm sewer in the lane between Sherbrooke Street and Keary Street, reconnect all existing and new storm service connections to new storm sewer. Sewer shall extend north to service the future expansion of the site and all new and existing catch basins in the lane.

4.5.2.4 Watermain and Appurtenances – On-Site

4.5.2.4(1) Provide a water system of diameter, grade, and depth to safely meet demand and fire flow requirements.

4.5.2.4(2) The water system will include the pipes, valves, hydrants, fittings and all other required appurtenances to comply with applicable municipal and provincial standards.

4.5.2.4(3) Provide two new separate watermain service connections to the Facility (watermain and ancillary components) from the municipal system, each system capable of providing all required commercial/institutional demands and firefighting capacity and redundancy for the Facility. The extent to which provision for on-site pumping, from both primary and secondary offsite connection points, will be required (to suit either domestic demand or fire-fighting demand, or both) will be determined, in part, by the available system pressures, the final building floor area and building height.

4.5.2.4(4) Firefighting volumetric demands are to be calculated using the Fire Underwriters Survey (FUS) method, unless alternates are otherwise approved by the applicable Authority Having Jurisdiction.

4.5.2.4(5) If required to meet the FUS fire flow demands, The Design-Builder will provide back-up, permanent fire-fighting equipment.

4.5.2.4(6) The watermain systems will include approved backflow preventers necessary to protect the municipal system and on-Site facilities from contaminants based on the hazard level of the Facility.

4.5.2.4(7) Provide a looped watermain system on-site with a 300mm diameter watermain in the lane between Keary Street and Allen Street.

4.5.2.4(8) Each water main service, from separate off-Site connection points, will cross-connect on-Site and enter the Building in mechanical rooms on opposite ends of the Building, wherein metering and splitting off of domestic and fire suppression flows will occur complete with meter and back flow preventers in the Building.

4.5.2.5 Road Works – On-Site

4.5.2.5(1) All on-Site road works will meet the requirements of the standards and guidelines of the Geometric Design Guide for Canadian Roads, as published by the Transportation Association of Canada.

4.5.2.5(2) Design and construct on-Site roadways, including the pavement, curbs and gutters, sidewalks, walkways, signage, pavement markings, and traffic calming devices, that are accessible to Persons with Disabilities, and provide safe passage between parking areas, loading areas, emergency vehicle areas and drop off areas without requiring the driver

to enter the municipal roadway. The minimum roadway surface width will be 7.3 metres.

4.5.2.5(3) Pavement structure will meet recommendations by a geotechnical engineer.

4.5.2.5(4) All roadways will accommodate fire truck access in accordance with the BCBC requirements or the requirements of the municipality ‘s fire department or by municipal bylaw requirements, whichever is more stringent.

4.5.2.5(5) The minimum design vehicle for loading access shall be WB20. Demonstrate with AutoTURN software all internal roadways and loading accessess safely accommodate the typical fire truck and WB-20 semi-trailers in use by the respective municipal authorities.

4.5.2.5(6) Use site surfacing materials which will meet intended use and minimize the ‘heat island’ effect, where possible.

4.5.2.5(7) Provisions for on-Site roadways will be required to account for snow removal machinery and methods in winter snowfall months.

4.5.2.5(8) Roadways and paved areas must have positive drainage to shed rain water quickly to a storm drainage facility.

4.5.2.5(9) Access road above underground chambers must be waterproofed to prevent water seepage and flooding of the chambers.

4.5.2.6 Street Lighting – On-Site

4.5.2.6(1) Provide lighting for on-Site roadways, walkways and parking areas to ensure safe vehicle and pedestrian traffic with respect to collisions, personal safety, and building access/egress. Provide lighting sympathetic to all neighbouring properties.

4.5.2.6(2) Review existing and if necessary provision of street lighting in accordance with City of New Westminster Design Criteria and “American National Standard Practice for Roadway Lighting, IES RP-8-14” on all frontages. All roadways, parking facilities, pedestrian walkways shall be illuminated for safety and to produce accurate and comfortable night time visibility to the satisfaction of the City of New Westminster Director of Engineering.

4.5.2.7 Electrical, Telecommunications, Gas Services

4.5.2.7(1) Provide adequate electrical, telecommunication and natural gas services to the Facility.

4.5.2.7(2) Provide two separate12kV electrical services from the Energy Centre to the Mental Health electrical substation, each service capable of providing all required electrical demands and providing service redundancy for the Building.

4.5.2.7(3) Provide service connections to the Campus Perimeter Pathway System.

Part 5. FACILITY DESIGN REQUIREMENTS

5.1 Adaptability, Flexibility and Maintainability

5.1.1 In addition to the requirements in Section 3.9 the Design-Builder will:

5.1.1.1 locate permanent building elements, such as stairs, elevators and duct shafts, to minimize constraints which inhibit changes to the Facility;

5.1.1.2 minimize interior columns for ease of planning and re-planning of care areas;

5.1.1.3 avoid interior shear walls whenever possible;

5.1.1.4 accommodate the vertical and horizontal distribution of electrical and mechanical services to allow maintenance and changes to occur with the least disruption to clinical service delivery;

5.1.1.5 provide access points to the Facility service systems in critical locations so that service disruption will be minimized; and

5.1.1.6 avoid cabling in the concrete slab. Provide a system or strategy to support equipment where cabling is imbedded into the slab, to allow for easy servicing to Security Offices and control rooms and medical equipment. Do not provide raised access flooring.

5.1.1.7 locate primary circulation corridors to allow for expansion without increasing the complexity of the circulation system as a whole;

5.1.1.8 provide floor zoning that allows for expansion of programs or services, for example by locating administrative and other non-clinical ‘soft’ functions adjacent to clinical areas that are likely to need to expand;

5.1.1.9 provide adequate and equipment appropriate access to and clearance around any and all equipment to allow for convenient routine and preventative maintenance during the operational phase of the project; and

5.1.1.10 provide adequate access for the replacement of equipment as required due to failure or life-cycle replacement without disruption to adjacent equipment and systems.

5.2 Post Disaster Requirements

5.2.1 In undertaking the Design, the Design-Builder will protect the life and safety of all Facility occupants and the need for the Energy Centre, Campus Communications Hub, Entrance Facility Room and Tech Room continuing services following catastrophic events such as earthquakes, severe weather, epidemics, chemical spill, disruption to service utilities and internal events such as fire. Particular attention will be paid to the generators, transformers and utility service connections.

5.2.2 Design and construct the following components of the Facility to post disaster standards in accordance with the BCBC:

5.2.2.1 the Energy Centre and all its structural and non-structural components, anchorages, and equipment;

5.2.2.2 the Campus Communications Hub, Entrance Facility Room and Tech Room and all its structural and non-structural components, anchorages, and equipment if designed as a separate component outside the Energy Centre;

5.2.2.3 the Building's structural system;

5.2.2.4 service connection structures;

5.2.2.5 service enclosures and assemblies from the Energy Centre and the Communications Hub into and through the Building; and

5.2.2.6 essential services servicing the Energy Centre, Campus Communications Hub, Entrance Facility Room and Tech Room including the electrical system, heating and cooling systems and distribution, domestic water, and their utilities enclosures and assemblies.

5.2.3 Design and construct the components indicated in Section 5.2.2 so that they are capable of meeting their functional requirements (lights, power, water, sewer, communication systems, security systems, alarm and signal systems and HVAC) for a minimum period of 72 hours following a natural disaster or other incident.

5.2.4 Refer to Part 7 of this Schedule for additional mechanical and electrical post disaster requirements.

5.2.5 The design of the Facility will provide means of securely evacuating Patients, staff, visitors and contractors, while maintaining security and public safety.

5.3 Architecture

5.3.1 Building Form and Character

5.3.1.1 General

5.3.1.1(1) The Facility will capitalize on the existing slope of the Site in order to stack the program while maximizing on-grade access and minimizing overall building footprint, without compromising the overall key functional relationships of the Building.

5.3.1.1(2) The Building will be designed and orientated to maximize views while responding appropriately to the environmental forces of sun, wind, and precipitation and to minimize excessive noise and spread of the noise into the rest of the Campus.

5.3.1.1(3) Daylighting and views will be provided throughout the design to assist wayfinding and promote a therapeutic environment of well-being.

5.3.1.1(4) The Building will not stop at its exterior walls, but rather will extend into the site itself, integrating with the campus environment, the site's infrastructure and the landscape to create cohesive indoor/outdoor connectivity.

5.3.1.1(5) The Building will feature an exterior and interior architectural vocabulary that speaks to the evolving future of behavioral health which seeks to normalize and de-stigmatize mental health, while, at the same time, responding to the physical, environmental and cultural context of New Westminster.

5.3.1.1(6) Exterior lighting will be designed to create a warm and inviting atmosphere while promoting safety and security, without creating an institutional ambiance. Comply with current IDA requirements for colour temperature and cut-offs.

5.3.1.1(7) Not used.

5.3.1.1(8) Utilize glazing to optimize views and daylight penetration, and to reduce energy consumption. This will be done in a manner that maximizes access to daylight without compromising security or creating opportunities for elopement.

5.3.1.1(9) All mechanical / electrical equipment that is part of the primary Building infrastructure services will be enclosed within a heated ventilated mechanical penthouse and will be consistent in form, material, and detail with the rest of the Building.

5.3.1.1(10) Roof mounted mechanical / electrical equipment related to the CCH will be fully screened and will be consistent in form, material, and detail with the rest of the Building.

5.3.1.1(11) Screen from view all utility areas, satellite dishes, outdoor vents, mechanical equipment, transformers and other similar structures. Locate these visual screening items so that they also serve as noise screens for components that generate outdoor noise including transformers and mechanical. Screening materials will be consistent in form, material, and detail with the rest of the Building. Where noise control is not required, hedging, shrubs, and trees are acceptable screening elements provided they afford complete screening from view of these components.

5.3.1.2 Exterior Building Materials and Colour

5.3.1.2(1) Exterior building materials will be durable and climatically appropriate and integrated with the Building's context. This will be combined with accent materials such as metal panel to accentuate the articulation of the building forms.

5.3.1.2(2) The following materials will not be used on the building exterior:

5.3.1.2(2)(a) Metal siding;

5.3.1.2(2)(b) Light gauge metal panels;

5.3.1.2(2)(c) Insulated metal panels;

5.3.1.2(2)(d) Fiber cement siding; and

5.3.1.2(2)(e) Stucco.

5.3.1.2(3) The Design-Builder will minimize the number of exterior cladding materials to reduce the number of envelope joint conditions while providing accent materials to accentuate the articulation of the building forms.

5.3.1.3 Building Envelope

5.3.1.3(1) Utilize a building envelope professional (whose credentials as a building envelope professional are recognized by the AIBC or the APEGBC to review and certify building envelope design and construction.

5.3.1.3(2) Complete the Design and Construction so as to prevent the accumulation and stagnation of rain, snow, ice and dirt on the horizontal

and vertical surfaces of the building envelope(s) appropriate for the climate the Facility is situated in.

5.3.1.3(3) Complete the Design and Construction so as to prevent both the ingress of exterior moisture and the trapping of condensation from infiltrating humid air within the envelope.

5.3.1.3(4) Design exterior walls in accordance with the 'rain-screen principle'. 'Rain-screen principle" means an exterior wall assembly with a primary and secondary line of defense with a pressure-equalized air cavity in between.

5.3.1.3(5) Ensure that materials and systems of the wall and roof assemblies contribute to reducing heat gains and losses with minimal decline in performance over their expected lifespan.

5.3.1.3(6) Ensure continuity of the air barrier, vapour barrier, thermal barrier and rain barrier across the entire envelope. Continuity of these components will be maintained at all intersections, attachments, and appendices.

5.3.1.3(7) Design building envelope details to avoid thermal bridging.

5.3.1.3(8) Design the building envelope so that the inside of Patient Bedrooms exposed to noise from hospital related equipment, delivery / loading bays, emergency intake areas, and busy roadway areas are exposed to noise levels less than:

5.3.1.3(8)(a) NC 35-40 from steady sources of noise such as HVAC equipment and transformers; and

5.3.1.3(8)(b) Leq 35 dBA for quasi-steady road and rail traffic noise and Lmax 45 dBA for noises associated with brief intermittent events such as heavy truck and locomotive pass-bys provided that NC requirements of Table 2 of Appendix 1D are satisfied (i.e., NC 35-40). If HVAC noise levels are less than NC 35, noise levels are not to exceed Leq 30 dBA for quasi-steady road and rail traffic noise and Lmax 45 dBA for noises associated with brief intermittent events such as heavy truck and locomotive pass-bys.

5.3.1.3(8)(c) Extreme intermittent noise events such as associated with sirens, helicopter movement and train horns, will be excluded from the determination of noise levels.

5.3.1.4 Roofs

5.3.1.4(1) Incorporate landscaped roofs and other “green” treatments of roof areas as appropriate to provide accessible therapeutic Secure Outdoor Spaces. To minimize opportunities for elopement, or the introduction of contraband, ensure these spaces will not have direct access to grade.

5.3.1.4(2) Where not landscaped, roof areas will be designed to be attractive when in view.

5.3.1.4(3) Provide stair access to all major roof areas larger than 100 m^2. Ladder access will only be allowed to smaller roof areas.

5.3.1.4(4) Use of roof hatch accesses will be minimized.

5.3.1.4(5) Any means of access to the roofs such as, but not limited to, doors and hatches will have hardware that is lockable and will integrate with access control system.

5.3.1.4(6) If mechanical penthouses are used, provide elevator access to such penthouses.

5.3.1.4(7) Provide high parapets or guardrails to minimize the need for fall arrest anchors for operational staff. Locate at main roofs and other roof areas needing regular access for maintenance. Minimum parapet height to comply with applicable codes.

5.3.1.4(8) Provide fall arrest systems as required to allow safe and convenient access to service building components such as, but not limited to, exterior glazing, cladding, exterior louvres, vents, and intakes.

5.3.1.4(9) Green Roofs

5.3.1.4(9)(a) Utilize vegetation and other permeable surfacing materials to accent and reinforce key architectural elements of the Building, the Secure Outdoor spaces and the surrounding landscape.

5.3.1.4(9)(b) Contribute to the overall restorative environment for Patients, staff and visitors.

5.3.2 Building Entrances and Access

5.3.2.1 All exterior doors will have weather protection (protection from the elements) by non-climbable canopies, building overhangs or similar features.

5.3.2.1(1) At the main entrance of the Building the weather protection will provide space for small group seating adjacent to the entry in excess of the width of the opening. and it will extend out to cover the totality of the vehicle on the drop-off side in the drop-off / lay-by area.

5.3.2.1(2) Weather protection will also be implemented where building entrances front a sidewalk or open space such as drop-off or lay-by areas.

5.3.2.1(3) Weather protection at all other doors will have a minimum depth of 1500mm and it will extend on both sides of the opening a minimum of 150mm.

5.3.2.2 Ensure that areas protected from weather still receive daylight using appropriate measures such as increased height –to- depth proportions and the use of glass roof panels.

5.3.2.3 Orient building generally to minimize wind induced by adjacent existing buildings.

5.3.2.4 Pedestrian interest and comfort at entries will be provided through specifically designed seating, signage, lighting and features that enhance a feeling of invitation, acceptance, normality and de-stigmatization.

5.3.2.5 Provide wheelchair alcoves visible and accessible to the main entrance vestibules. Provide easy access to wheelchairs close to the main and visitor entrances.

5.3.2.6 The main entrance in the Building will have an intimate, warm and welcoming character. The space must be acoustically treated to control excessive noise and sound reverberation that would prevent effective communications in the space, allow the spread of noise to adjacent noise sensitive interior spaces or make spending time in the main entrance uncomfortable.

5.3.2.7 Entryways and doors must be illuminated using light levels that are comfortable when entering and exiting.

5.3.2.8 All entrances leading into the main lobby will have a vestibule. These vestibules will:

5.3.2.8(1) provide complete transparency from the exterior, from the interior immediately in front of the vestibule, and from inhabited spaces adjacent to at least one long side of the vestibule.

5.3.2.8(2) be configured and sized in order to preserve the airlock effect for climate control. Ensure distance between the sets of doors allow wheelchairs ample room for manoeuvring into the vestibule. Provide a heated air

curtain system over the exterior doors to control the temperature loss during winter months.

5.3.2.8(3) have sliding doors to the exterior and the interior, except that where sliding doors are not feasible, use swinging doors. Use doors that will be motion-sensor activated. Provide in addition to the motion-sensor activation by Persons with Disabilities push-button controls located on the inside and outside of the doors.

5.3.3 Outdoor Spaces

5.3.3.1 The landscape will complement and enhance the existing surrounding landscape form, tree species, open space, and adjacent street character.

5.3.3.2 Formal planting will define movement corridors such as streets, driveways and pedestrian walkways.

5.3.3.3 Low under-planting will be used to create accents in the landscape and a hierarchy of space by drawing attention to focal points and important building entrances.

5.3.3.4 Refer to Appendix 1A [Clinical Specifications] for clinical and additional requirements for Outdoor Spaces.

5.3.4 The Bridges/Corridors

5.3.4.1 The Bridges/Corridors will be Design and Constructed so that:

5.3.4.1(1) they are consistent in form, character, materials, colours and details with those of the Building and in accordance with Appendix 1L [RCH Campus Design Standards];

5.3.4.1(2) they will not be considered ramps. If sloped floors are required to connect different floor elevations between the existing Health Care Centre and the Facility they will have a maximum slope to be determined through the design development process to reduce the maximum for service functions, but to the satisfaction of the Authority, and a maximum slope of up to 4% for Patient transfers..

5.3.4.1(3) Not used.

5.3.5 Interior Design and Environment

5.3.5.1 Interior Walls and Partitions

5.3.5.1(1) Use interior walls and partition systems that provide acoustic separations as required for the specific functions to be carried out in the spaces affected, and in accordance with the requirements of Appendix 1D [Sound Transmission Ratings].

5.3.5.1(2) Provide fittings, attachments and internal bracing/backup as required to accommodate and support wall mounted equipment.

5.3.5.2 Ceilings

5.3.5.2(1) Ceiling systems will comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed and will comply with the requirements in Appendix 1D [Sound Transmission Ratings] and all other applicable provisions in this Schedule.

5.3.5.2(2) Ceiling Height will not be less than 2700 mm in all areas of the Building except for the following:

5.3.5.2(2)(a) Secure rooms will have a minimum Ceiling Height of 3000 mm;

5.3.5.2(2)(b) Ceiling Heights in rooms with equipment will be based on specific equipment requirements but no less than 2700 mm;

5.3.5.2(2)(c) ceilings in mechanical, electrical, plumbing, and telecommunication rooms and in Material Management will be open, unless required otherwise by code to meet fire ratings;

5.3.5.2(2)(d) the public lobby will have a minimum Ceiling Height of 3600 mm;

5.3.5.2(2)(e) the Large Multipurpose Room will have a minimum Ceiling Height of 4200 mm; and

5.3.5.2(2)(f) the Sally-Port will have a minimum Ceiling Height of 3700 mm.

5.3.5.2(3) Ceiling mounted Patient lift will be installed in the ceiling (i.e. recessed track) to avoid ligature risks to the extent possible.

5.3.5.2(4) All Patient Bedrooms will have ceilings and the space between ceiling and structure above designed and constructed so that location of fixtures and services (such as, but not limited to, luminaires, sprinklers, ducts,

pipes, etc.) will not require removal or relocation for future installation of ceiling mounted Patient lifts and their required support layouts.

5.3.5.2(5) Suspended structure located for overhead equipment will be located above finished ceiling.

5.3.5.2(6) Ceilings will allow access to equipment where necessary, except at those spaces as indicated elsewhere in this Schedule.

5.3.5.2(7) Make voids above suspended ceiling systems inaccessible to Patients.

5.3.5.2(8) Exposed building services are not permitted in Lobbies and Patient accessible areas.

5.3.5.2(9) Ceilings in public areas and Patient common areas will be designed to avoid plain and featureless ceilings. Ceilings in these spaces will provide visual interest.

5.3.5.3 Floor Finishes

5.3.5.3(1) The Design-Builder will provide flooring that is complementary and integral to the functional and aesthetic requirements of the interior space.

5.3.5.3(2) The Design-Builder will select floor finishes to suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated.

5.3.5.3(3) The Design-Builder will design and select floor finishes that comply with the following criteria:

5.3.5.3(3)(a) comfort, cleaning, maintenance and infection prevention and control including the frequency and quality of joints and also including ease of replacement if and when required;

5.3.5.3(3)(b) imperviousness to concentrations of moisture anticipated to be existing on the floors and for the duration of that moisture;

5.3.5.3(3)(c) permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;

5.3.5.3(3)(d) compatibility of patterns and textures with the requirements for pedestrian safety and elderly friendly design.

5.3.5.3(4) Patient shower floors and floors in Tub rooms will slope to drain and be flush-walk-in without ridges for water retention. Minimum slope will be as indicated in Section 5.3.5.3(5) and to a maximum slope that allows for comfortable movement of wheeled equipment.

5.3.5.3(5) All rooms where there is risk of flooding or liquids accumulation on the floors will be provided with floor drainage system and a minimum of 2% slope to drain.

5.3.5.3(6) Install flooring over materials that contain no more than the maximum percentage of moisture as recommended by the flooring manufacturer.

5.3.5.4 Corridors

5.3.5.4(1) Corridor widths will be a minimum of 2400 mm wide clear, except:

5.3.5.4(1)(a) in Clinical Education and Applied Research Program areas, corridors will be a minimum of 1800 mm wide;

5.3.5.4(1)(b) in major service supply areas, corridors will be a minimum of 3000 mm wide; and

5.3.5.4(1)(c) in areas where there maybe potential congestion provide a greater width as required.

5.3.5.4(2) Provide access to the ceiling plenum for building systems maintenance only from corridors. Access will be secure but convenient. If ceiling tiles are used, provide the ceiling tile layout such that access to the plenum requiring a hooded area in the corridor below will not reduce the clear corridor to less than half its original width.

5.3.5.4(3) Corridors will have recessed rest areas for Patients to promote mobility and activity.

5.3.5.4(4) In Patient Units, locate lighting fixtures that remain on during the night so that they cannot be seen from bed positions from within the Patient Bedroom.

5.3.5.4(5) All access panels located on corridor walls in public and Patient accessible areas will be consistent in form, material, and detail with the rest of the adjacent corridor materials and finishes.

5.3.5.5 Exit Stairs

5.3.5.5(1) Locate exit stairs strategically for the convenience of staff moving between related clinical departments.

5.3.5.5(2) Locate exit stairs conveniently accessible from circulation routes.

5.3.5.5(3) Avoid stair locations that negatively impact future planning flexibility or constrain desirable views from Patient care and staff work areas.

5.3.5.5(4) Provide windows with views to the exterior at each level for orientation and amenity, and provide adequate lighting into stairwells for staff security at night.

5.3.5.6 Convenience Stairs

5.3.5.6(1) Include convenience stairs, located strategically within the staff support areas of the Units, to reduce dependence on elevator use.

5.3.5.6(2) Provide convenience stairs that may also function as required exit stairs, at all elevator locations. The maximum allowable distance between the convenience stair and the closest elevator is 10 metres.

5.3.6 Infection Control

5.3.6.1 General

5.3.6.1(1) Design the Building in compliance with all applicable infection control standards.

5.3.6.1(2) Design the Building to mitigate and prevent, where possible, the spread of infection, movement of dust, debris and moisture into rooms including via contaminated surfaces and airborne pathogens.

5.3.6.1(3) Select appropriate materials and use simple detailing leading to quality workmanship and ease of accessibility for routine cleaning and maintenance.

5.3.6.1(4) Design the Building to allow for ease of infection prevention and control in future alterations, modifications and additions.

5.3.6.1(5) The following are considered by the Authority infection control sensitive areas:

5.3.6.1(5)(a) Medication room;

5.3.6.1(5)(b) Tub rooms;

5.3.6.1(5)(c) Soiled Utility room;

5.3.6.1(5)(d) Soiled Holding room;

5.3.6.1(5)(e) Phlebotomy Station;

5.3.6.1(5)(f) Clean Supply room;

5.3.6.1(5)(g) Exam / Treatment room;

5.3.6.1(5)(h) locker-rooms, washrooms and showers; and

5.3.6.1(5)(i) all other areas in the vicinity of plumbing fixtures

5.3.6.2 Walls and ceilings

5.3.6.2(1) Wall and ceilings will limit the passage of particles from both above the ceiling plane and adjacent non-clinical areas into the clinical environment.

5.3.6.2(2) Provide smooth, solid surface, non-perforated and scrub-able wall and ceilings surfaces in infection control sensitive areas. Note that there are some micro-perforated materials that may be acceptable for use in these areas and which may also provide useful sound absorption to control noise.

5.3.6.3 Floors

5.3.6.3(1) Floors in Patient accessible areas must:

5.3.6.3(1)(a) be washable, maintainable without toxic stripping and finishing, and able to withstand routine low level hospital disinfection;

5.3.6.3(1)(b) be properly sealed at all penetrations;

5.3.6.3(1)(c) be seamless, have homogeneous and heat welded seams; and

5.3.6.3(1)(d) have integral wall base.

5.3.6.4 Sinks and Hand Hygiene Stations

5.3.6.4(1) Prepare a workflow pattern and risk assessment in collaboration with the Authority to address placement of hand wash sinks and alcohol-based hand rub dispensers.

5.3.6.4(2) Provide hand hygiene stations:

5.3.6.4(2)(a) at all entrances to the Building so that visitors stop, take notice, and access them (stations will have at least four antiseptic hand rub dispensers mounted for convenient access for visitors); and

5.3.6.4(2)(b) other rooms or areas as indicated in the Clinical Specifications.

5.3.6.5 Equipment & Storage

5.3.6.5(1) Provide storage shelves that are:

5.3.6.5(1)(a) cleanable with Authority approved detergents and disinfectants;

5.3.6.5(1)(b) not located under sinks; and

5.3.6.5(1)(c) minimum 200 mm above the floor to permit routine cleaning;

5.3.6.5(2) Dedicated storage space with power outlet for charging (e.g. alcove, equipment room) required for large wheeled equipment (e.g. floor lifts).

5.3.6.5(3) If open shelving is provided for storage, the bottom shelf of such shelving will be a solid surface to prevent contamination from the floor.

5.3.6.5(4) Storage space for sharps disposal and Patient waste disposal will be secure to avoid tampering or inappropriate access.

5.3.6.6 Furniture and Millwork

5.3.6.6(1) Organic finish substances (e.g. wood), which will be exposed to a liquid, and upholstered furnishings, will be avoided, or at least minimized, in areas where immunocompromised Patients are present.

5.3.6.6(2) The use of impermeable and non-shedding upholstery (such as vinyl) is permitted in Patient accessible areas and any area where a healthcare worker goes after providing direct Patient care (including Care Team Base, Staff Lounge, conference rooms and office within Patient care areas). Polyurethane fabrics are preferred, if they meet the requirements of the application.

5.3.6.6(3) Durable, cleanable fabrics are appropriate in low risk areas. A low level of risk applies to any office areas where staff members are not providing direct Patient care, or return to after providing direct Patient care.

5.3.6.7 Corner Guards, door and door frame edge protection

5.3.6.7(1) Provide stainless steel corner guards, door and door frame edge protection in infection control sensitive areas.

5.3.7 Acoustic treatment

5.3.7.1 Design and construct the Facility to comply with the minimum sound transmission ratings between spaces described in Appendix 1D [Sound Transmission Ratings].

5.3.7.2 Provide acoustic treatment and other sound control measures as necessary to create harmonious acoustical and a healing environment for Patients and a safe and comfortable environment for staff, and where privacy and confidentiality are required.

5.3.7.3 Providing adequate speech privacy:

5.3.7.3(1) to achieve acceptable levels of speech-privacy between various spaces, compliance is required with the NIC, NC, and STC requirements of Appendix 1D [Sound Transmission Ratings]. These NIC, NC and STC requirements are intended to result in the following degrees of speech privacy. Conversations at normal speaking levels will not be understood nor overheard through the walls between adjoining Patient Bedrooms or other privacy-sensitive rooms. Raised speech will be audible but not intelligible in adjacent rooms to indicate a potential safety concern. For rooms which have doors connecting them to corridors or other rooms, but for which a high level of speech privacy must be maintained (e.g., interview, consultation, group and social work rooms), conversations at normal levels may be audible but should not be understood at a position immediately outside a door when the door is closed. For rooms requiring normal levels of speech privacy, such as Patient Bedrooms, conversations at normal speaking levels will be expected to be overheard and partially understood at a position immediately outside the door in the adjacent corridor when the door is closed;

5.3.7.3(2) as applicable, if a door and/or glazing is required between adjacent sensitive rooms (where a high level of speech privacy is required), the composite STC rating of the wall assembly and the door/ glazing sections, taking into account their relative surface areas, will equal or exceed the specified minimum (STC rating of the wall assembly. Otherwise, door or glazing between connecting sound sensitive rooms

will be avoided. For rooms having normal speech privacy needs, such as Patient Bedrooms, doors to corridors do not need to have the same sound insulation rating as the assembly there are in. However, best practices will be employed to achieve the highest sound insulation possible from standard doors

5.3.7.4 Sounds absorptive materials (acoustic surfaces) will be employed to control the reverberation and transmission of sound within and beyond the room or space in which it is created:

5.3.7.4(1) all normally occupied spaces will incorporate acoustic surfaces to achieve a design Reverberation Time equal to or less than those indicated in Appendix 1D [Sound Transmission Ratings].

5.3.7.5 When the doors to their rooms are closed, Patients in their rooms will be able to sleep with minimal interruptions from noise created in the corridor or in adjoining rooms:

5.3.7.5(1) corridor designs will incorporate suitable acoustics surfaces to adequately control the reverberation and transmission of sound within and beyond the area in which it is created.

5.3.7.6 Sound sensitive rooms, where possible, will avoid vertical and horizontal adjacencies with noise producing spaces. Noise generating spaces include group activity rooms, mechanical rooms, service rooms or circulation paths where loud activity/conversation is common:

5.3.7.6(1) as applicable, adjacent sound sensitive rooms will have doors located as far apart as possible and not directly opposite each other;

5.3.7.6(2) where possible, provide buffer zones (e.g. corridors) between noise sensitive areas (e.g. Patient Bedrooms, Multimedia rooms, meeting rooms and offices) and noisy areas (e.g. service areas and lounges).

5.3.7.7 TV's and any other sound reproducing systems, will be located and oriented so as to limit as much as possible the spreading of their sound beyond the room in which they are located.

5.3.7.8 Perceptible levels of sound and Vibration from equipment will not transfer to other Patient spaces, rooms or corridors:

5.3.7.8(1) noise from equipment such as washer and driers will be contained within their room when the door is closed.

5.3.7.9 For all noise sensitive spaces, demising partitions and ceiling constructions will be designed to provide essentially the same degree of sound insulation through each assembly.

5.3.7.10 Partitions:

5.3.7.10(1) In order to achieve the required level of speech privacy, extend an appropriate STC rated assembly full-height from floor to the underside of structure above (i.e. slab to slab) for all walls and partitions requiring an STC/NIC rating of 45/40 or higher. If such partition cannot extend full height, provide an alternate system and an acoustic consultant's report verifying that the required level of speech privacy will be achieved with the proposed design.

5.3.7.10(2) There will be no back to back penetrations (e.g., outlets) on the same stud space, stagger them by at least one stud space;

5.3.7.10(3) Recessed wall cabinets such as electrical panels, washroom towel dispensers/disposals, access panels will not be placed in walls with NIC ratings of 48 or higher. If they are required, measures will be taken (such as providing thicker or double stud walls) to prevent degradation of sound insulation;

5.3.7.10(4) All penetrations will be sealed with non-setting acoustical sealant. This includes all mechanical, electrical, and plumbing;

5.3.7.10(5) Use mineral fibre insulation to seal (plug) joints/gaps around all cut-outs such as electrical, TV and telephone outlets, plumbing escutcheons, recessed cabinets, and bathtubs where the cut-outs are too large to seal effectively using acoustical sealant only.

5.3.7.10(6) All walls will be insulated.

5.3.7.10(7) Where applicable, fiberglass acoustical blankets will be installed over wall/ceiling junctions.

5.3.7.11 Ceilings:

5.3.7.11(1) Ceilings will be constructed of an appropriate sound absorptive material. The use of drywall ceilings/bulkheads is discouraged in open spaces requiring good speech intelligibility/privacy such as intakes/triage, care team bases, or receptions, except as required for infection control as indicated in this Schedule;

5.3.7.11(2) There will be a minimal number of penetrations for lighting into the ceiling and all penetrations will be acoustically treated;

5.3.7.11(3) Ceiling in sound sensitive and potentially high noise areas such as open offices, large admitting areas and corridors will have a minimum NRC of 0.90.

5.3.7.11(4) All acoustic tile ceilings in spaces which do not have special cleaning, maintenance or environmental needs (as in food preparation areas or high temperature / humidity areas) will to have an NRC of 0.70 or higher.

5.3.7.12 Doors:

5.3.7.12(1) Except as indicated in Section 5.3.7.3(2), if doors are located in a partition required to have a specified STC rating, apply the specified rating only to the partition and not the door. However, the Design-Builder will provide such doors with full sound-rated perimeter seals and automatic door bottoms or sound-rated sweeps seals. If metal doors are used, they will be insulated with fibrous insulation (not Styrofoam) having a minimum surface density of 20 kg/m2.

5.3.7.12(2) For any doors which will not be fitted with automatic door bottoms or sound-rated sweep seals, the door undercut will not exceed 12mm.

5.3.7.12(3) Sliding doors will have full perimeter gaskets including a drop-down threshold to maintain contact with the door and frame with the intent of eliminating sound leakage pathways.

5.3.7.12(4) Use solid wood doors for corridor doors.

5.3.7.12(5) For doors in the Large Multipurpose room refer to Appendix 1J(I) [RCH MSHU Large Multipurpose Room Specifications]. For doors in rooms in the Mental Health and Substance Use Clinical Education and Applied Research Program refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications].

5.3.7.13 Glazing:

5.3.7.13(1) Except as indicated in Section 5.3.7.3(2), if glazing is located in a partition required to have a specified STC rating, apply the specified rating only to the partition and not the glazing. However, such glazing will be as a minimum a double glazed unit tempered-laminated on both sides.

5.3.7.13(2) All joints at walls abutting windows will be acoustically treated(sealed);

5.3.7.13(3) All side lights will have STC ratings equal to or higher than that of the door they are adjacent to. Their perimeters will be sealed to prevent sound leakage.

5.3.7.14 Mechanical systems and equipment:

5.3.7.14(1) Minimize constructions such as ducts, rigid conduits, or corridors that act as speaking tubes to transmit sound from one area to another.

5.3.7.14(2) Where supply and/or return ducts are common to (i.e. serve) adjacent rooms, provide appropriate sound attenuation duct lining at the diffuser and/or grill to maintain the STC of the wall assemblies involved. Seal around any duct or conduit penetrations.

5.3.7.14(3) To avoid the flanking transmission of sound, return air openings/grills serving adjacent rooms will be spaced as far apart as possible, and specifically will not be located close on either side of a demising wall.

5.3.7.14(4) Insulation jackets (acoustic duct lining) will be utilized as appropriate at supply air diffusers to reduce sound entering space from the plenum.

5.3.7.14(5) Supply air diffusers will be selected so that turbulent airflow noise levels generated by the diffusers will not exceed the NC range specified for that room type in Appendix 1D [Sound Transmission Ratings], Table 2

5.3.7.14(6) Provide vibrating equipment with appropriate resilient mountings to sufficiently suppress structure-borne sound and vibration transfer to adjacent or nearby noise and/or vibration sensitive spaces.

5.3.7.14(7) Provide ducts, pipes, and conduits with resilient, non-rigid boots or flexible couplings where they leave vibrating equipment; and isolate them from supporting structures with resilient hangers/gaskets and apply sealant where they pass through walls, floors, or other building surfaces.

5.3.7.14(8) Noise producing equipment will not be located within corridors or in rooms or alcoves which open onto the corridor.

5.3.7.14(9) When testing sound levels from HVAC equipment the units will be fully operational. Refer to Appendix 1D [Sound Transmission Ratings] for room Noise Criteria (NC) ratings.

5.3.7.14(10) Not used.

5.3.7.14(11) Mechanical and electrical equipment, whether operating continuously, quasi-continuously or intermittently but regularly, shall not, individually or collectively, cause the noise levels at the facades of neighbouring buildings within the Existing Hospital, or at exterior spaces associated with the Building (such as walkways, entryways, balconies or patios), to exceed 50 dBA. Neither shall ongoing mechanical or electrical system noise at the façades of neighbouring hospital buildings exceed those

levels necessary to insure that noise levels inside these existing facilities with windows closed, do not, when combined with the normal building system noise created within these buildings, exceed appropriate thresholds (e.g. NC 35-40 for Patient Bedrooms, offices, exam/treatment rooms). The Design-Builder will retain a professional acoustical consultant to assess mechanical and electrical system noise levels at the facades of neighbouring buildings within the Existing Hospital and to develop noise control measures which will assure that the above noise limits are met. In carrying out these tasks, the acoustical consultant will employ industry standard sound source modelling and sound propagation techniques/software.

5.3.7.14(12) Noise produced by continuously, quasi-continuously or intermittently but regularly, operating mechanical and electrical equipment and received at neighbouring residential buildings on Allen and Keary Streets shall not exceed the appropriate limits contained within the New Westminster noise bylaw (Bylaw No. 6520). Note that the levels of road and rail noise currently experienced at some existing nearby residences will be lower when the project is completed due to the noise shielding effects of the Facility. The Design-Builder will retain a professional acoustical consultant to assess mechanical and electrical system noise levels at the facades of neighbouring residential buildings on Allen and Keary Streets and to develop noise control measures which will assure that the above noise limits are met. In carrying out these tasks, the acoustical consultant will employ industry standard sound source modelling and sound propagation techniques/software.

5.3.7.15 Luminaires:

5.3.7.15(1) Give priority to the use of pendant luminaires, instead of inset ceiling lights, to increase the sound absorptive (acoustic) ceiling surface area, as appropriate by infection control requirements, maintainability, and where allowed in accordance with the SRC level of the room in non-Patient areas.

5.3.7.16 Sound Masking:

5.3.7.16(1) The use of masking noise to improve speech privacy will only be permitted in Outpatient areas (MH Level 1 only).

5.3.7.16(2) Not used.

5.3.7.17 Acoustic Treatment requirements in Patient accessible areas, except in SRC-J:

5.3.7.17(1) Friable materials are not permitted;

5.3.7.17(2) Acoustic panels that are framed are not permitted; and

5.3.7.17(3) Thoroughly anchor material mounted on walls to the wall structure with concealed stainless steel tamper resistant fasteners such that they will not be compromised or removed without use of special tools;

5.3.7.17(4) Acceptable Acoustic Wall Treatment Materials and Products:

5.3.7.17(5) Composite wood fibre bonded with cement binders such as Tectum Panels.

5.3.7.17(6) Semi rigid fibre glass with hardened edges and wrapped in an acoustic transparent vinyl fabric.

5.3.7.18 For additional acoustic treatment requirements refer to Appendix 1J(I) [RCH MHSU Large Multipurpose Room Specifications], and Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] for the corresponding rooms.

5.3.7.19 The acoustic performance requirements as indicated in this Section and corresponding Appendices is also applicable to exterior wall assemblies.

5.3.7.20 Acoustic Performance Testing

5.3.7.20(1) Post-construction performance verification tests shall be carried out at the earliest opportunity on two separate examples of each unique wall assembly having a required NIC rating (see Table 1 in Appendix 1D [Sound Transmission Ratings]) of 40 or more. If both tests do not achieve the required NIC rating, then another two walls shall be tested to establish the extent of the problem. Corrective measures shall be taken as appropriate and all failing walls retested.

5.3.7.20(2) Post-construction performance verifications tests shall be carried out of HVAC noise levels (NC) in 50% of all occupied spaces as listed in Table 2 of Appendix 1D [Sound Transmission Ratings]. The testing shall be focused (but not exclusively) on those spaces located closest to the mechanical spaces serving the various portions of the building. Where the NC requirements of Table 2, Appendix 1D [Sound Transmission Ratings] are not met, measures shall be taken to reduce the HVAC noise and the rooms retested.

5.3.7.20(3) Post-construction performance verification tests shall be taken of the reverberation times within two unique examples of each type of space listed in Table 3 of Appendix 1D [Sound Transmission Ratings]. Where the measured reverberation times do not meet the requirements of Table

3, Appendix 1D [Sound Transmission Ratings], corrective measures shall be taken and the space retested. Similar corrective measures shall then be applied to all other spaces of the same type.

5.3.7.20(4) For acoustic performance testing requirements of spaces and rooms in the Mental Health and Substance Use Clinical Education and Applied Research Program refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications].

5.3.8 Design for Safety and Efficiency

5.3.8.1 The Design-Builder will:

5.3.8.1(1) Provide detailed design features, which expressly facilitate the physical activities of the staff and Patients to increase their safety, efficiency and general well-being, and assist in eliminating ergonomic risk factors in accordance with applicable WorkSafe BC Regulations;

5.3.8.1(2) provide a design consistent with:

5.3.8.1(2)(a) Good Industry Practice;

5.3.8.1(2)(b) the Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks;

5.3.8.1(2)(c) the Fraser Health Ergonomic Standards for Sitting and Standing Workstations;

5.3.8.1(2)(d) the Fraser Health Patient Handling Equipment Including Ceiling Lift Coverage Requirements – Safe Client Handling Program: FHA Standard for Facility Design and Equipment;

5.3.8.1(2)(e) the Fraser Health Bariatric Patient Room Design Guidelines and

5.3.8.1(2)(f) applicable WorkSafe BC Regulations.

5.3.8.1(3) design all work spaces including millwork, furniture, lighting, and finishes to eliminate strain and injury to health care workers; and

5.3.8.1(4) Not used.

5.3.8.1(5) Colour

5.3.8.1(6) The Design-Builder will:

5.3.8.1(7) select departmental color palettes appropriate for the emotional and psychological needs of Patients;

5.3.8.1(8) select color palettes that contribute to the creation of a healing environment which enhances the therapeutic processes and the Patient's recovery;

5.3.8.1(9) select distribution of ambient full-spectral color within typical staff and Patient environments; and

5.3.8.1(10) avoid glare-creating finishes.

5.3.9 Art Works

5.3.9.1 The Design-Builder will design the Building to allow for the display of art work described in this Section and other art work provided by the Authority as follows:

5.3.9.1(1) provide display areas for art, including wall spaces for wall hung/mounted art in the following spaces;

5.3.9.1(1)(a) Main lobby;

5.3.9.1(1)(b) Vestibules;

5.3.9.1(1)(c) Entrance corridors;

5.3.9.1(1)(d) Patient lounges;

5.3.9.1(1)(e) Patient corridors;

5.3.9.1(1)(f) Group therapy rooms; and

5.3.9.1(1)(g) Manager's offices

5.3.9.1(2) Not used.

5.3.9.1(3) provide adjustable lighting to enhance the display of art works;

5.3.9.1(4) provide all necessary structural support, seismic restraint, vandal-proof mounting and other protective measures as required.

5.3.9.1(5) The Design-Builder will, in consultation with the Authority during the user consultation process as described in Schedule 2 [Review Procedure], install art works provided by the Authority.

5.3.9.1(6) In Patient areas art works will be fixed to the building with tamper-resistant screws.

5.3.10 Equipment Maneuverability

5.3.10.1 The Design-Builder will design and construct the Facility so that all equipment such as, but not limited to, stretchers, wheelchairs, food carts, linen carts, tow motors, etc. will satisfactorily maneuver in the areas, particularly, but not limited to, vestibules and corridors, where such equipment is expected to be circulating through, arriving at, or parked in. The Design-Builder will clearly demonstrate how the Design meets this requirement with diagrams (e.g. turning radii, required clearances, etc.) on the drawings of the corresponding floor plans.

5.4 The Energy Centre

5.4.1 design and construct it to post disaster standards as described in Section 5.2;

5.4.2 the Energy Centre will be consistent in form, character, materials, colours and details with those of the Building and in accordance with Appendix 1L [RCH Campus Design Standards];

5.4.3 secure it against unauthorized access and design it in a manner which will prevent acts of vandalism and theft.

5.4.4 Provide vehicular access for maintenance and delivery of alternative fuel source.

5.4.5 Configure the Energy Centre to enable quick removal and replacement of main equipment without the need to relocate adjacent equipment. Features such as, but not limited to, access corridors, openings or removable panels shall be provided to allow for the replacement of this equipment through the building exterior walls.

5.4.6 Minimize the exhaust from the Energy Centre, and locate and design the exhaust system (including with regard for prevailing winds) so that exhaust is not a nuisance to users of the Building or to Patients of off-Site facilities.

5.4.7 Orient the intake louvers of the Energy Centre to face away from Patient areas and other noise sensitive locations and so that outdoor air entering the ventilation system does not contain any contaminant in a concentration greater than normal outdoor ambient air in that locality. For example, no fresh air intakes will be located near areas where vehicles are parking and/or left idling as this would cause vehicle exhaust emissions to be entrained into the Energy Centre and areas supplied by the ventilation system. Locate all intake louvers of the Energy Centre so that outdoor air is available 24/7 and is not required to pass through areas whose operations may impact the availability of outdoor air at any time, including emergency scenarios. Generator radiator cooling air shall be discharged in a location where the elevated temperature will not have an adverse impact.

5.4.8 Space Table

5.4.8.1 The following table outlines the space requirements for the Energy Centre. Note that many of these spaces are determinant on the specific equipment and it configuration so will be determined by the Design-Builder's design solution.

	Energy Centre				
EC5.0	**Description**	**Unit**	**Unit/NSM**	**Total NSM**	**Comments**
EC5.0.1	**STAFF SUPPORT AREAS**				
EC5.0.1.1	Control Room	1	28.0	28.0	
EC5.0.1.2	Workshop	1	36.0	36.0	
EC5.0.1.3	Workshop Office	2	9.0	18.0	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs
EC5.0.1.4	Staff Room/Kitchenette/Locker Area	1	29.0	29.0	Soft seating; Kitchenette with fridge, microwave, counter space, tables, chair; 1/2 lockers
EC5.0.1.5	Female Staff Washroom/Shower Room/Change Room	1	10.0	10.0	
EC5.0.1.6	Male Staff Washroom/Shower Room/Change Room	1	10.0	10.0	
EC5.0.1.7	Communications Room	1	30.0	30.0	
EC5.0.1.8	Elevator Machine Room	1			To suit manufacturer's requirements
EC5.0.1.9	Chiller Room	quantity per design			To suit design and equipment requirements
EC5.0.1.10	Secondary Water Intake Room	quantity per design			To suit design and equipment requirements
EC5.0.1.11	DES Entry Room	quantity per design			To suit design and equipment requirements
EC5.0.1.12	Heating Plant	quantity per design			To suit design and equipment requirements

EC5.0.1.13	Fuel Tank	quantity per design			To suit design and equipment requirements
EC5.0.1.14	Chiller Plant	quantity per design			To suit design and equipment requirements
EC5.0.1.15	Electrical	quantity per design			To suit design and equipment requirements
EC5.0.1.16	Generators	quantity per design			To suit design and equipment requirements
EC5.0.1.17	Energy Centre Entry	quantity per design			To suit design and equipment requirements
EC5.0.1.18	Generator Silencer	quantity per design			To suit design and equipment requirements
EC5.0.1.19	Service Corridor	quantity per design			To suit design and equipment requirements
EC5.0.1.20	Bridge/Corridor	quantity per design			To suit design and equipment requirements
EC5.0.1.21	Cooling Towers	quantity per design			To suit design and equipment requirements
EC5.0.1.22	Future Service Tunnel	quantity per design			To suit design and equipment requirements
	Sub-total (CNSM)				

Total Energy Centre				

5.5 Campus Communications Hub

5.5.1 If the Campus Communications Hub and adjoining spaces (Entrance Facility Room and Tech Room) are designed and constructed as a separate component to the Energy Centre it will be:

5.5.1.1 to post disaster standards as described in Section 5.2;

5.5.1.2 consistent in form, character, materials, colours and details with those of the Building and in accordance with Appendix 1L [RCH Campus Design Standards];

5.5.1.3 secure it against unauthorized access and design it in a manner which will prevent acts of vandalism and theft; and

5.5.1.4 configured to enable a quick removal and replacement of critical equipment.

5.6 Structural Design

5.6.1 Structural Design Principles

5.6.1.1 The Design-Builder Structural Engineer of Record will be a professional engineer and a designated structural engineer with “Struct Eng” standing with APEGBC and licensed to practice in British Columbia and with demonstrated experience in structural design of buildings similar in size and complexity to this Facility.

5.6.1.2 The structural design for a Post Disaster importance level, including minimum design loads and general provisions and material specifications, to satisfy the more stringent requirements of the BCBC, local by-laws, other applicable or referenced design standards, loading criteria required by equipment suppliers or construction technique and the performance requirements detailed in this Section.

5.6.1.3 Carry out the Construction so that Construction-caused settlement of existing buildings and structures does not exceed 6 mm at any location.

5.6.1.4 Design and construct the Facility so that the long term settlement total foundation settlement does not exceed 25mm and that the differential settlement will not exceed 12.5 mm in 20m.

5.6.1.5 not used

5.6.2 Design loads

5.6.2.1 Performance criteria

5.6.2.1(1) Use the following minimum specified floor design live loads except where the specific use and occupancy of a space requires a higher live load:

5.6.2.1(1)(a) level 1 floor: 4.8 kPa (100 psf);

5.6.2.1(1)(b) Level 1 Drive Lane: 12.0 kPa (250 psf) but not less than that required for the designated City of New Westminster fire truck.

5.6.2.1(1)(c) upper floors 3.60 kPa (75 psf);

5.6.2.1(1)(d) mechanical, electrical, telecommunication, and service rooms: 6.0 kPa (125 psf) and

5.6.2.1(1)(e) Parking floors 2.4 kPa (50 psf).

5.6.2.1(1)(f) Campus Communication Hub: 7.2 kPa (150 psf)

5.6.2.1(2) Design all suspended floors to accommodate concentrated loads from (future and present) equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted, including medical equipment and Patient lifting devices.

5.6.2.1(3) Design floors for a minimum superimposed specified dead load allowance of 1.0 kPa to allow for partitions, and 0.5 kPa on upper floors and roof levels to allow for ceilings and mechanical equipment (other than medical equipment). Provide for a superimposed dead load of 0.25 kPa on the parking floors.

5.6.2.1(4) Design roofs for minimum net uplift wind loads and for the minimum snow and rain loads, including snow drift loads, required by Post Disaster importance levels per the BCBC and referenced standards. Notwithstanding other requirements, design the roofs to accommodate concentrated loads from equipment, machinery and features, whether roof or ceiling-mounted, including medical equipment and Patient lifting devices.

5.6.2.1(5) Design roofs for the superimposed specified dead load of roofing materials, green roofs (where applicable), ceilings, mechanical equipment, but not less than 1.5 kPa (30 psf) to allow for future re-roofing alternatives.

5.6.2.1(6) Design floors and roofs above mechanical and electrical service rooms for not less than a superimposed suspended equipment specified dead load of 2.0 kPa (40 psf) in addition to the minimum dead load allowances specified above.

5.6.2.1(7) Design floors for rooms designated for medical records storage or compact mobile shelving for a minimum 12.0 kPa (250 psf) specified live load.

5.6.2.1(8) Removal of formwork for suspended reinforced concrete floors and immediate re-shoring shall commence only once 100% of the 28 day design concrete strength has been achieved. This removal and re-shoring must take place in small areas. It is not acceptable to remove the formwork for an entire floor prior to re-shoring. Re-shoring must be completed during the same day as the formwork was removed.

5.6.3 Flexibility for Future Change

5.6.3.1 Design the floor structure to be able to accommodate one 130 mm diameter cored hole per structural bay at almost any location in the floor plate. The design for the concrete floors will assume at least one reinforcing bar is cut in each direction at each core location.

5.6.3.2 Design the floor structure with a minimum of one 150 mm diameter knock-out opening on two sides of each column for future use, except at parking levels (that only have parking areas in them and no other Building or Energy Centre program spaces) where one 150 mm diameter knock-out opening on one side of each column located within exterior walls is required. The knock-out openings will be in addition to any openings required for current services; additionally, the floor structure will be capable of having a minimum of six additional core holes (100 mm diameter) per bay without additional reinforcing.

5.6.3.3 Design the floor structure so that it will not interfere with the support layout of future ceiling mounted Patient lifts installations.

5.6.4 Coordination

5.6.4.1 Coordinate the structural members with the architectural finishes to have adequate thickness, cover and reinforcing to satisfy the fire protection and durability requirements.

5.6.4.2 Coordinate all structural members with other disciplines to avoid utility interferences and to ensure adequate architectural headroom and clearances.

5.6.4.3 Coordinate structure with equipment requirements for slab depressions and cast-in hardware. Provide adequate depth of slab depressions to avoid the need for ramps.

5.6.5 Deflection limitations

5.6.5.1 Design the structure to meet the deflection limits of the BCBC, and in accordance with the applicable materials design standards listed in this Schedule as a minimum and as appropriate for the non-structural components of the Facility. Notwithstanding the above, the deflection limit will not exceed the levels specified in this Section:

5.6.5.1(1) for typical concrete floor or roof construction, the maximum deflection occurring after the installation of non-structural elements due to all sustained loads, including long-term creep deflection and live load deflection, will not exceed span/480 and will not exceed span/360 for the parking levels;

5.6.5.1(2) for steel floor construction, the maximum live load deflection will not exceed span/480 with the total load deflection not exceeding span/360. The total load deflection is to include effects of shrinkage of concrete topping slabs;

5.6.5.1(3) for steel roof construction, the maximum live load deflection will not exceed span/360 and the total load deflection will not exceed span/240;

5.6.5.1(4) wind storey drift: Height/500; and

5.6.5.1(5) seismic storey drift: Height/100.

5.6.5.2 In addition to the above design deflection limits, the structure must conform to specific deflection requirements for specialty equipment as recommended by the supplier or manufacturer of that equipment.

5.6.5.3 In addition to the above design deflection limits, the deformations of the structure under service loads must be compatible with the architectural finishes and cladding system.

5.6.6 Vibration limitations

5.6.6.1 Design the structural system to minimize the effects of floor vibration due to use, occupancy and equipment. Vibration is to be limited to acceptable levels for the use and occupancy of the floors and the performance requirements of this Section. An acoustic and vibration consultant will be retained by the Design-Builder. The consultant will be a Professional Engineer registered in the Province of B.C. with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance of buildings.

5.6.6.2 Floor system vibration characteristics are to be in accordance with Commentary D of the NBCC.

5.6.6.3 Performance criteria

5.6.6.3(1) Select and design floor structural systems to have a vibration acceleration maximum limit of 0.5%g with a damping ratio of 0.02 when an excitation force of 0.29 kN is applied.

5.6.6.3(2) Machinery that could be a source of vibration is to be mounted using vibration isolation techniques.

5.6.6.3(3) In areas supporting sensitive equipment and occupancies, design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space. In-situ measurement verification of floor vibration

characteristics is to be carried out where specified by the equipment manufacturer.

5.6.6.3(4) To verify compliance with the vibration requirements, an independent testing firm may be retained by the Authority. The testing firm will measure the vibration using instrumentation which may include transducers, accelerometers, signal-conditioning equipment, data recorders, and analysis systems. Measured vibration performance characteristics for the structure must meet the requirements set out in this Schedule. The following table indicates acceptable vibration levels for various typical medical and non-medical Facility spaces:

Table Vibration Limitations

Occupancy or Equipment Requirements	Source of Vibration	Vibrational Velocity (1)		Floor Stiffness KFn(2)
		µin/s	µm/s	Kips/in-sec
Mechanical rooms on an unoccupied floor above or below an occupied floor	All systems	40000	1000	Not Applicable
Office areas, waiting rooms and corridors (non-patient care areas)	All systems other than Energy Centre standby generator sets	8000	200	250-1500
	Energy Centre standby generator sets	16000	400	
Mechanical Rooms on the same floor as an occupied area	All systems	12000	300	Not Applicable
Computer areas (Communications Rooms including the CCH)	All systems other than Energy Centre standby generator sets	8000	200	500-3000
Patient care areas including Patient Rooms	All systems other than Energy centre standby generator sets	4000	100	
	Energy Centre standby generator sets	8000	200	
(1) Value of constant velocity regions measured in one-third octave bands of frequency range 8 to 100 Hz. Based on ASHRAE, AISC and ISO Criteria. Note these limits should not be exceeded in any single one-third octave band. (2) KFn depends on walker weight and gait. Ranges indicated reflect average to conservative designs. Average walker (150 lbs, 75 steps/min). Conservative walker (185lbs, 100 steps/min)				

5.6.7 Durability

5.6.7.1 Design the structure and structural components of the Facility, including the secondary structure supporting cladding systems, to meet or exceed the requirements of CSA S478, Guideline on Durability in Buildings for a Long Life Category Design Service Life (50-99 years).

5.6.7.2 Design the structure and structural components of the Facility to minimize the effects of corrosion and deterioration due to the environment and use in accordance with the following:

5.6.7.2(1) provide adequate concrete crack control joints and expansion / contraction joints. Caulk exposed joints.

5.6.7.2(2) provide high strength concrete mixes proportioned to CSA A23.1/A23.2 durability requirements for exposure class.

5.6.7.2(3) reinforce concrete for crack control and repair exposed cracks. The maximum allowable crack width is per ACI and CSA 23.3

5.6.7.2(4) Chamfer all corners of exposed concrete.

5.6.7.2(5) hot-dip galvanize all exterior non-exposed steel.

5.6.7.2(6) hot-dip galvanize all exterior exposed steel and paint to MPDA requirements. Design parking levels to comply with CSA S413.

5.6.7.2(7) Add corrosion inhibitors to exterior reinforced concrete pavements subject to vehicle traffic.

5.6.8 Medical equipment supports

5.6.8.1 Design and provide for support/anchorage of all supplied equipment. Medical equipment will be supported, anchored, and braced to resist gravity, operational, and seismic loads in a manner appropriate for the functional and service requirements for the specific equipment.

5.6.8.2 The design for medical equipment supports, anchorage, and bracing will be carried out by a qualified professional engineer registered in the Province of British Columbia. Installations will be field reviewed by the design engineer.

5.6.8.3 Performance criteria

5.6.8.3(1) Design floor and roof assemblies to support the gravity and seismic loads for floor, wall, or ceiling-mounted medical equipment. Ensure that steel content of structural members is compatible with equipment which is sensitive to steel content of the surrounding structure.

5.6.8.3(2) Design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space. Carry out in-situ vibration testing when specified by the equipment manufacturer.

5.6.8.3(3) Where practical, design the supports for ceiling-mounted equipment, such as radiology gantries, to be universal so that the supports may be used for various types of equipment.

5.6.8.3(4) Drilled insert-type anchors for medical equipment supports and anchorage are to be rated by the insert manufacturer for seismic and cyclic loading applications.

5.6.9 Member Design Criteria

5.6.9.1 Design all floor and roof structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored loads.

5.6.9.2 Design all floor and roof structural framing members to have sufficient stiffness so as to remain serviceable under the specified gravity loads.

5.6.10 Structural Systems

5.6.10.1 the preferred structural system for the suspended floors and roof consists of cast-in-place concrete flat slab construction. Any other proposed system must provide similar performance for flexibility or change, vibration resistance, fire rating, acoustic separation, ceiling space available for services and overall building height.

5.6.10.2 Post-tensioned or precast concrete structural systems will not be accepted.

5.6.10.3 Roofs may be structural steel or concrete slab construction. Structural steel open web joists may be used at roof areas directly above mechanical rooms. They are not permitted in spaces containing clinical, functional or storage of materials related to hospital functions as required by CSA Z8000.

5.6.11 Structural Integrity

5.6.11.1 Design any structure and its structural members to have sufficient structural capacity and structural integrity to safely resist all loads and effects of loads and

influences that may reasonably be expected over the service life of the structure including settlement.

5.6.12 Thermal Expansion

5.6.12.1 Design the primary and secondary structural elements to accommodate the effects of thermal movements of the building structure.

5.6.13 Seismic Isolation

5.6.13.1 Design the structure to be completely independent from any existing or new adjacent structures by a properly designed seismic isolation joint which takes into account the lateral drifts of both structures in accordance with the provisions of the BC Building Code.

5.7 Security Requirements

5.7.1 The Patient population of the Building ranges from low risk to high risk and consists of both males and females, therefore requiring multiple levels of security that is appropriate for the various Patient classification and genders.

5.7.2 Even though the Patient population of the Building ranges from low risk to high risk, all Patients in this Facility will require varying levels of therapeutic interventions. Therefore, the Authority is seeking a design that will simultaneously promote both the safety and well-being of Patients and at the same time create a therapeutic environment that will provide innovative, Patient-centered therapeutic interventions that will allow Patients to successfully re-integrate into society to become productive members of the community.

5.7.3 Because the Building's primary purpose is therapeutic, the Design-Builder will design and construct the Building and its systems and security measures:

5.7.3.1 to be unobtrusive, not interfere with the therapeutic processes and environment, and emphasize human interaction and effective operations as the primary means of control rather than physical control and reaction, while ensuring proper security and safety for all;

5.7.3.2 to provide a level of security that is appropriate for this type of Building without compromising its therapeutic and healing aspects;

5.7.3.3 within the limits of the appropriate protocols and rules for the Patients, provide freedom of movement and allow full use of the amenities without perceived monitoring by minimizing the visual presence of security elements.

5.7.3.4 to create an inclusive and dignifying environment throughout the Building, while maintaining not only the security of the Building and its contents (e.g., equipment, medicines, Patients' valuables, stored items, etc.) but also the safety for Patients,

staff and visitors, meeting the requirements of the applicable Laws including the Mental Health Act;

5.7.3.5 to ensure the scope of visual surveillance in the Building is maximized and the provision of small alcoves (where Patients could conceal themselves) is minimized;

5.7.3.6 to comply with the following dynamic security criteria:

5.7.3.6(1) Patient Care Services units will feature Care Team Bases. The security provisions of the Care Team Base will be unobtrusive, while maintaining visibility to the Patient Bedroom doors and Patient activity spaces.

5.7.3.6(2) All circulation routes within the Building must be secure and will be monitored using ESS systems (see Section 1.2.1).

5.7.3.7 include no ligature attachment points, no opportunity to hide contraband and no opportunity to disassemble building components to create weapons within Patient accessible areas;

5.7.3.8 except as indicated otherwise in this Schedule, provide building components, assemblies, materials, and design details in each room or space in the Building that resist and meet the adequate level of security as required based on the intended use of the space as described in Appendix 1A [Clinical Specifications] and the Safety and Risk Categories as described in Section 5.8.1 ;

5.7.3.9 to address, through the application of Crime Prevention Through Environmental Design (CPTED) principles of physical safety and security wayfinding and legible connections between functional components;

5.7.3.10 support the application of innovative and emerging technologies relating to communications, security control and access, systems control and monitoring, and information storage and retrieval:

5.7.3.10(1) systems infrastructure will be flexible with enough bandwidth to support new and evolving technologies as they gain acceptance. In all cases, state of the art technology will be required;

5.7.3.10(2) technologies such as biometric identification and body scanning technologies may be employed in the future. Infrastructure will be designed in a manner that allows for this possibility;

5.7.3.10(3) all internal door controls in the Patient Care units will be monitored by staff stationed in the Care Team Bases;

5.7.3.10(4) security and alarm systems for the Building will be monitored by staff stationed in the Security Office.

5.8 Building Security and Safety

5.8.1 Safety and Risk Categories (SRC)

5.8.1.1 All areas of the Building require different treatment with respect to Patient and staff safety and risk reduction. Based on the space's functionality, its intended use, and to ensure that assemblies (such as, but not limited to, walls, ceilings, floors, doors, windows), materials, finishes, fixtures, equipment, security and safety technologies, are designed, constructed and provided by the Design-Builder to a level acceptable by the Authority a Safety and Risk Category (SRC) has been assigned to each space in the Building. The following are the different SRCs descriptions from lowest to highest safety and risk:

5.8.1.1(1) Safety and Risk Category A (SRC-A): This category is applicable to spaces where anyone is walking in from the street and no screening being applied. Some examples of these spaces are waiting areas, Main Lobby, Large Multipurpose Room, and Public Washrooms. The materials and performance of these spaces will be standard "hospital grade". Even though these spaces may be accessed by Patients they do not require to have features such as ligature resistance, tamper-proofing, anti-barricade, and security assemblies (e.g., windows/glazing, walls, doors, etc.) and are excluded from spaces that are referred to as "Patient accessible areas". Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(1)(a) Abuse resistant walls.

5.8.1.1(2) Safety and Risk Category B (SRC-B): This category is applicable to service rooms and is typically found in the "back of house" or off the unit and is off limits to Patients. Some examples of these spaces are Electrical, Mechanical, and Telecommunication rooms. The materials and performance of these spaces will be standard "hospital grade". Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(2)(a) Abuse resistant walls.

5.8.1.1(3) Safety and Risk Category C (SRC-C): This category is applicable to Staff only spaces. Some examples of these spaces are Staff Washrooms, Linen Clean Supplies, and Housekeeping. The materials

and performance of these spaces will be standard “hospital grade”. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(3)(a) Abuse resistant walls.

5.8.1.1(3)(b) Small window with vision glazing in the door to determine if someone is in the room.

5.8.1.1(4) Safety and Risk Category D (SRC-D): This category is applicable to spaces where access for Patients is controlled by Clinical Staff. Some examples of these spaces are Life Skills Assessment, Exam, and Consultation/Therapy room. The construction of these spaces will not allow Patients to penetrate or compromise the integrity and security of the room’s assemblies by providing a higher level of material and performance than standard “hospital grade” appropriate for a Mental Health facility and features such as tamper-proofing and vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(4)(a) Impact resistant walls up to 1220mm above finished floor and balance to be abuse resistant;

5.8.1.1(4)(b) Vision glazing that allows for casual walk by observation of the room

5.8.1.1(5) Safety and Risk Category E (SRC-E): This category is applicable to spaces freely accessed and occupied by Patients. Patients are supervised by having Direct Line of Sight from the Care Team Base/reception/control desk. Some examples of these spaces are Lounge (Quiet), Dining Room/Lounge, and Patient Corridor in Units. The construction of these spaces will not allow Patients to penetrate or compromise the integrity and security of the room’s assemblies by providing a higher level of material and performance than standard “hospital grade” appropriate for a Mental Health facility and features such as ligature resistance, tamper-proofing, anti-barricade, and vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(5)(a) Impact resistant walls up to 1220mm above finished floor and balance to be abuse resistant;

5.8.1.1(5)(b) Vision glazing that allows for casual walk by observation of the room;

5.8.1.1(5)(c) Computer and other equipment are securely fastened

5.8.1.1(6) Safety and Risk Category F (SRC-F): This category is applicable to spaces freely accessed and occupied by Patients under casual supervision and that have no Direct Line of Sight from the Care Team Base/reception/control desk etc. Some examples of these spaces are Visitor Lounge, Lounge (Quiet), and Patient Laundry Facilities. The construction of these spaces will not allow Patients to penetrate or compromise the integrity and security of the room's assemblies by providing a higher level of material and performance than standard "hospital grade" appropriate for a Mental Health facility and features such as ligature resistance, tamper-proofing, anti-barricade and vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(6)(a) Impact resistant walls up to 1220mm above finished floor and balance to be abuse resistant;

5.8.1.1(6)(b) Vision glazing that allows for casual walk by observation of the room;

5.8.1.1(6)(c) Computer and other equipment are securely fastened

5.8.1.1(6)(d) Areas are not accessible to Patients during the night.

5.8.1.1(7) Safety and Risk Category G (SRC-G): These spaces will be accessed and occupied by Patients without continuous supervision and where Patient privacy is required. Some examples of these spaces are Patient Bedroom, Ensuite, Patient/Public Washrooms and Patient Washrooms. The construction of these spaces will not allow Patients to penetrate or compromise the integrity and security of the room's assemblies by providing the highest level of material, performance and durability and features such as ligature resistance, tamper-proofing, anti-barricade and vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(7)(a) Impact resistant walls (to u/s of structure);

5.8.1.1(7)(b) Vision glazing that allows for casual walk by observation of the room, except in Patient Bedrooms, Ensuites, Patient/Public Washrooms, and Patient Washrooms;

5.8.1.1(7)(c) Not used;

5.8.1.1(7)(d) Items stored on fixed open shelving; and

5.8.1.1(7)(e) Power cords are kept to a maximum length of 450mm.

5.8.1.1(8) Safety and Risk Category H (SRC-H): This category is applicable to Staff only spaces and where there is a transaction counter for exchange of information between Patients/Public and Staff. The intent is to protect the Staff and the contents within. Some examples of these spaces are reception, open portions of Care Team Base, Medication Room with a dispensing window. Adjacent space(s) will be used by staff as refuge areas should staff feel unsafe where they call for assistance. The construction of the perimeter of these spaces will not allow Patients or public to penetrate or compromise the integrity and security of the space's assemblies by providing the highest level of materials, performance and durability and features such as vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(8)(a) Impact resistant walls (to u/s of structure) or perimeter as applicable; and

5.8.1.1(8)(b) Computer and other equipment are securely fastened.

5.8.1.1(9) Safety and Risk Category I (SRC-I): This category will not be used to avoid confusion between numerical and alphabetical denominations.

5.8.1.1(10) Safety and Risk Category J (SRC-J): This category is applicable to spaces where Patients are at risk to harm themselves or others. The intent for these spaces is to confine and protect the Patient. Some examples of these spaces are Secure Room and Ante Room. The construction of these spaces will not allow Patients to penetrate or compromise the integrity and security of the room's assemblies by providing the highest level of material, performance and durability and features such as ligature resistance, tamper-proofing, anti-barricade and vandal resistance. Without limitation and in addition to all other applicable requirements described in this Schedule, some of the features and requirements in this category are:

5.8.1.1(10)(a) Impact resistance walls (to u/s of structure);

5.8.1.1(10)(b) Vision glazing that allows for observation of the room;

5.8.1.1(10)(c) Non ligature coat hooks, towel bars, shower curtains or coat rods;

5.8.1.1(10)(d) Soap, shampoo and clean towels will be stored in open fixed shelf cupboard in Ante room.

5.8.1.2 The Design-Builder will design and construct all rooms and spaces included in the Building in accordance with the Safety and Risk Category (SRC) applicable to that room or space as set out in Appendix 1A [Clinical Specifications] while maintaining a friendly, inviting, and non-institutional character and in accordance with Section 5.7.3.8 of this Schedule

5.8.1.3 When two spaces of different SRC rating share an assembly (e.g., partition, door, window) such assembly will be rated as the highest SRC rating of the two spaces.

5.8.2 Staffing Model

5.8.2.1 Refer to Attachment 1 to Appendix 1A [Staffing Model].

5.8.3 Electronic Security Systems

5.8.3.1 Include electronic security systems as described in this Schedule to assist staff in the supervision, control, and monitoring of Patient and staff movement and activity within a high risk therapeutic environment. The electronic security system will be designed as a secondary system which supports the primary passive security elements (such as the Building's Design itself as required in this Schedule); and

5.8.3.2 use static security systems that will be responsive to the Safety and Risk Categories indicated for each room in Appendix 1A [Clinical Specifications] and will include:

5.8.3.2(1) Electronic Access Control;

5.8.3.2(2) Video surveillance (for security and Patient safety purposes);

5.8.3.2(3) Panic/Duress system;

5.8.3.2(4) Intrusion Detection system; and

5.8.3.2(5) Not used

5.8.3.2(6) unobtrusive security measures to the extent possible.

5.8.4 Building Construction Systems

5.8.4.1 Static security measures will include security construction, barriers and monitoring devices.

5.8.4.2 To enhance monitoring of Patients, corridors without 2 directions and 2 means of exit will be avoided.

5.8.4.3 Secure construction systems include the provision of assemblies such as, but not limited to, walls, windows, doors, floors, roofs, and ceilings that resist penetration by physical force. Refer to Section 5.7.3.8 of this Schedule.

5.8.4.3(1) Security Windows

5.8.4.3(1)(a) Security windows will be required in all Patient accessible areas including SRC-H.

5.8.4.3(1)(b) For security windows in Secure rooms refer also to the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act

5.8.4.3(1)(c) In Patient units, windows will have a maximum operable window opening in accordance with Section 6.7.2.7(1)(c).

5.8.4.3(2) Security Glazing

5.8.4.3(2)(a) Provide Security Glazing in all Patient accessible areas, including SRC-H areas.

5.8.4.3(2)(b) As applicable, convenience stairs, upper floor interior balconies and corridors and areas open to below will be fitted with full height Security Glazing guardrails (to underside of structure above) for occupant safety.

5.8.4.3(3) Security Doors

5.8.4.3(3)(a) Security doors are required in Secure Rooms and will be designed and constructed in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act.

5.8.4.3(4) Hardware Systems

5.8.4.3(4)(a) Anti-ligature, tamper resistant and abuse resistant hardware will be consistent throughout the Building with the Safety and Risk Categories.

5.8.4.3(4)(b) Detection features, such as alarms on doors, will monitor unauthorized entry and egress on all Facility entry and exit points. Monitoring of all Building access doors will be by the Security Office.

5.8.4.3(4)(c) Subject to applicable Law and the requirements of the applicable Authority Having Jurisdiction, door operations will follow Appendix 1E [Door Operations Matrix].

5.8.4.3(4)(d) Provide access and egress hardware for security door assemblies to restrict and control movement through the Building.

5.8.4.3(5) Security Screens (Outdoor Spaces)

5.8.4.3(5)(a) Secure Outdoor Spaces will be provided with Security Screens that will:

(a).1 allow for vision to the outside;

(a).2 be designed to prevent escape or unauthorized entry;

(a).3 be of minimum 3600mm above finished floor or full height (to underside of structure above);

(a).4 be non-climbable, including restrictions at wall junctions and interfaces;

(a).5 be anti-ligature; and

(a).6 be of a glazing assembly in accordance with the following requirements:

(a).6.1 have a post disaster importance factor in accordance with the BCBC;

(a).6.2 have a design service life of at least thirty years; and have a 3mm polycarbonate layer laminated between 6mm fully tempered glass and 6mm fully tempered glass.

5.8.4.4 Security system cameras will be provided on both sides of the Sally-Port doors, controlled vestibule doors, ingress and egress doors and double egress doors, in addition to those referred to elsewhere in this Schedule and in Appendix 1A [Clinical Specifications].

5.8.4.5 The impact resistance, on the side exposed to Patients, of exterior wall assemblies, interior partition assemblies or any other assembly that have security

windows in them, or immediately adjacent to them, will be equivalent to the 2000 ft-lb impact test as specified by New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines and AAMA 501.8 Standard Test Method for Determination of Resistance to Human Impact of Window Systems Intended for Use in Psychiatric Applications.

Part 6. FACILITY CONSTRUCTION SUBGROUP SPECIFICATIONS

6.1 Existing Conditions (Division 2)

6.1.1 Refer to the Design-Build Agreement and the Data Room regarding the Site Reports.

6.2 Concrete (Division 3)

6.2.1 General Requirements

6.2.1.1 Design and construct cast in place concrete of appropriate properties for the intended use in accordance with the requirements of all applicable codes and specifications.

6.2.1.2 Design concrete for the applicable concrete exposure class.

6.2.1.3 Maximize the fly ash content of the mix consistent to ensure satisfactory concrete performance properties. All cast in place concrete must be vibrated or densified in an approved manner by a competent Place and Finish Contractor.

6.2.2 Design and Performance Requirements

6.2.2.1 Inspect and test cast in place concrete and concrete materials through a CSA certified testing laboratory in accordance with CAN/CSA A23.1-09. Comply with CAN/CSA A23.2-09 for Non-Destructive Methods for Testing Concrete.

6.2.2.2 Ensure inspection and testing of precast concrete materials and workmanship by the precast concrete contractor as part of its quality control program in accordance with all applicable standards. Maintain plant records and ensure quality control as required by CSA A251 and in accordance with this Agreement.

6.2.2.3 Finish concrete floors with a smooth, dense, steel trowel finish with a Class B Levelness and Flatness Classification in accordance with CAN/CSA A23.1/A23.2-09, except where stricter requirements are needed to suit the proposed occupancy or equipment that will be located in the space. Do not use overlay toppings to level floors.

6.2.2.4 Repair cracks in concrete floors and walls to suit the floor finish and long-term serviceability requirements of the floor.

6.2.2.5 Water proof all foundation walls for below-grade to prevent groundwater ingress. Use purpose-made water stops in construction joints. Install a perimeter draining system around the exterior of the entire Building.

6.2.2.6 Comply with CAN/CSA A23.1/A23.2-09 to minimize honey combing or patching in exposed architectural concrete. Honeycombing and bug holes will be repaired immediately under the direction of the Structural Engineer.

6.2.2.7 Provide architectural concrete for exposed concrete in areas used by staff, Patients or public. Identify the proposed surface finishes intended for architectural concrete in each relevant Submittal.

6.2.2.8 Provide vapour barrier under slabs-on-grade in the form of continuous, cross-linked, minimum 10 mil sheets with a water vapor transmission rate of less than 0.008 perms.

6.2.2.9 See Section 6.4.2.4 for concrete topping on metal deck requirements.

6.2.2.10 Where no applied finish is required, seal concrete surfaces to resist penetration and staining from food products, bodily fluids, cleaning compounds, etc. Apply and maintain sealers in accordance with manufacturer's recommendations.

6.2.2.11 Where floor drains are required, design and construct floors with minimum slope to drain of 2% (1:50) so as to prevent ponding of water or other fluids.

6.3 Masonry (Division 4)

6.3.1 General Requirements

6.3.1.1 The Design-Builder may use masonry construction for:

6.3.1.1(1) exterior walls and walls systems where permanence of finishes, both visually and functionally, and ease of maintenance are primary considerations in the exterior fabric of the Facility.

6.3.1.1(2) interior walls and wall systems when priorities include permanence and maintenance, sound transmission control, fire resistance and separation requirements and security.

6.3.1.2 The Design-Builder may use concrete unit masonry for;

6.3.1.2(1) both independent exterior walls and in exterior wall systems as a structural backing to other finish materials or systems; and

6.3.1.2(2) for interior applications as an integrally finished material, as a base for applied finish and as a structural backing to other finish systems.

6.3.1.3 Ensure masonry wall assemblies are only installed by installers who are members in good standing with the Masonry Institute of British Columbia.

6.3.1.4 Concrete Masonry Units

6.3.1.4(1) Do not use concrete unit masonry as an exposed finish in clinical areas, Patient areas, and public areas.

6.3.1.4(2) Where concrete unit masonry is used as the exposed finish, all exposed corners will have rounded or chamfered corners.

6.3.1.4(3) Ensure masonry design and construction comply with all applicable codes and standards including, but not limited to CSA S304, CSA A371, the BC Building Code and the Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual.

6.3.1.4(4) Masonry design and construction must meet or exceed current Canadian standards and practices, as set out in this section, may be considered for building elements.

6.3.1.5 Brick Masonry

6.3.1.5(1) Exterior wall systems comprising brick masonry as a finish veneer to concrete, concrete masonry or metal framing will be a rain screen or cavity wall system.

6.3.1.5(2) Brick masonry below grade for exterior applications is not permitted.

6.3.1.5(3) Brick masonry in interior applications is to have integral finish and construction compatible with the Authority's infection prevention and control requirements.

6.3.1.6 Stone Masonry

6.3.1.6(1) Stone masonry may be used as a finish veneer to concrete walls or concrete masonry walls. Exterior wall systems in such applications will be in accordance with a rain screen or cavity wall system.

6.3.1.6(2) Stone will be sound, hard and durable, well-seasoned and of uniform strength, colour and texture, and free of quarry sap, flaws, seams, sand holes, iron pyrites or other mineral or organic defects.

6.3.1.6(3) Manufactured stone products are excluded.

6.4 Metals (Division 5)

6.4.1 General Requirements

6.4.1.1 Structural steel, steel deck, and cold-formed steel stud design and construction that meets or exceeds current Canadian standards and practices, as set out in this section, may be used for building elements and systems, where appropriate.

6.4.1.2 The Design-Builder may use load bearing steel studs as a component of the exterior wall systems to support exterior wall finishes and form an integral part of the perimeter envelope.

6.4.1.3 Load bearing steel studs may be part of the structural framing or may be independent of the principal structural system.

6.4.2 Design and Performance Requirements

6.4.2.1 Design structural steel, steel deck, and cold-formed steel stud systems to comply with the deflection and vibration criteria outlined in Section 5.6.

6.4.2.2 Erection tolerances for steel construction will be in accordance with all applicable CAN/CSA standards.

6.4.2.3 For steel floor and roof construction, design for the effects of deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs. Vary the topping slab thickness as required to maintain floor levelness tolerances. Consider the additional concrete ponding weight in the design of the structure.

6.4.2.4 Design and construct concrete topping slabs on steel deck to control cracking and avoid random surface shrinkage cracking and radial cracking around re-entrant corners. Implement concrete construction and curing procedures to minimize cracking for concrete topping slabs on steel deck.

6.4.2.5 Provide wide rib profile steel floor/roof decking for ease of attachment of current and future services, equipment, and fixtures using drilled insert expansion anchors into the bottom of the deck ribs.

6.4.2.6 Provide steel floor/roof decking plus the concrete topping slab thickness assemblies that satisfy the requirements of a ULC-rated assembly meeting the BCBC fire rating requirements. Do not use spray on or applied fireproofing material to achieve required floor deck fire rating.

6.4.2.7 Fire proof structural steel floor/roof framing and supporting members to meet the BCBC fire rating requirements.

6.4.2.8 Structural Steel and Steel Joists

6.4.2.8(1) Use a CSA certified testing laboratory to provide quality assurance testing and monitoring of workmanship using testing procedures

specified in the CAN/CSA standards listed in Section 2.5 of this Schedule to verify soundness of representative shop and field welds.

6.4.2.8(2) All welding is to be performed by welders certified by the Canadian Welding bureau to the requirements of CAN/CSA W47.1. The Design-Builder will provide certification that all welders comply with this requirement, if requested by Authority.

6.4.2.8(3) Conform to the Master Painters Institute (MPI) Standards for preparation and painting of Structural Steel components.

6.4.2.8(4) Exterior exposed structural steel will be hot-dipped galvanized to 600g/m^2 or painted with quality two-part epoxy paint system.

6.4.2.9 Load Bearing Steel Studs

6.4.2.9(1) Design, detail and construct load bearing steel stud design and construction to comply with all applicable CAN/CSA standards.

6.4.2.9(2) Ensure all load bearing steel stud construction is designed by a professional engineer registered in the Province of British Columbia.

6.4.2.9(3) Ensure the steel stud manufacturer is certified in accordance with CSSBI Standard 30M06 and all applicable CAN/CSA standards.

6.4.2.9(4) Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.4.2.9(5) Limit maximum deflection under specified wind loads to L/360 (L/720 for masonry veneers), unless a smaller maximum deflection is specifically required due to wall finishes.

6.4.2.9(6) Design components to accommodate erection tolerances of the structure.

6.4.2.9(7) Design wind bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially.

6.4.2.9(8) Design steel studs to take into account the anchorage of other materials being supported including sub-girts supporting metal cladding and composite panels, soffit finishes and the provision of lateral support at window heads.

6.4.2.10 Guardrails and Handrails

6.4.2.10(1) Design all guardrails and handrails to their usage classification and per applicable codes.

6.4.2.10(2) Provide a durable painted finish for steel guardrails.

6.4.2.10(3) Provide a manufactured pre-finish for stainless steel or aluminum guardrails.

6.5 Wood, Plastics and Composites (including Millwork) (Division 6)

6.5.1 General Requirements

6.5.1.1 Use wood and plastic products within the limitations of combustible content restrictions of the BCBC for the specific occupancy classification of the buildings.

6.5.1.2 Do not use materials containing urea formaldehyde in the Facility.

6.5.1.3 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/communication rooms, roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including exterior fascia, cabinets, casework, frames, panelling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required:

6.5.1.3(1) to support functionality as set out in the Clinical Specifications or as required for operation of the Facility; and

6.5.1.3(2) for wood products exposed to view in finished interior and exterior installations.

6.5.1.4 Provide solid polymer fabricated or stainless steel surfacing for:

6.5.1.4(1) all counters that incorporate integral sinks; and

6.5.1.4(2) other areas as required to create surfaces that provide antiseptic or clean characteristics, will endure special or regular maintenance, and are resistant to caustic action of chemicals or agents used by the Authority.

6.5.1.5 Provide acrylic plastic products (or other products as requested by the Authority) for wall protection, casework finishing, trims, ornamental elements, and other applications as required to achieve a quality of interior finish suitable for use by Patients and staff.

6.5.1.6 Use pressure treated wood for any exterior exposed wood and wood in direct contact with concrete, masonry, and soil.

6.5.2 Design and Performance Requirements

6.5.2.1 Finish Carpentry, Millwork and Architectural Woodwork

6.5.2.1(1)(a) Conform to AWMAC Architectural Woodwork Standards Manual for minimum “Custom Grade” and DHI standards for the design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork.

6.5.2.1(1)(b) Conform to AWMAC Guarantee and Inspection Service (GIS) program.

6.5.2.1(1)(c) Use adhesives that are non-toxic, non-solvent glue and comply with AWMA Quality Standards Manual, Canadian ‘Eco-Logo’ program and CaGBC standards.

6.5.2.1(1)(d) Provide countertops that comply with the following requirements:

(d).1 high pressure plastic laminate: general purpose grade, standard duty, minimum 1.06 mm thick complete with minimum 3mm PVC edge to match faces;

(d).2 core: western softwood plywood in compliance with CSA 0151-M1978, good one side, solid two sides, for use as plastic laminate cores, minimum 19 mm thick. Provide liner grade backer sheet to the underside of all countertops. Use marine-grade plywood substrate for countertops. Do not use fibreboard or particleboard; and

(d).3 solid surface countertops: solid surface material (SSM) consisting of reacted monomers and resins, mineral fillers and pigments manufactured in sheets of 13 mm nominal thickness. SSM will be solid, non-porous, homogeneous, hygienic, renewable, and, when applicable, will feature inconspicuous hygienic seams. SSM will be free from conspicuous internal strengthening fibers. SSM must meet or exceed performance standards set out in ISSFA -2-01.

6.5.2.1(1)(e) Provide casework that meets the following requirements:

(e).1 Core for doors: plywood.

(e).2 Core for all other panel products: hardwood plywood.

(e).3 Laminate grade: general purpose grade, standard duty, minimum 1.06 mm thick.

(e).4 Plastic laminate to both sides of doors and drawer fronts.

(e).5 Edge banding for all exposed parts: minimum 3 mm PVC edge to match faces.

(e).6 Edge banding at semi-exposed parts: minimum 1 mm PVC edge, colour to match door face.

(e).7 Liner grade for semi-exposed parts: minimum thickness of 0.76 mm, used on the following: semi-exposed shelves, interior portions of case bodies, all surfaces of drawer boxes.

6.5.2.2 Patient Bedroom Wardrobe

6.5.2.2(1) The Patient Bedroom wardrobe will be constructed as a millwork element in the rooms as identified in Appendix 1A [Clinical Specifications].

6.5.2.2(2) The Patient room wardrobe will:

6.5.2.2(2)(a) be accessible from within the Patient Bedroom by staff and Patients; and

6.5.2.2(2)(b) have an upper cupboard for longer term storage and a lower cupboard for frequent use items.

6.5.2.2(3) Patient Bedroom wardrobe will be constructed as a singular millwork unit consisting of a lower and upper cupboard.

6.5.2.2(4) The Authority prefers the wardrobe to be 1066mm in width, 610mm in depth, and 2440mm in height, however the minimal acceptable size is 914mm in width, 610mm in depth, and 2440mm in height.

6.5.2.2(5) The upper cupboard will be at least 610mm in height and the lower cupboard will be at least 1830mm in height. Doors and drawers are not acceptable.

6.5.2.2(6) The lower cupboard will be divided vertically into 2 equal sections with a fixed bottom shelf.

6.5.2.2(6)(a) The right section will be divided into 5 equally sized compartments with fixed shelves. The two lower compartments will be fitted with pull out drawers.

6.5.2.2(6)(b) The left section will have one upper fixed shelf (sized to match the upper fixed shelf in the right section) and three anti-ligature coat hooks.

6.5.2.3 Patient Bedroom Desk

6.5.2.3(1) The Patient Bedroom desk will be constructed as a millwork element in the rooms as identified in Appendix 1A [Clinical Specifications].

6.5.2.3(2) Patient Bedroom desk will be constructed as a singular millwork unit but can be constructed in conjunction with the Patient room wardrobe.

6.5.2.3(3) Patient Bedroom desk will be a minimum of 914mm in width, and 610mm in depth, and mounted 715mm above the finished floor.

6.6 Thermal and Moisture Protection (Division 7)

6.6.1 General Requirements

6.6.1.1 Design construction assemblies according to sound building envelope principles.

6.6.1.2 Design construction assemblies to prevent the ingress of moisture or water vapour from the exterior through the building envelope and the passage of air through the building envelope from the interior spaces to the exterior and vice versa.

6.6.1.3 Design construction assemblies to prevent the ingress of moisture through foundation walls below grade, both subject and not subject to hydrostatic pressure.

6.6.1.4 Provide protection (such as insulation) to resist the transfer of heat through exterior walls and roofs to create comfortable, liveable interior environments.

6.6.1.5 Provide resistance to the propagation and spread of fire for exterior walls and interior walls designated as fire-resistance rated separations where appropriate.

6.6.2 Design and Performance Requirements

6.6.2.1 Dampproofing

6.6.2.1(1) Do not use dampproofing as a means of prevention of moisture ingress.

6.6.2.2 Waterproofing

6.6.2.2(1) Provide waterproofing to prevent moisture ingress to basement and crawlspaces below grade.

6.6.2.2(2) Use membrane waterproofing to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated.

6.6.2.2(3) Use fluid-applied waterproofing for mechanical room floors.

6.6.2.2(4) Provide waterproof membranes in exterior walls as part of the building envelope and integral with rain screen or cavity wall assemblies.

6.6.2.2(5) Dam the floor under key mechanical equipment in the mechanical penthouse, mechanical rooms and mechanical shafts with a continuous curb and waterproofing to contain the water. Provide floor drains.

6.6.2.3 Vapour Barriers

6.6.2.3(1) Prevent water vapour transmission and condensation in wall assemblies, roofing assemblies, and under concrete slabs-on-grade within the building perimeter by means of a continuous vapour barrier membrane.

6.6.2.4 Air Barriers

6.6.2.4(1) Prevent air leakage caused by air pressure across the wall and roof assembly by means of air barrier assemblies.

6.6.2.4(2) Provide air barrier assemblies that:

6.6.2.4(2)(a) limit air exfiltration and infiltration through materials of the assembly, joints in the assembly, joints in components of the wall assembly, and junctions with other building elements including the roof; and

6.6.2.4(2)(b) prevent air leakage caused by air pressure across the wall and roof assembly, including interruptions to the integrity of wall and roof systems such as junctions with dissimilar constructions.

6.6.2.5 Thermal Protection

6.6.2.5(1) Provide continuous rigid and semi-rigid thermal insulation as part of the building envelope to prevent the transfer of heat both from the interior to the exterior and vice versa, depending on seasonal conditions, and to resist the absorption of water.

6.6.2.5(2) Use thermal protection materials of a type and quality that will provide consistent environmental quality to enclosed spaces.

6.6.2.5(3) Use foamed plastic insulation that is CFC and HCFC free.

6.6.2.5(4) Minimum insulation values will be:

6.6.2.5(4)(a) R20 (U-Value 0.05) for exterior walls; and

6.6.2.5(4)(b) R30 (U-Value 0.033) for roof areas

or higher as necessary to achieve targeted energy performance.

6.6.2.6 Roofing

6.6.2.6(1) Comply with the Roofing Contractors Association of British Columbia Guarantee Roof Star latest standards and requirements for a five (5) year Guarantee, as published in the Roof Star Roofing Practices Manual. Perform roofing quality inspections as required by the RCABC to obtain the RCABC warranty.

6.6.2.6(2) Comply with CRCA Roofing Specifications Manual “Acceptable Materials List”.

6.6.2.6(3) Membrane roofing will withstand uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings will remain watertight.

6.6.2.6(4) Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience

6.6.2.6(5) Use foamed plastic insulation that is CFC- and HCFC-free.

6.6.2.6(6) Provide SBS modified bitumen roofing system (multi-ply) for all roofs in accordance with the following standards:

6.6.2.6(6)(a) Base sheet: Conforming to CGSB 37-GP-56-M and ASTM D6162, Type II;

6.6.2.6(6)(b) Base sheet flashing: Conforming to CGSB 37-GP-56M;

6.6.2.6(6)(c) Cap Sheet and Cap Sheet Flashings: Conforming to CGSB 37-GP-56-M and ASTM D6162, Type II;

6.6.2.6(6)(d) Traffic Cap Sheet: Conforming to CGSB 37-GP-56-M.

6.6.2.6(7) Not used

6.6.2.6(8) In vegetated green roofs, design the assembly so that the system dead load, measured according to ASTM D2397, when added to the weight of the roofing membrane system, does not exceed the maximum allowable dead load for the roof.

6.6.2.6(9) Include the following as part of the roofing systems:

6.6.2.6(9)(a) flashings and sheet metal;

6.6.2.6(9)(b) thermal insulation;

6.6.2.6(9)(c) assembly components for green roofs, as applicable;

6.6.2.6(9)(d) roofing specialties and accessories required for completion;

6.6.2.6(9)(e) interior access systems to roof areas;

6.6.2.6(9)(f) protection from pedestrian traffic and solar radiation;

6.6.2.6(9)(g) roof drainage, including overflow scuppers; and

6.6.2.6(9)(h) fall protection or fall arrest systems

6.6.2.6(10) Provide sheet metal flashings that divert water away from membrane flashing termination and protect the membrane from deterioration due to the exterior elements and mechanical damage. Provide flexible membrane subflashing continuously under the metal.

6.6.2.6(11) Metal roofing systems, if used, will be complete with continuous waterproof membrane as part of the assembly and provide clear internal paths of drainage to allow any trapped moisture to drain to the exterior and avoid the staining of architectural finishes, forming of puddles, forming of icicles, and dripping on pedestrians.

6.6.2.6(12) In designing the Facility, including any roof systems, ensure that entrance ways are protected from sliding snow and ice and that there are no accumulations of snow and ice in roof valleys.

6.6.2.6(13) Shingles are not permitted as a roofing material.

6.6.2.7 Fire and Smoke Protection

6.6.2.7(1) Use spray-applied cementitious fireproofing if required to achieve a fire resistance rating, except in locations as referred to in Section 6.4.2.6.

6.6.2.7(2) Use spray-applied cementitious fireproofing that conforms to standards of Warnock-Hersey (WH) Certification Listings.

6.6.2.7(3) Integrate barriers into vertical and horizontal space separations to protect against the spread of fire and smoke. Apply protection to exposed building elements (structural and non-structural) susceptible to fire and subsequent damage.

6.6.2.7(4) Apply protection around penetrations through vertical and horizontal fire-resistance rated separations.

6.6.2.7(5) Use firestopping and smoke seal systems that consist of asbestos-free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.

6.6.2.7(6) Use firestopping that:

6.6.2.7(6)(a) is compatible with substrates;

6.6.2.7(6)(b) allows for movement caused by thermal cycles; and

6.6.2.7(6)(c) prevents the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.

6.6.2.7(6)(d) When more than one product is required for an assembly, use products that are compatible with one another and from the same manufacturer.

6.6.2.7(6)(e) are silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water. Do not use acrylic-based coatings and sealants.

6.6.2.7(6)(f) is installed by an FM Global approved firestop contractor or an UL-qualified firestop contractor.

6.6.2.7(6)(g) is capable of maintaining an effective barrier against flame, smoke and gases when tested to CAN/ULC-S115 or ASTM E814 or UL 1479, acceptable to all applicable authorities having jurisdiction, and not exceeding opening sizes for which they are intended.

6.6.2.7(6)(h) are designed to allow for the 25% spare capacity of the corresponding building system.

6.6.2.8 Sealants

6.6.2.8(1) Apply sealant materials to achieve:

6.6.2.8(1)(a) seals to the building envelope systems and around openings in the building envelope systems as required to prevent water ingress;

6.6.2.8(1)(b) seals around and over cavities in or behind surface elements to allow effective infection prevention and control (note that sealant around door frames must include joints at bottom of door frames between floor finish and frames);

6.6.2.8(1)(c) sealed joints between dissimilar or similar materials to allow a smooth or even transitions; and

6.6.2.8(1)(d) sealed expansion or controls joints in the building envelope systems or structural systems to allow movement.

6.6.2.8(2) Do not use unsealed joints in clinical areas.

6.6.2.8(3) Provide pick-proof sealant in all Patient accessible areas.

6.6.2.8(4) For the exterior, use sealants to completely and continuously fill joints between dissimilar and/or similar materials.

6.6.2.8(5) For the interior, use sealants (at frames such as those at doors, windows and skylights) to completely fill joints between dissimilar materials using one component, acrylic emulsion, paintable type.

6.6.2.8(6) Use silicone caulking that is mildew-resistant and impervious to water for caulking washroom plumbing fixtures.

6.6.2.8(7) Use sealants with self-levelling properties for expansion and control joints in concrete floors using two-component epoxy urethane sealants.

6.6.2.8(8) Use non-sag sealants for exterior vertical expansion and control joints in masonry or wall cladding.

6.6.2.8(9) Use sealants that allow for minimum 25% movement in joint width.

6.6.2.8(10) In corridors and other traffic areas used by equipment such as laundry carts, supply carts and material handling equipment, use traffic bearing

type sealants suitable to support imposed load without deformation or failure.

6.6.2.9 Traffic Coatings

6.6.2.9(1) Provide seamless fluid applied traffic coating with surface aggregate in the following areas:

6.6.2.9(2) Vehicular:

6.6.2.9(2)(a) Underground parking including the Sally-Port

6.6.2.9(3) Pedestrian:

6.6.2.9(3)(a) The Energy Centre

6.6.2.9(3)(b) Not used

6.6.2.9(3)(c) All service rooms (e.g. mechanical, electrical).

6.6.2.9(4) Use vehicular traffic coating that complies with the following:

6.6.2.9(4)(a) Primer: Multi-component, 100% solids, low VOC, low viscosity polyurethane primer or as recommended by manufacturer to suit substrate and site conditions.

6.6.2.9(4)(b) Base and Intermediate Coats: Multi-component low VOC liquid urethane or epoxy elastomeric membrane forming part of manufacturer’s vehicular traffic coating system.

6.6.2.9(4)(c) Topcoat: Multi-component low VOC liquid urethane elastomeric membrane top coat forming part of manufacturer’s vehicular traffic coating system; colour as selected by the Authority from manufacturer's full range, and meeting or exceeding the following specifications:

(c).1 Tensile Strength: ASTM D-638 at 9.1 MPa
(c).2 Elongation at Break: ASTM D-638 at 435%
(c).3 Tear Strength: ASTM D-624 at 38.2 KN/mm
(c).4 Hardness: ASTM D-2240 at 80 Shore A
(c).5 Abrasion Resistance wear course (CS-17 wheel, 1000g): ASTM D-4068 at Maximum Weight loss of 22 mg/1000 cycles
(c).6 Fire Rating: ASTM CAN/ULC S102.2 at Class A
(c).7 Water vapour Permeability: ASTM E-96 at 0.0013 ng/Pa•s•m, 0

6.6.2.9(4)(d) Provide additional aggregate at high wear areas such as, but not limited to, corners and breaking and acceleration points

6.6.2.9(5) Use pedestrian traffic coating that complies with the following:

6.6.2.9(5)(a) Flooring and base: Combining primer, membrane and slip resistant wearing surface with non-slip surface texture. Minimum 0.762 (30 mils) thick, Class A fire resistance or better.

6.6.2.9(5)(b) Sealant: Polyurethane type, One Part moisture curing modified urethane sealant: To meet specified requirements of CAN/CGSB-19.13-M.

6.6.2.9(6) Provide fluid applied integral flashings at all locations where a horizontal surface butts a vertical surface and at all deck projections. Extend the membrane a minimum of 10 cm on vertical and horizontal surfaces.

6.6.3 Cladding

6.6.3.1 Design and construct all exterior wall cladding systems for the buildings to incorporate the following:

6.6.3.1(1) a means to drain all accumulated water to the exterior of the building;

6.6.3.1(2) materials installed to shed precipitation;

6.6.3.1(3) a means of preventing moisture penetration through the exterior of the wall assembly;

6.6.3.1(4) flashings, drips or overhangs sufficient to deflect accumulated water away from the building face, at all:

6.6.3.1(4)(a) changes in plane;

6.6.3.1(4)(b) intersections of walls and roofs;

6.6.3.1(4)(c) changes in cladding material; and

6.6.3.1(4)(d) window and door heads or sills.

6.6.3.2 Ensure materials are accessible for maintenance purposes provided that, within Patient occupied spaces, materials will not be removable without use of special tools.

6.6.3.3 In all exterior walls, use durable materials and secure materials in a fashion which, to the greatest extent practicable, resists intentional damage and ensures materials cannot be dislocated by Patients without use of special tools or otherwise used as a weapon.

6.6.3.3(1) Design claddings such that they are not climbable to access roof(s) or soffits.

6.6.3.3(2) Provide tamperproof claddings so that they cannot be disassembled or vandalized without use of special tools.

6.6.3.3(3) Design claddings to prevent concealment of contraband.

6.6.3.4 The following are some of the acceptable cladding materials. Refer to their corresponding Sections in this Schedule for descriptions and requirements. For unacceptable exterior building materials refer to Section 5.3.1.2(2):

6.6.3.4(1) Concrete and Precast Concrete;

6.6.3.4(2) Concrete Masonry Unit, Brick & Stone Masonry;

6.6.3.4(3) Glass & Glazing;

6.6.3.4(4) Phenolic Panels;

6.6.3.4(5) Metal and Composite Aluminum Cladding; and

6.6.3.4(6) Aluminum Windows and Curtain Walls.

6.6.3.5 Phenolic Panels

6.6.3.5(1) Use panels of high density phenolic resin with acrylic resin finish.

6.6.3.5(2) Acceptable phenolic panels include Trespa, Prodema, Fundermax or similar.

6.6.3.5(3) Use phenolic panels that comply with all applicable CSA standards.

6.6.3.6 Metal or Composite Aluminum Cladding

6.6.3.6(1) Metal Panel cladding will be integrated into aluminum curtain wall system or be a stand-alone system.

6.6.3.6(2) Use metal panel with baked enamel finish. Use aluminum with prefinished aluminum or baked enamel finish.

6.6.3.6(3) Maximum panel deviation (flatness) will be 3 mm in 1530 mm in any direction for assembled units (non-accumulative – no oil canning).

6.7 Openings (Division 8)

6.7.1 Basic Requirements

6.7.1.1 Subject to any other glazing specifications set out in this Section, at minimum provide all exterior and interior glazing of tempered-laminated glass.

6.7.1.2 Installation methods and locations for doors, frames and hardware to conform with the standards of the Door and Hardware Institute (DHI) for hospitals facilities unless otherwise indicated in the Design and Construction Specifications.

6.7.1.3 Door assemblies will comply with applicable reference standards and codes.

6.7.1.4 Provide assemblies that resist local seismic conditions as a post-disaster building as defined in the BCBC and that resist 1-in-100 year climatic events (with a safety factor).

6.7.1.5 Doors

6.7.1.5(1) Size, fabricate and install doors to suit the intended function of spaces or rooms requiring acoustic or visual privacy, security, special HVAC requirements, fire-resistance rated separations or other closures.

6.7.1.5(2) Size Requirements for Doors

6.7.1.5(2)(a) Provide door openings of adequate width to suit the intended purpose of rooms and allow the movement of people and equipment associated with those rooms (e.g. enable two staff accompany a Patient on either side and allow access for stretchers surrounded by medical staff).

6.7.1.5(2)(b) No single door will have a width of less than 915mm.

6.7.1.5(2)(c) Provide double doors into rooms where large pieces of equipment will be moved in or out during the lifetime of the Facility and where such equipment will not pass through a single 1200 mm wide opening.

6.7.1.5(2)(d) Size door openings to suit bariatric Patient requirements as identified in the Appendix 1A [Clinical Specifications]. The minimum door width for both the room door and the washroom door will be 1530mm clear in a double door configuration (1070mm & 460mm).

6.7.1.5(2)(e) Provide double doors into corridors and major rooms to ease access where Patients in beds or stretchers may be attended to or accompanied by a large number of medical staff and medical equipment.

6.7.1.5(2)(f) Patient bedroom doors will have a minimum width of 1070mm.

6.7.1.5(2)(g) Provide a minimum of 2135 mm high door or door leaf, unless specifically required for access to services or other purposes where height is restricted.

6.7.1.5(2)(h) In the Secure rooms, provide door width in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act.

6.7.1.5(3) Provide Patient Bedrooms, Ensuite, Laundry Facility, Comfort Rooms, and Consultation/Therapy Rooms with hardware that allows the doors to stay in an open position and facilitates casual observance of Patients by the clinical staff.

6.7.1.5(4) Apply door sizes and designs consistently to rooms of similar use, location, and configuration.

6.7.1.5(5) Avoid doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to spaces that are used infrequently and are not subject to occupancy, such as small closets.

6.7.1.5(6) For doors into or between major departments or activity areas through which cart and wheel chair traffic is anticipated on a routine basis, provide automatic activation by an electronic device or manual push button, located to allow emergency access without the necessity to stop movement. For all other doors through which cart, or frequent Patient or staff traffic is anticipated on a routine basis, provide appropriate hardware or automatic activation that allows the doors to stay in an open position.

6.7.1.5(7) Provide concealed bearing swing clear hinges in these locations to provide greater access and protect the hinge edge of door from mobile equipment damage that often results in misalignment and failure to close and latch to meet fire code requirements. These doors and other doors in the facility, provide concealed bearing conventional door hinges.

6.7.1.5(8) Doors may swing into Patient Washroom and Patient/Public Washroom, provided they allow for ease of Patient use, both on their own and assisted by staff. Equip such doors with rescue hardware to allow the door to be opened out into the room in an emergency situation (i.e. anti-barricade features).

6.7.1.5(9) Doors will not swing into Ensuites

6.7.1.5(10) Design and construct door assemblies, including frames, hinges, and associated hardware and components, to resist intentional damage to the greatest extent practicable, and to be easily maintainable and repairable.

6.7.1.5(11) Finish doors and frames with a suitable finish that prevents dirt and fingerprint accumulation, and will be easily cleaned and disinfected.

6.7.1.5(12) Be consistent with the extent of glazing in doors throughout the Facility and the size and quantity of sidelights, and balance these between the nature of observation required and the privacy requirements of the occupants of the room. Where possible and appropriate, provide glazing in an adjacent sidelight rather than within the door itself.

6.7.1.5(13) Provide glazing in doors and sidelights to allow Patient observation and operational safety of the spaces they serve as follows:

6.7.1.5(13)(a) as indicated in Appendix 1A [Clinical Specifications];

6.7.1.5(13)(b) in service room doors, except for mechanical, electrical, and telecommunication rooms. The vision panel in these rooms will have a minimum size of 150mm x 300mm, or as permitted by code; and

6.7.1.5(13)(c) if there is no available wall space a vision panel in the door is acceptable.

6.7.1.5(14) Provide integral blinds or coverings suitable and appropriate for the level of privacy and security intended and required.

6.7.1.5(15) Provide doors and door frames with the capability to withstand the varying and high levels of humidity and impact that occur typically within hospitals, and in specific rooms within these facilities, and maintain their inherent aesthetic and functional capacities.

6.7.1.5(16) Design frames and anchors for door, sidelights, interior and exterior windows in areas to which Patients will have access, and other areas as requested by the Authority, to withstand a heavy degree of impact while

maintaining their aesthetic and functional capacities. Glazing of such components will be Security Glazing and use hospital-type cut-away jambs.

6.7.1.5(17) Design doors at mechanical, electrical, plumbing and telecommunication rooms to swing out, unless required otherwise by code, and be lockable through access control system.

6.7.1.5(18) Not used.

6.7.1.5(19) Wicket and “door within a door” types of doors are not acceptable.

6.7.1.5(20) Provide doors with vision panel in doors into stairwells (exit stairs and convenience stairs), as code permits.

6.7.1.5(21) The Design-Builder will provide door assemblies in accordance to the intended use of the room and ensure the security requirements are met based on the SRC definitions as stated in this Schedule.

6.7.1.6 Exterior Windows

6.7.1.6(1) Size, configure, and adequately construct windows to suit rooms that require daylight, views and/or natural ventilation.

6.7.1.6(2) Provide window framing systems that are thermally-broken and designed based on principles of pressure equalized rain screen.

6.7.1.6(3) Provide operable windows (windows that may be opened and closed) in Patient bedrooms only, except in Secure Room, where operable windows are not allowed. Operable windows must be fitted with perimeter seals which, when windows are closed, will maintain the required sound insulation rating (STC) of the overall window assembly. Provide contacts for each operable window to signal whether windows are open or closed, and monitor window contacts through the BMS. Ensure operable windows are in accordance with Section 6.7.2.7(1)(c).

6.7.1.6(4) Unless a larger size of window is required to comply with other applicable requirements in this Schedule, exterior windows in Patient Bedrooms will have a minimum area of 2.5 square metres and a minimum short dimension of 1200mm. The vertical dimension of the window will be greater than the horizontal. Operable section of window, when applicable, will not be included in the minimum area described and will be a maximum 300mm wide.

6.7.1.6(5) The exterior window in Secure Rooms will have a minimum total area of 1.5 square metres. This exterior window will be made up of several

smaller windows that could be stacked vertically or placed side by side horizontally but that will be separated between them by sections of wall and not mullions. The smaller windows will have a maximum clear (glass) width of 100mm and a minimum clear (glass) length of 1000mm with no mullions in between. The sum of the areas of the smaller windows will be the minimum total area required in this Section.

6.7.1.6(6) Exterior windows in occupied spaces, except in Secure Rooms, will be no less than 1200mm x 1200mm in size or larger as required to meet the provisions in Section 3.13.

6.7.1.7 Interior Windows

6.7.1.7(1) Provide 'borrowed light' through interior windows to occupied rooms that do not have exterior windows. The intent is to borrow light from areas that have windows and consequently create a more comfortable and less closed-in atmosphere.

6.7.1.7(2) In the Secure room, provide an interior window (in-door observation panel) in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act.

6.7.1.7(3) Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

6.7.2 Performance Criteria

6.7.2.1 Hollow Metal Doors and Frames

6.7.2.1(1) Ensure materials and manufacture of metal doors comply with the requirements of the Canadian Steel Door and Frame Manufacturer's Association (CSDFMA).

6.7.2.1(2) Provide interior metal doors with flush face and no trims construction.

6.7.2.1(3) Provide exterior metal doors with:

6.7.2.1(3)(a) flush face construction;

6.7.2.1(3)(b) fully sealed weather cap on top of door

6.7.2.1(3)(c) welded edge seams;

6.7.2.1(3)(d) edge seams to correspond with door function and minimize maintenance needed; and

6.7.2.1(3)(e) prepared surfaces to receive finishes that resist corrosion from exposure to weather.

6.7.2.1(4) Provide pressed metal frames with:

6.7.2.1(4)(a) fully welded construction (knock-down type frames are not allowed0;

6.7.2.1(4)(b) thermally-broken door frames for exterior door; and

6.7.2.1(4)(c) anchors to each jamb to suit wall type and receive the frame.

6.7.2.1(5) Door Glazing

6.7.2.1(5)(a) For exterior hollow metal door glazing, use sealed units with warm edge, in thermally-broken frames to prevent heat loss.

6.7.2.2 Wood Doors

6.7.2.2(1) Ensure all wood doors comply with applicable standards, including the Quality Standards for Architectural Woodwork published by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC).

6.7.2.2(2) Construct, finish, and install wood doors to minimize the requirement for maintenance and resulting disruption to Facility operations.

6.7.2.2(3) Provide wood doors in flush design, Architectural Grade quality (as defined in the AWMAC standards referred to above), solid particleboard core.

6.7.2.2(4) Provide fire-resistance rated doors with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.

6.7.2.2(5) Install finish hardware securely to resist loosening over time. Fasten to solid wood backing, except where hardware is designed to be through-bolted.

6.7.2.2(6) Glue stiles, rails and faces to the core with Type II water-resistant adhesive to minimize de-lamination or disassembly as a result of moisture ingress.

6.7.2.2(7) Use B-Grade hardwood veneer with AWMAC No. 3 edge, finish to suit the intended use.

6.7.2.2(8) Use wood doors with fibre reinforced laminate finish except as indicated in Section 6.7.2.2(10). Finish will be either solid colour or wood-look.

6.7.2.2(9) In locations requiring radiation protection, line doors with lead and label such doors with lead thickness.

6.7.2.2(10) Wood doors will not be allowed in SRC-J, SRC-H areas, and service rooms (e.g., mechanical, electrical, communications, exit stairs, etc.).

6.7.2.2(11) In addition to the requirement in this Section, all wood doors will be in accordance with Section 5.7.3.8 of this Schedule.

6.7.2.3 Aluminum Entrances and Storefronts

6.7.2.3(1) Aluminum entrances and storefront framing and doors may form part of the exterior envelope of the buildings. Styles and rails will be oversized to avoid the failure of glazing unit and potential twisting and fastener failure of door frame assembly.

6.7.2.3(2) Provide glazed interior partitions as appropriate to comply with the functions of the spaces as defined by the Appendix 1A [Clinical Specifications].

6.7.2.3(3) Use aluminum doors within aluminum entrances and storefront.

6.7.2.3(4) Use frames that are thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.

6.7.2.3(5) Incorporate in the frames drained and vented system (rain screen) with a complete air and vapour seal, allowing any moisture entering the frame to drain to the exterior and allowing air into the pressuring chamber.

6.7.2.3(6) Use aluminum swing entrance doors that are heavy-duty commercial or institutional grade that may be automatically operated, motion-detector controlled.

6.7.2.3(7) Apply aluminum finish for exposed aluminum surfaces. Finish to be permanent and resistant to corrosion caused by weather exposure and climate.

6.7.2.4 Specialty Doors

6.7.2.4(1) Overhead Rolling Service Doors

6.7.2.4(1)(a) Restrain lateral movement of door curtain slats. Provide windlocks as required by door size or wind load requirements.

6.7.2.4(1)(b) Provide interlocking flat slats, complete with bottom bar and contact type bottom astragal.

6.7.2.4(1)(c) For manually operated doors, provide inside lift handle and locking bar or chain hoist. Motor operation will be provided on doors requiring constant usage. Chain operation will be by means of reduction gears and galvanized hand chain.

6.7.2.4(1)(d) For fire doors, provide automatic closing device operated by fire door release device connected to fire alarm system.

6.7.2.4(1)(e) Insulate overhead rolling service doors with a minimum insulation value of RSI-1.4 (R-8), and provide weather stripping / seals.

6.7.2.4(2) Overhead Rolling Grilles

6.7.2.4(2)(a) Provide grilles that allow visual access to secure areas.

6.7.2.4(2)(b) Provide aluminum or steel guides that are: fabricated to withstand vertical and lateral loads; counterbalanced by helical torsion springs; and sound-deadened.

6.7.2.4(2)(c) For manually operated closures, provide inside lift handle and locking bar or chain hoist. Provide motor operation on grilles requiring constant usage. Provide chain operation by means of reduction gears and heavy chrome plated hand chain.

6.7.2.4(3) Overhead Rolling Counter Shutters / Horizontal Sliding Grilles

6.7.2.4(3)(a) Provide shutter curtains fabricated with extruded aluminum, galvanized steel, or stainless steel interlocking flat slats, complete with guides of similar materials.

6.7.2.4(3)(b) Provide closures that are manually operated and with locking capability.

6.7.2.4(4) Interior Sliding Doors and Sidelights

6.7.2.4(4)(a) Provide interior glass sliding doors and sidelights without floor track.

6.7.2.4(4)(b) Provide interior sliding doors and interior glass sliding doors with break-out capability.

6.7.2.4(4)(c) Provide visual cues/glazing film in transparent glass panels as appropriate to prevent collisions.

6.7.2.4(5) Automatic Sliding Doors

6.7.2.4(5)(a) Automatic sliding doors complete with break-away capability for exiting may be installed at the main entrance of the Building, provided that the size and configuration of the entrance vestibule is designed such that both sets of doors will not be open at the same time.

6.7.2.4(5)(b) Ensure door equipment will accommodate medium to heavy pedestrian traffic and up to the following weights for active leaf doors: 100 kg for bi-part doors and 200 kg for single slide doors.

6.7.2.4(5)(c) Provide door operators, including the motion and presence detection system that are capable of operating within the temperature ranges existing at the Facility Building and Ancillary Buildings and unaffected by ambient light or ultrasonic interference.

6.7.2.4(5)(d) Provide energy-saving devices to reduce conditioned air loss.

6.7.2.4(5)(e) Provide integration with access control system.

6.7.2.4(6) Automatic Swing Doors

6.7.2.4(6)(a) Use automatic swing doors for interior and exterior locations where appropriate, including the entrance vestibule, cross-corridor double-egress doors, entrances to departments and areas where equipment is frequently wheeled, and doors to exterior spaces that are required to be accessible by Persons with Disabilities. If push button operator is used it will be provided with a clear protective cover and labeled appropriately.

6.7.2.4(6)(b) If used, provide directional motion sensor control device that are unaffected by ambient light or ultrasonic frequencies.

6.7.2.4(6)(c) Equip all in-swing doors that are required exits with an emergency breakaway switch that internally cuts power to the operator. No external power switch allowed.

6.7.2.4(6)(d) Implement longer hold-open times to accommodate the elderly and frail.

6.7.2.4(6)(e) Provide integration with access control system.

6.7.2.4(7) Acoustic Doors

6.7.2.4(7)(a) Speciality acoustics doors will be required for certain of the space adjacencies listed in Table 1 of Appendix 1D [Sound Transmission Ratings]. In these cases, the composite STC rating of the door and the wall assembly in which they are located, taking into account their relative surface areas, will equal or exceed the STC rating of the wall assembly. These specific space adjacencies are listed in Section 5.4.9.12(1)(b)

6.7.2.5 Aluminum Windows and Curtain Walls

6.7.2.5(1) Ensure aluminum windows and curtain walls comply with all applicable standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.7.2.5(2) Incorporate in aluminum windows and curtain walls a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.7.2.5(3) Provide aluminum windows and curtain walls that incorporate a thermal-break.

6.7.2.5(4) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.7.2.5(5) Window wall framing relying on primary face seals is not allowed.

6.7.2.6 Exterior Fixed Glazing and Framing Minimum Performance:

6.7.2.6(1) Design the air infiltration rate for fixed glazing to be maximum 0.1 L/s/m2 (0.02 cfm/ft2) of glazing area when tested in accordance with ASTM E283 at test pressure of 300 Pa (6.24 psf).

6.7.2.6(2) Ensure no condensation or frost will form on the interior of glazing or framing members when tested under the following conditions:

6.7.2.6(2)(a) interior air 22°C, 30% R.H. minimum and

6.7.2.6(2)(b) exterior air -32°C, 24 km/h (15 ml/h) wind speed.

6.7.2.6(3) Design the framing system such that condensation and frost will not form on the interior surface of the aluminum members before appearing on the adjacent insulating glass units.

6.7.2.6(4) Fixed Vision Glazing Thermal Transmittance (U-factor): Ensure fixed vision glazing and framing areas have U-factor of not more than 1.87 W/sq. m x K (0.33 Btu/sq. ft. x h x deg F) for double-glazed units and 1.41 W/sq. m x K (0.25 Btu/sq. ft. x h x deg F) for triple-glazed units as average of largest and smallest panels as determined according to NFRC 100.

6.7.2.6(5) Non-Vision (Spandrel) Thermal Transmittance (U-factor): Ensure non-vision zones have spandrel assembly U-factor of not more than 0.567 W/sq. m x K (0.10 Btu/sq. ft. x h x deg F) as determined according to NFRC 100.

6.7.2.7 Security Windows - Patient accessible areas

6.7.2.7(1) In addition to conform to all applicable requirements in Section 6.7:

6.7.2.7(1)(a) provide Security Glazing with integral blind system as appropriate for the level of privacy and in accordance with Appendix 1A [Clinical Specifications]. Refer to Section 6.11.2;

6.7.2.7(1)(b) on the side exposed to the Patients, ensure security windows comply with the 2000 ft-lb impact test as specified by New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines and AAMA 501.8 Standard Test Method for Determination of Resistance to Human Impact of Window Systems Intended for Use in Psychiatric Applications; and

6.7.2.7(1)(c) for operable windows, where applicable:

(c).1 provide impact resistant safety screens to prevent items being thrown from the Building; and

(c).2 limit window opening to a maximum 100mm wide.

6.7.2.7(2) The Design-Builder will explore alternative glazing products for exterior window applications such as smart glass and other similar products in lieu of integral blind systems and propose them accordingly. Refer to Section 3.8.

6.7.2.8 Skylights and Clerestory

6.7.2.8(1) Skylights will comply with all applicable standards, including the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.7.2.8(2) Incorporate in skylights and clerestory windows a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.7.2.8(3) Provide skylights and clerestory windows that incorporate a thermal-break.

6.7.2.8(4) Roof or skylight glazing may be provided where natural light is required in interior spaces to augment or complement interior ambient lighting.

6.7.2.8(5) Provide skylights that are sealed double glazed in thermally-broken, internally drained rain screen type extruded aluminum frames. Plastic skylights are not to be used.

6.7.2.8(6) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.7.2.8(7) Refer to Section 3.13 for shading devices requirements.

6.7.2.8(8) When design provides for light through the roof, clerestory glazing is preferred over sloped glazing or skylights.

6.7.2.8(9) Glazing slope will be 30° or greater.

6.7.2.8(10) Ensure skylights, sloped glazing and clerestory windows are fully accessible for maintenance and cleaning from the interior and exterior of the buildings without disruption to their operations.

6.7.2.8(11) Ensure air seal and water seal connections to curbs and walls will be fully accessible and will not be dependent on construction sequence.

6.7.2.8(12) Provide drainage of water entering the glazing system to the exterior under all conditions.

6.7.2.8(13) Design glazing to prevent condensation on the interior face of the glazing or framing system. Provide interior gutters to catch water in the event condensation occurs. Drain condensation gutters to the interior.

6.7.2.8(14) Provide dry glazing.

6.7.2.9 Light Tubes

6.7.2.9(1) If light tubes are required for providing natural light to internal areas, provide a reflective light tube system that that will transmit the full range of natural light, ensuring a bright, clean and white light source.

6.7.2.9(2) Provide a daylight dimmer to control the level of light.

6.7.2.9(3) Coordinate the light tube solution with the other components of the ceiling design, including the artificial lighting, to provide an integrated design solution.

6.7.2.10 Roof Hatches

6.7.2.10(1) Minimize use of roof hatch accesses. If roof hatches are used to provide access to the roof for maintenance the minimum hatch size will be 762 mm x 762 mm.

6.7.2.11 Entrance Mat Wells

6.7.2.11(1) Provide a recessed, integrated mat well at all entrances with built in drainage.

6.7.2.12 Glass and Glazing

6.7.2.12(1) Ensure glass and glazing comply with all applicable standards, including the Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines and the equivalent standards to the Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual.

6.7.2.12(2) Exterior and interior glass and glazing may be provided as integral components of the exterior envelope, interior partitions and screens, exterior and interior doors, handrail balustrades, skylights and decorative and ornamental glazing.

6.7.2.12(3) Use of wired glass is not permitted anywhere in the Facility. When glass is used in a fire rated partition The Design-Builder will provide non-wired fire rated glass and meet all applicable standards and codes.

6.7.2.12(4) Provide glazing with excellent optical clarity and ease of maintenance over time.

6.7.2.12(5) Ensure glazing will provide for a “fail safe” condition once attacked, and will provide a barrier to keep people from entering or exiting a space without the need for an immediate “board-up”.

6.7.2.12(6) Ensure glazing will not allow for:

6.7.2.12(6)(a) excessive loss of the glazing on the rear or protected side; or

6.7.2.12(6)(b) breach of the building envelope and resulting exposure of the protected side.

6.7.2.12(7) Interior glazing in hospital facilities is subject to possible frequent damage. Design the window sizes within the Building to a common standard size in order to reduce manufacturing costs and simplify the stocking of glazing material for replacement purposes.

6.7.2.12(8) Provide interior glass sliding doors and sliding and fixed panel(s) that are single glazed with 6 mm clear fully tempered-laminated glass.

6.7.2.13 Security Glazing – Patient accessible areas

6.7.2.13(1) Locate Security Glazing on the side where impact will occur. If impact will occur from both sides, provide Security Glazing on both sides of the insulating glass unit.

6.7.2.13(2) Heat strengthen laminated safety glass to CAN/CGSB 12.1-M90.

6.7.2.13(3) Ensure laminated glass products are fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.

6.7.2.13(4) Security Glazing will be a polycarbonate glazing assembly or a laminated safety glazing assembly as accepted by the New York State

Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines for “High Risk Areas”.

6.7.2.14 Ensure non-wired fire rated glazing meets the following requirements:

6.7.2.14(1) clear ceramic laminated, fire rated glass.

6.7.2.14(2) impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

6.7.2.15 Ensure non-wired fire rated Security Glazing meets the following requirements:

6.7.2.15(1) clear ceramic laminated, fire rated glass for use in impact safety-rated locations such as doors, transoms, and borrowed lites complete with 0.3 mm (0.012”) security anti-spall film.

6.7.2.15(2) Impact Safety Resistance:

6.7.2.15(2)(a) Comply with the New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines.

6.7.2.15(2)(b) Impact test performance: Provide glazing capable of withstanding minimum of ten 2000 ft-lb. impact loads from 1 foot diameter impact object without breach or dislodging of the glass or glazing materials.

6.7.2.16 Mirrors

6.7.2.16(1) For full wall unframed mirrors, use 6 mm thick minimum float glass backed with electrolytically-applied copper plating. Grind smooth and polish all edges.

6.7.2.16(2) For wall mounted posture mirrors, use framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back with galvanized steel.

6.7.2.16(3) In SRC-J areas, no mirrors are allowed.

6.7.2.16(4) In Patient accessible areas, ensure mirrors are unbreakable and securely fasten to the wall, do not use glass. Mirrors will not distort the viewer’s reflection.

6.7.2.17 Finish Hardware

6.7.2.17(1) Door finish hardware to be designed by a certified finish hardware professional – Architectural Hardware Consultant (AHC) with a minimum of five (5) years of experience in design health care facilities including hospitals. Scope of this work will include the preparation of a detailed hardware schedule shop drawing, keying schedule in consultation with the Authority, and carrying on-site inspections.

6.7.2.17(2) Standard hardware locations dimensions with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers Association.

6.7.2.17(3) Listed hardware for doors in fire separations and exit doors shall be certified by a Canadian Certification Organization accredited by Standard Council of Canada.

6.7.2.17(4) Finish hardware to be Grade 1 heavy duty institutional quality hardware. Locksets, privacy sets and latch sets to be mortise type. Provide key release function, coin turn release function c/w indicator for privacy set function.

6.7.2.17(5) Provide Grade 1 gear type full mortise continuous hinges for aluminum swing doors.

6.7.2.17(6) Provide Grade 1 edge wrap full mortise stainless steel continuous hinges for doors in wheelchair/cart/bed/gurney/tool carts/utility cart/pallet trucks/hand dolly path of travel.

6.7.2.17(7) Provide hospital tip hinges for doors in Patient accessible areas.

6.7.2.17(8) Provide ligature resistant hardware/gasketing complete with tamper proof fasteners for doors in Patient accessible areas.

6.7.2.17(9) Provide access control to doors that are to be locked.

6.7.2.17(10) Provide doors with access control to the acceptable solutions listed as:

6.7.2.17(10)(a) Electric Lock;

6.7.2.17(10)(b) Integrated Lock;

6.7.2.17(10)(c) Electric strike;

6.7.2.17(10)(d) Magnetic Lock; and

6.7.2.17(10)(e) Electrified panic and fire exit hardware.

6.7.2.17(11) Provide mechanical cylinder override for access control doors.

6.7.2.17(12) Provide current transfer hinges, power transfers (EPT), current transfer pivots on doors with access control locking hardware (electric locks, electric latch retraction panic/fire exit hardware).

6.7.2.17(13) Provide cylinder dogging feature for panic hardware.

6.7.2.17(14) Provide recessed “Impact” device, concealed cable panic hardware and fire exit hardware for in cart/bed/gurney/tool carts/utility cart/pallet trucks/hand dolly path of travel for double doors, doors swinging in same direction and swinging in opposite direction. For single doors provide mortise type “Impact” device.

6.7.2.17(15) Provide stainless steel kick plates minimum 300mm high for doors with door closers and automatic door operators.

6.7.2.17(16) Provide stainless steel mop plates minimum 150mm high for doors with kick plates. armour plates/stretcher plates installed.

6.7.2.17(17) Provide auxiliary stops for doors. Provide wall type for doors opening against a wall, where the wall is located with 100 degrees swing or less. Floor stops are not allowed. Door closer combination stop/holders are not allowed. All other doors provide concealed overhead stops.

6.7.2.17(18) Provide smoke seal for rated door assemblies. Provide ligature resistant smoke seals in Patient accessible areas.

6.7.2.17(19) Provide stainless steel armour plates for exam rooms, minimum 900mm high.

6.7.2.17(20) Provide armour plates and frame protection for utility room/dirty/ housekeeping closets/clean supply storage/ equipment storage/clean utility rooms/soiled utility rooms doors, 900 mm high.

6.7.2.17(21) Provide hold open devices for doors to soiled utility, clean rooms and equipment rooms, typical.

6.7.2.17(22) Provide touch-less actuators for interior use for barrier free operators

6.7.2.17(23) Provide delay action door closers on doors in cart/bed/gurney/wheelchair/barrier free path travel. Not applicable to Patient accessible areas.

6.7.2.17(24) Provide concealed overhead stops where typical template sheets detail coat hooks installed behind the door.

6.7.2.17(25) Provide stainless steel armour plates and frame protection as required in this Schedule.

6.7.2.17(26) Provide auto door operators for single occupant washrooms, doors to allow for 180 degree swing complete with hold back rescue style hardware.

6.7.2.17(27) Provide auto door operators to washrooms, department entrances single or double door, (double doors with operator on both leafs) from a public corridor. Power door operators are required on doors leading from or to the corridors or rooms which support of movement of stretchers or Patients in wheel chairs as well as on the main entrance doors designed to be barrier free for rooms designated to be barrier free where power assist is required. Power door operators to be provided on doors are required by codes, regulations and Authorities having Jurisdiction and where the following use is provided:

6.7.2.17(27)(a) Patient transport;

6.7.2.17(27)(b) Rolling Equipment; and

6.7.2.17(27)(c) Washrooms for Persons with Disabilities.

6.7.2.17(28) Provide access control devices to technical/mechanical/electrical/ elevator storage/A/V/storage rooms.

6.7.2.17(29) Provide magnetic locking devices on stair doors. Access control readers and key switches on the push side and pull side of the door.

6.7.2.17(30) Provide panic hardware (exit only) on exterior stair doors that do not have access control devices for entry

6.7.2.17(31) Provide gasketing/thresholds/door sweeps for exterior doors. Provide gasketing to completely seal the opening.

6.7.2.17(32) Provide gasketing/thresholds/door sweeps for negative pressure room doors. Provide gasketing to completely seal the opening and full mortise door bottom

6.7.2.17(33) Provide sound seal for rooms requiring STC rating 45 or more. Provide minimum of 3 side adjustable seals, full mortise door bottom and threshold.

6.7.2.17(34) Provide hold open device on pairs of double egress cross corridor doors and doors swinging in the same direction

6.7.2.17(35) Not used

6.7.2.17(36) Provide classroom function panic/fire exit hardware for parking garage stair doors.

6.7.2.17(37) Not used

6.7.2.17(38) Integrate hardware with the security requirements and coordinate with electrical wiring and power requirements.

6.7.2.17(39) Where openings are designed for locked down scenarios and are not congruent with building code compliance and life safety, such as Secure rooms, the Design-Builder will provide a code variance and obtain approval from the relevant Authority Having Jurisdiction.

6.7.2.17(40) In fire alarm conditions where openings are required to become fail secure, The Design-Builder will provide a code variance and obtain approval from the relevant Authority Having Jurisdiction.

6.7.2.17(41) The Design-Builder will also provide written procedures outlining specific rescue plans for those locations in the Facility that are designed for lock down scenarios or to be fail secure to the Authority and the local fire authorities.

6.7.2.17(42) Select finishes that will provide maximum longevity and preservation of the finish.

6.7.2.17(43) Provide, ULC-listed hardware for the required fire rating.

6.7.2.17(44) For special areas identified through the user consultation process as described in Schedule 2 [Review Procedure], provide hardware to suit the purposes unique to those areas.

6.7.2.17(45) Provide remote capable locking systems (pneumatic or electric) with connection to the ESS. Conform locksets for Security door assemblies to Grade 2 standards, as defined in the applicable ASTM standards, with the exception of Sally-Port doors, which will conform to Grade 1 standards, as defined in the applicable ASTM standards.

6.7.2.17(45)(a) Equip each Grade 2 lockset with a restricted keyway mogul high security cylinder that allows for manual locking and unlocking.

6.7.2.17(45)(b) Equip each Grade 1 lockset with a restricted paracentric high security cylinder that allows for manual locking and unlocking.

6.7.2.17(46) Test detention locksets in accordance with ASTM F 1577, Section 6 “Testing Methods”.

6.7.2.17(47) Prepare and submit reports and documentation of testing and performance in accordance with ASTM F 1577, Section 7 “Reports” for each type of detention lockset. All test reports will be current within two (2) years of the date of installation and all tests will be performed under the applicable manufacturer’s current organizational structure.

6.7.2.17(48) Electronic Door Security – refer to Section 7.10 of this Schedule.

6.7.2.17(49) Keying

6.7.2.17(49)(a) Supply and install geographically exclusive, patented protected interchangeable core cylinders, patent to be to the minimum year 2029, 6 pin (factory recorded, factory pinned).

6.7.2.17(49)(b) Not used.

6.7.2.17(49)(c) Implement a 4-level system.

6.7.2.17(49)(d) Supply four (4) keys for each lock cylinder.

6.7.2.17(49)(e) Keying groups will be assigned by the Authority.

6.7.2.17(49)(f) New key bittings will be provided to and controlled by the Authority.

6.7.2.17(49)(g) Turn over keys from factory to the Authority.

6.7.2.17(49)(h) Design-Builder will remove construction cores and install permanent cores under the direction of the Authority.

6.7.2.17(50) See Section 7.10 and Appendix 1E [Door Operations Matrix] for additional requirements.

6.8 Finishes (Division 9)

6.8.1 Basic Requirements

6.8.1.1 Provide interior finishes that are capable of being easily cleaned, maintained, and repaired throughout the Operating Period.

6.8.1.2 In areas where finishes and systems of installation will occur and water is anticipated to be present as part of cleaning or other procedures, allow water to collect and exit without causing damage to the finishes or substrate.

6.8.1.3 For areas in which wear is a concern, such as areas with anticipated pedestrian or wheeled traffic, use durable finish materials able to withstand damage and easily replaceable in sections if damage does occur.

6.8.1.4 Give equal priority to infection prevention and control and acoustic characteristics in the selection of finishes where applicable as indicated in the Appendix 1A [Clinical Specifications]. Provide finishes that do not support microbial spread and the growth of mildew or mould that are moisture proof/resistant, and that are compatible with the Authority's approved disinfectants and cleaning products. List of Authority's approved disinfectants and cleaning products would be provided in further consultation with the Authority.

6.8.1.5 Select the appearance of finishes and colours to create and promote a natural healing environment, prevent glare, and minimize artificial lighting requirements.

6.8.1.6 Select materials to promote sustainability by, for instance, having low-emissivity or comprising of renewable resources.

6.8.1.7 Select finish materials that do not use known carcinogenic material or chemicals in their manufacture or disposal. Consult the Green Guide for Healthcare.

6.8.1.8 Select finishes and materials that will be durable to dissuade attack and damage and secure them such that they will not be dislodged by Patients or other persons without use of special tools. Finishes and materials in all Patient accessible areas will be unbreakable, to the extent possible, to prevent use of pieces of materials as weapons or for creating areas of concealment. Refer to Section 5.7.3.8 of this Schedule.

6.8.2 Performance Criteria

6.8.2.1 Interior Wall Framing

6.8.2.1(1) Interior wall framing will comply with all applicable standards, including the Canadian Sheet Steel Building Institute Standards (CSSB1) and the equivalent standards to the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual for materials and workmanship for interior walls, including steel studs and furring and gypsum wall board ceiling suspension systems.

6.8.2.1(2) System design and components will meet seismic restraint requirements for a post-disaster building where applicable.

6.8.2.1(3) Use prefabricated non-load bearing steel studs for interior partitions and furring with no axial load other than its own weight, the weight of

attached finishes, and lateral loads of interior pressure differences and seismic loads.

6.8.2.1(4) Construct steel stud framing to accommodate electrical, plumbing and other services in the partition cavity, and to support fixtures, wall cabinets, medical equipment and other such wall-mounted items. Provide reinforcement and backing throughout.

6.8.2.1(5) Design systems for the differences in air pressure that may result on opposite sides of the wall or partition due to factors such as wind and other lateral pressures, stack effects, or mechanically-induced air pressurization.

6.8.2.1(6) Provide backing for wall and ceiling mounted equipment and furnishings, handrails, grab-bars, wall protection and other similar items in accordance with their intended use and load requirements. Identify areas for mounting artwork and other display items that would require backing and confirm with the Authority. In Patient accessible areas backing will also be provided in accordance with tamper-proofing and vandal resistance requirements.

6.8.2.2 Gypsum Wall Board

6.8.2.2(1) Gypsum wall board will comply with all applicable standards, the equivalent standards to the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual, and the following standards:

6.8.2.2(1)(a) Plain gypsum board: to ASTM C1396/C1396-03a.

6.8.2.2(1)(b) Fire-rated gypsum board: to ASTM C1396, Type X, Type C.

6.8.2.2(1)(c) Abuse and impact resistant gypsum board:

(c).1 Conforming to: ASTM C1658, ASTM C1396, ASTM C1177 and ASTM C1629.

(c).2 Soft-body impact penetration: to ASTM E695.

6.8.2.2(1)(d) Mould and moisture resistant board: to ASTM C1396. Paper face and moisture resistant core.

6.8.2.2(1)(e) Glass scrim exterior sheathing gypsum board: to ASTM C1177. Glass scrim faced on front and back sides and long edges, silicone-treated water-resistant core, to ASTM C1177/C1177M-04e1, fire rated where required.

6.8.2.2(1)(f) Glass scrim tile backer gypsum board: moisture resistant core and fibreglass face mats and heat cured water resistant face coating to ASTM C1178/C1178M-04.

6.8.2.2(1)(g) Gypsum shaftwall liner: to ASTM C1396 .25 mm minimum thickness.

6.8.2.2(1)(h) Cement board: To ANSI A118.9, 12.5 mm cementitious tile backer board. High strength Portland cement building panel with self-adhesive glass tape.

6.8.2.2(2) Gypsum wall board will be no less than 16 mm in thickness.

6.8.2.2(3) Use cementitious backer board (tile backer board) behind ceramic wall tile. Use glass mat water-resistant gypsum backing panels behind sinks.

6.8.2.2(4) Provide abuse-resistant gypsum wall board, except as indicated otherwise, on the bottom 1220mm of all walls, in order to increase resistance to abrasion, indentation and penetration.

6.8.2.2(5) Use glass scrim exterior sheathing gypsum board wherever exterior gypsum sheathing is required at exterior walls.

6.8.2.2(6) The bottom edge of gypsum wall board will be set at a minimum of 12 mm above the finished floor level and the gap will be fully sealed.

6.8.2.2(7) Fasteners:

6.8.2.2(7)(a) Fasteners for gypsum board: with corrosion resistant finish to ASTM C1002-01/ASTM C954 -04.

6.8.2.2(7)(b) For cement board: with corrosion resistant polymer finish.

6.8.2.2(7)(c) Tamper resistant fasteners: Fasteners on all products and systems exposed to view and accessible to Patients to be tamper resistant, conforming to ISO standard 10664.

6.8.2.3 Ceramic Tilework

6.8.2.3(1) Ceramic tilework will comply with all applicable standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

6.8.2.3(2) not used.

6.8.2.3(3) For installations on wet and exterior surfaces, use floor tiles that have the following dynamic coefficients of friction (DCOF) as per ANSI A137.1 standard:

6.8.2.3(3)(a) Level Surfaces: Not less than 0.42 for interior wet and dry conditions, and not less than 0.65 for exterior wet and dry conditions.

6.8.2.3(3)(b) Stair Treads: Not less than 0.55 for interior wet and dry conditions, and not less than 0.65 for exterior wet and dry conditions.

6.8.2.3(3)(c) Ramp Surfaces interior and exterior: Not less than 0.65 wet and dry conditions.

6.8.2.3(4) For exterior installations, provide frost-resistant exterior tiles with a moisture absorption rating of 3.0% or less.

6.8.2.3(5) Provide control joints and expansion joints in conformance with the recommendations of the TTMAC Tile Installation Manual.

6.8.2.3(6) Provide a waterproof membrane under ceramic floor and wall tile in showers and other wet areas. The membrane will be trowel-applied, built-up, liquid-applied or sheet-applied.

6.8.2.3(7) Provide crack isolation membranes to resist crack transmission from the substrate due to lateral movement; design for use in thin-set applications of tile over a cracked substrate. Use elastomeric sheets or trowel-applied materials suitable for subsequent bonding of ceramic tile.

6.8.2.3(8) Set ceramic tile with latex modified mortar and grout with epoxy grout.

6.8.2.3(9) Only use ceramic tilework in public areas. Locations will be further review in consultation with the Authority.

6.8.2.4 Ceilings

6.8.2.4(1) Ceiling reflectance will complement the lighting design.

6.8.2.4(2) Provide permanence and durability appropriate for the applicable Safety and Risk Category.

6.8.2.4(3) All ceiling systems and ceiling finishes will comply with the following:

6.8.2.4(3)(a) fire and smoke separation and fire resistance ratings will conform to the requirements of the BCBC;

6.8.2.4(3)(b) suspended ceilings will comply with seismic resistance as required by BCBC; and

6.8.2.4(3)(c) equivalent standards to the Specification Standards Manual as published by the Association of Wall and Ceiling Contractors of BC (AWCC).

6.8.2.4(4) Acoustic Tile Ceilings

6.8.2.4(4)(a) Acoustic ceiling tiles in suspension system will:

(a).1 not be used in SRC-F, SRC-G, and SRC-J areas; and

(a).2 be permitted with hold down clips in SRC-D and SRC-E areas

6.8.2.4(4)(b) Acoustic ceiling tiles: Non-directional, fissured pattern, Imperial dimension white ceiling panel, trim edge detail (square) to fit a standard 15/16” T-bar grid panel size. Acoustic ceiling tiles having other textures/finishes may be considered provided they meet acoustic and other requirements.

6.8.2.4(4)(c) Provide the levels of sound attenuation required to suit the intended function of the room and as indicated in Appendix 1D [Sound Transmission Ratings].

6.8.2.4(4)(d) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.8.2.4(4)(e) Special surface-treated ceiling tiles, such as mylar, vinyl-faced or metal-faced tiles, may be used where maintenance and ease of cleaning are priorities as well as the accessibility and subject to acoustic requirements.

6.8.2.4(4)(f) Provide acoustic panels that are appropriate for the normal occupancy condition range of 18°C - 28°C and maximum 70% relative humidity. When the service use temperature and relative humidity are expected to exceed these ranges, use acoustical units specifically designed for such applications.

6.8.2.4(4)(g) Use tiles with scratch-resistant surfaces in any area where lay-in ceiling panels frequently need to be removed for plenum access.

6.8.2.4(5) Hard Ceilings

6.8.2.4(5)(a) Construct hard ceilings of 16 mm gypsum wall board or fire-rated gypsum board as required and in accordance with the corresponding SRC level of the room. In addition to those rooms required to have hard ceilings as described elsewhere in this Schedule provide hard ceilings for the following rooms:

(a).1 SRC-F, SRC-G, and SRC-J spaces

6.8.2.4(5)(b) When applicable, hard ceilings in Patient accessible areas:

(b).1 construct a hard secured ceiling system that is not accessible or able to be dismantled by Patients and is secured with concealed tamper resistant fasteners to prevent entry into the ceiling space or adjoining spaces by Patients. Patients will not be able to dismantle the ceiling without use of special tools.

6.8.2.4(6) Specialty Ceiling - CCH Ceiling

6.8.2.4(6)(a) Ceiling system will be capable of supporting a fully populated ceiling grid, including blank panels, HVAC supply and return registers, and light fixtures, plus directly supporting cable trays, utility racks, and other accessories.

6.8.2.4(6)(b) Ceiling system will be manufactured of extruded aluminum and clear anodized finish. Grid profile will have a minimum of 38mm wide face.

6.8.2.4(6)(c) Ceiling system will have features to allow direct attachment of cable trays, utility racks, partition wall system head tracks, surface-mounted lighting fixtures, softwall, curtain tracks or other accessories.

6.8.2.4(6)(d) To minimize air leaks, closed cell polyethylene gasket tape will be provided. The gaskets will be factory-applied, with precision cut ends, extended on grid members to ensure an airtight seal at all intersections.

6.8.2.4(6)(e) The suspension system grid connector will be of heavy duty zinc alloy or a material of equivalent performance.

6.8.2.4(6)(f) Ceiling panels will be extruded twin-wall polycarbonate panels. Minimum thickness of 10mm. Finish to be “ice”.

6.8.2.4(6)(g) Ceiling panels for the hot air return will be perforated aluminum ceiling panels with a cell size of 12.7mm x 12.7mm, a height of 12.7mm and 92% open area. Finish to be white powder-coat.

6.8.2.4(7) Access Panels

6.8.2.4(7)(a) Where hard ceilings are used, provide access panels to allow for mechanical and electrical servicing in the ceiling.

6.8.2.4(7)(b) Access panels are to be prefinished.

6.8.2.4(7)(c) In SRC-G and SRC-J areas access panels will not be permitted.

6.8.2.4(7)(d) If access panels have to be placed in the restricted areas described above, the Design-Builder will submit for review by the Authority locations and suggested strategies to mitigate the visibility of such access panels (e.g., mechanical or electrical fixtures may double-up as access panels). Regardless of location and strategy proposed for these access panels the Design-Builder will comply with all provisions as required by the SRC of these areas.

6.8.2.5 Flooring

6.8.2.5(1) All Rooms except Wet Rooms

6.8.2.5(1)(a) Use solid homogeneous sheet flooring, unless specified otherwise.

6.8.2.5(1)(b) Hot weld all joint seams.

6.8.2.5(1)(c) Use water soluble, low odour flooring adhesive, of types recommended by flooring manufacturer.

6.8.2.5(1)(d) Where there is no existing product to butt against, finish edging finish with vinyl finishing strip as per manufacturers’ specifications.

6.8.2.5(1)(e) Finish flooring with high speed buffing as per manufacturers' specification. Do not apply sealer or wax.

6.8.2.5(2) Wet Rooms

6.8.2.5(2)(a) Use slip-resistant solid sheet flooring that provides a coefficient of friction (COF) no less than 0.8 per ASTM D2047 standard in spaces as appropriate for their functionality and traffic such as, but not limited to:

(a).1 Tub Room;
(a).2 Soiled Utility room;
(a).3 Soiled Holding room;
(a).4 Laundry Facility;
(a).5 Housekeeping Room;
(a).6 Medication room;
(a).7 Staff Lounge;
(a).8 Life Assessment Skills room;
(a).9 Kitchenette;
(a).10 All Changing/Locker rooms;
(a).11 Shower Room;
(a).12 Specimen Collection/Washroom
(a).13 Secure rooms;
(a).14 Ante room and Shower;
(a).15 All spaces accessible to older adults population within their Care unit;
(a).16 Main Entry Lobby; and
(a).17 All Washrooms;

6.8.2.5(2)(b) Hot weld all joint seams.

6.8.2.5(2)(c) Provide integral wall base.

6.8.2.5(2)(d) Use solvent based, low odour flooring adhesive, of types recommended by flooring manufacturer.

6.8.2.5(2)(e) Hot weld new flooring to existing floor product.

6.8.2.5(2)(f) Finish flooring as per manufacturer's specification. Do not apply sealer or wax.

6.8.2.5(3) Stair Covering

6.8.2.5(3)(a) Use one piece treads and sheet risers with carborundum strip or an alternate designed for the visually impaired (product approved in advance by the Authority).

6.8.2.5(3)(b) Use water soluble, low odour adhesive, of types recommended by product manufacturer.

6.8.2.5(4) Comply with all applicable standards, including the National Floor Covering Association (NFCA) Specification Standards Manual. US Federal Specification RR-T-650d.

6.8.2.5(5) Select flooring materials that are suitable for:

6.8.2.5(5)(a) ease of cleaning and maintenance;

6.8.2.5(5)(b) pedestrian and rolling traffic;

6.8.2.5(5)(c) the acoustic requirements of the space;

6.8.2.5(5)(d) infection prevention and control; and

6.8.2.5(5)(e) the aesthetics of the Facility.

6.8.2.5(6) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate. Terminate flooring at the walls in the form of flash coves. Match the height of the base with all other wall bases.

6.8.2.5(7) Use heavy-duty materials for flooring on which wheeled or service vehicle traffic is anticipated and to which wear and damage may result.

6.8.2.5(8) Use permanent, heavy-duty integral materials for flooring in areas subject to moisture and heat over extended periods of time.

6.8.2.5(9) Use suitable flooring in Patient and staff areas where cart traffic is expected or where cleaning on a regular basis is necessary.

6.8.2.5(10) Use water resistant and slip-resistant flooring in public, staff, Patient Washrooms, Patient/Public Washrooms and Ensuites.

6.8.2.5(11) Use resilient tile products for flooring in service corridors and service areas.

6.8.2.5(12) Use static resistant flooring material for the CCH and Telecommunication rooms.

6.8.2.5(13) Provide flooring that will provide permanence and durability appropriate to the Safety and risk classification and the specific function of each space as indicated in the Appendix 1A [Clinical Specifications].

6.8.2.5(14) Resilient Flooring

6.8.2.5(14)(a) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms.

6.8.2.5(14)(b) Provide a coefficient of friction (COF) no less than 0.6 for level surfaces and 0.8 for incline surfaces per ASTM D2047 standard.

6.8.2.5(14)(c) The use of linoleum flooring is not allowed except in the Telecommunication rooms and the Entrance Facility room.

6.8.2.5(14)(d) Hot weld all seam joints.

6.8.2.5(14)(e) Use solvent based low odour flooring adhesive, of types recommended by flooring manufacturer.

6.8.2.5(14)(f) Finish flooring with high speed buffing as per manufacturers specification.

6.8.2.5(14)(g) Provide tactile warning strips and stair nosings to assist the visually impaired.

6.8.2.5(14)(h) Use adhesive for resilient flooring that meets or exceeds the United States Environmental Protection Agency (EPA) Standards for acceptable VOC concentration and emission rates.

6.8.2.5(14)(i) Provide integral wall base.

6.8.2.5(15) Sports Flooring – Exercise/Wellness room

6.8.2.5(15)(a) Provide sports flooring suitable for the intended use of the space.

6.8.2.5(15)(b) Provide material that is a minimum of 7.5mm thick for shock absorption.

6.8.2.5(15)(c) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms.

6.8.2.5(15)(d) Provide a coefficient of friction (COF) no less than 0.6 for level surfaces and 0.8 for incline surfaces per ASTM D2047 standard.

6.8.2.5(15)(e) Hot weld all seam joints or seamless.

6.8.2.5(15)(f) Provide integral wall base.

6.8.2.5(15)(g) Primers and adhesives will be waterproof, low VOC, of types recommended by flooring manufacturer.

6.8.2.5(15)(h) Provide anti-reflective finish.

6.8.2.5(15)(i) Ensure an Impact Sound Reduction of 6db when tested in accordance with ISO 717-2.e.

6.8.2.5(16) Seamless Quartz Epoxy Flooring

6.8.2.5(16)(a) Provide seamless epoxy flooring with 100% solids, zero VOC, solvent-free comprised of a two-component epoxy primer, a two-component epoxy resin and curing agent, coloured quartz aggregate broadcast into both primer and undercoat, and a high performance, UV-resistant two-component, clear epoxy sealer.

6.8.2.5(16)(b) Provide integral wall base.

6.8.2.5(16)(c) Provide a coefficient of friction (COF) no less than 0.6 for level surfaces and 0.8 for incline surfaces per ASTM D2047 standard.

6.8.2.5(17) Carpets and Carpet Tiles

6.8.2.5(17)(a) Carpets and carpet tile will only be allowed in non-wet areas and non-Patient areas, except in the Patient Corridor in the Outpatient area, such as:

(a).1 single and multi occupancy offices;
(a).2 open office and administrative areas;
(a).3 conference and meeting rooms; and
(a).4 other similar administrative areas.

6.8.2.5(17)(b) Provide secure wall base.

6.8.2.5(18) Concrete Stain:

6.8.2.5(18)(a) Contractors used to install/apply concrete stains will have minimum 10 years verified experience in the installation of concrete floor treatment finishes.

6.8.2.5(18)(b) Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer prior to applying.

6.8.2.5(19) The use of flocked flooring is permitted, except in wet rooms.

6.8.2.5(20) Static-Resistant Flooring – CCH

6.8.2.5(20)(a) Water based self-leveling epoxy electro-static dissipative coating.

6.8.2.5(20)(b) Bond Coat/Prime Coat and Maintenance Sealer: As required by manufacture of static dissipative coating.

6.8.2.5(20)(c) Coating System Thickness: Minimum of 14 mils.

6.8.2.5(20)(d) Provide a flooring system that meets or exceeds the listed minimum physical property requirements when tested according to the following standards:

(d).1 Electrical Transmission Properties (Point to Point and Point to Ground resistance): ANSI/ESD STM 7.1 Static Dissipative: 1E6-1E9 ohms;

(d).2 Microbial Resistant ASTM G 21 Passes, Rating 1;

(d).3 Flexibility,1/8” mandrel ASTM D 522 Passes;

(d).4 Adhesion Resistance ASTM D 4060 5B;

(d).5 Impact Resistance (Direct/Reverse 160/160 in-lbs.) ASTM D 2794 Passes;

(d).6 Abrasion Resistance (CS-17 wheels, 1 kg, 1000 cycles) ASTM D 4060 40 mg; and

(d).7 Chemical Resistance ASTM C 868, ASTM C 267, ASTM D 1308 As listed by manufacturer.

6.8.2.6 Painting and Protective Coatings

6.8.2.6(1) Comply with LEED requirements for Low Emitting Materials Paints and Coatings. In particular:

6.8.2.6(1)(a) architectural paints, coatings and primers: low voc.

6.8.2.6(1)(b) anti-corrosive and anti-rust: low voc.

6.8.2.6(1)(c) clear wood finishes, floor coatings, stains and shellacs: low VOC.

6.8.2.6(2) Walls, doors and shelving

6.8.2.6(2)(a) Use eggshell or semi gloss for all walls, doors and painted shelving.

6.8.2.6(3) Door frames and metal doors

6.8.2.6(3)(a) Use semi gloss for all door frames and metal doors.

6.8.2.6(4) Wood finish doors

6.8.2.6(4)(a) Use clear coat interior rub varnish for all wood finish doors.

6.8.2.6(5) Paint Grade Doors

6.8.2.6(5)(a) Use semi gloss for all paint grade doors.

6.8.2.6(6) Ceilings

6.8.2.6(6)(a) Use eggshell paint for all ceilings.

6.8.2.6(7) Floors, concrete

6.8.2.6(7)(a) Use a 2-component (base component A, curing agent B).

6.8.2.6(7)(b) Use a primer if part of coating system.

6.8.2.6(8) Floors, underground parking

6.8.2.6(8)(a) Provide seamless fluid applied elastomeric traffic bearing membrane with surface aggregate in accordance with Section 6.6.2.9. Provide additional aggregate at high wear areas such as, but not limited to, corners and breaking and acceleration points.

6.8.2.6(9) Paint painted Patient care areas with a semi-gloss finish.

6.8.2.6(10) Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) Architectural Painting Specification Manual.

6.8.2.6(11) Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

6.8.2.6(12) Use exterior and interior finish materials with surface finishes either as integral to the finish material or field-applied separately to the surface of the finish material.

6.8.2.6(13) Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

6.8.2.6(14) Provide a special protective coating on exterior and interior materials that are subject to corrosion from exposure to moisture or other corrosive agents, and where painting is deemed to be insufficient protection. Materials requiring a special protective coating include exterior and interior structural, galvanized, and miscellaneous steel.

6.8.2.6(15) Use interior paint materials of a quality to withstand regular or repeated cleaning as the function of the area dictates.

6.8.2.6(16) Paint handrails, doors, and frames with a contrasting colour from walls in consideration of the visually impaired.

6.8.2.6(17) Do not use materials containing lead and mercury.

6.8.2.6(18) If seamless epoxy wall coatings are used, provide a two-component, high solids, zero or low VOC, solvent-free, epoxy glaze wall coating that is seamless and abrasion, chemical, and UV-resistant.

6.8.2.7 Vinyl Acrylic Wall Covering

6.8.2.7(1) Provide vinyl/acrylic wall covering that is high impact resistant, rigid sheet with nominal 2.0mm thickness with colour-matched vinyl/acrylic trim for joint/transitions.

6.8.2.7(2) Furnish complete packaged system containing all primers and adhesive. Use non water-based and non-hazardous primer and adhesive materials.

6.8.2.8 Dry Erase Wall Covering

6.8.2.8(1) Provide as required throughout the Facility pigmented gloss vinyl wall covering presentation surfaces for dry erase markers, 0.61 kg/sq.m, non-woven backing.

6.8.2.8(2) Provide trim and other accessories including but not limited to wall covering trim of anodized aluminum, low profile trim, plastic marker dispensers, dry erase markers (set of 4 colours), low odour, and eraser, magnets, clearer, towels.

6.8.2.9 Padded Surfaces

6.8.2.9(1) Provide protective surface padding system for walls, doors and frames for use in all Secure rooms in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act. Floors may be constructed with padded surfaces.

6.8.2.9(2) Door padding panels will be composed of a padded material system adhered to a 19mm thick fire resistant plywood backing board. OSB is not permitted.

6.8.2.9(3) Provide openings in door padding for glazed observation openings and food slots.

6.8.2.9(4) Application of protective surface padding will be performed by an applicator with a minimum of 5 years' experience in the successful fabrication and installation of surface padding system;

6.8.2.10 Solid Surface wet wall/ceiling panel system

6.8.2.10(1) Provide in all showers of the Building a seamless wet wall/ceiling panel system of non-porous, homogenous material with a composition of solid acrylic polymer maintaining the composition throughout the panel.

6.8.2.10(2) The minimum nominal thickness of the panel system will be 12mm.

6.9 Specialties (Division 10)

6.9.1 Basic Requirements

6.9.1.1 Provide specialty products manufactured for the specific purposes intended, and installed in strict accordance with the manufacturer's directions.

6.9.2 Whiteboards

6.9.2.1 Provide, as required in Appendix 1G [Millwork, Casework, Fixtures and Fittings], whiteboard surfaces that allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort. Use porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant and have maximum contrast, glare control, and reflectivity.

6.9.2.2 Provide whiteboards with extruded aluminum frames, accessory trays, map rails and map hooks.

6.9.2.3 Use non-toxic, water based lamination adhesive.

6.9.3 Compartments, Cubicles, and Bays

6.9.3.1 Provide compartments and cubicles including toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.

6.9.3.2 Provide exposed surfaces that are permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.

6.9.3.3 Secure partitions and standards to the floor or ceiling structure, and in a manner to resist lateral loading and impact.

6.9.3.4 For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access.

6.9.3.5 Provide a mirror in all change compartments.

6.9.3.6 Curtain tracks in these spaces that are accessible to Patients will comply with the requirements of shower curtain tracks as indicated in this Schedule.

6.9.4 Toilet Partitions

6.9.4.1 Galvannealed sheet metal will conform to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish in polyester, baked enamel or powder coating.

6.9.4.2 For stainless steel, use Type 304 conforming to ASTM A240 with No. 4 finish.

6.9.4.3 For plastic laminate, use Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to NEMA LD-3.

6.9.4.4 Avoid use of particleboard core partitions.

6.9.4.5 For fibre-reinforced plastic (fibreglass), use a moisture resistant grade.

6.9.5 Wall and Door Protection

6.9.5.1 General Requirements

6.9.5.1(1) Propose to the Authority the locations and types of all wall and door protection for review by the Authority in accordance Schedule 2 [Review Procedure].

6.9.5.1(2) Use extrusions that are high impact-resistant in conformance with ASTM D4226;

6.9.5.1(3) Use materials that are stain-resistant to pen marks, paint and graffiti, able to withstand commercial cleaners without fading or staining and contain anti-microbial additives to retard mildew and bacterial growth.

6.9.5.1(4) Corner Guards, handrails, chair rails, and Bumper Rails

6.9.5.1(4)(a) Provide protection for walls, exposed wall corners and exposed edges at Patient care areas, service areas, and other areas as required to prevent damage due to impact from traffic such as stretchers, equipment and service vehicles.

6.9.5.1(4)(b) Select materials appropriate to the amount and degree of impact anticipated.

6.9.5.1(4)(c) Secure corner guards, handrails, chair rails and bumper rails to reinforcing and backing in the walls, such backing to be sufficient to withstand expected impact loads.

6.9.5.1(4)(d) Provide wood wall bumper guards in the following high traffic pedestrian areas:

(d).1 public corridors;
(d).2 service corridors; and
(d).3 Patient Care Unit corridors.

6.9.5.1(4)(e) Provide heavy duty steel corner guards and bumper rails in utility areas, including:

(e).1 the material management storage, loading dock and marwilling areas;
(e).2 utility corridors with heavy utility cart and pallet jack traffic; and
(e).3 utility shop areas.

6.9.5.1(5) Wall Protection

6.9.5.1(5)(a) Apply sheet wall protection to wall areas where the impact damage anticipated is of a larger area of wall than would be protected by bumper guards.

6.9.5.1(5)(b) Apply wall protection to spaces and rooms in SRC-B, SRC-C, SRC-D, SRC-E, SRC-F, SRC-G and SRC-H.

6.9.5.1(5)(c) Provide wall splash back protection behind and surrounding hand sinks, scrub sinks and housekeeping sinks.

6.9.5.1(5)(d) Apply sheet wall protection to faces of doors where impact damage is anticipated. Use sheet wall protection that complements the installation of door edge and frame protection.

6.9.5.1(5)(e) Wall protection will be high impact and stain resistant.

6.9.5.1(6) Door Edge and Door Frame Protection

6.9.5.1(6)(a) Provide protection to door edges and door frames in Patient accessible areas and service areas from damage such as impact caused by the regular movement of stretchers, service vehicles, and other wheeled vehicles.

6.9.5.1(7) Handrails

6.9.5.1(7)(a) Provide handrails in all corridors and Patient care areas of an appropriate type for Patient support.

6.9.5.1(7)(b) Select materials and shapes appropriate for Patient support, with continuous uninterrupted supports.

6.9.5.1(7)(c) Refer to Section 6.4 and Section 6.5 for additional requirements.

6.9.6 Change Cubicle Partitions

6.9.6.1 Where not adjacent to showers, change cubicle partitions will comply with the above requirements for toilet partitions.

6.9.7 Shower Partitions

6.9.7.1 Use solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or NEMA LD3.

6.9.8 Metal Lockers

6.9.8.1 Provide individual and shared storage facilities in designated staff and Patient areas in the Facility as described in Appendix 1A [Clinical Specifications], in Appendix 1G [Millwork, Casework, Fixtures and Fittings], and as appropriate for operation of the Facility. Such storage facilities will be metal lockers, and will include a mix of full height and half size lockers.

6.9.8.2 For sheet metal, use galvannealed steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.9.8.3 Lockers will be placed on minimum 150 mm high masonry bases finished with rubber wall cove bases.

6.9.8.4 Lockers will fit tightly below gypsum wall board bulkheads or be complete with sloped metal tops.

6.9.8.5 Finish steel surfaces with polyester baked enamel or powder coating.

6.9.8.6 All metal lockers for staff use will have number plates and be lockable with pad locks.

6.9.8.7 Each individual locker will include as a minimum two coat hooks and one shelf. The bottom of the locker will not be considered a shelf.

6.9.9 Storage Shelving Systems

6.9.9.1 Provide storage systems for materials in designated storage areas.

6.9.9.2 Adjustable shelving systems may be specifically manufactured for storage purposes, such as plywood or steel-slotted angle industrial shelving for bulk materials of plastic laminate-faced plywood for clean storage.

6.9.9.3 For mobile storage systems, provide a high-density system designed to make maximum use of available space by eliminating need for access aisle for each run of shelving. Install and brace systems to resist seismic loads. The mobile storage system will be either power assisted or will be easily operable without undue required strength by any person.

6.9.9.4 Provide storage shelving systems in accordance with the applicable requirements of the Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks.

6.9.9.5 Refer to Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks.

6.9.10 Washroom Accessories

6.9.10.1 Provide washroom accessories in all Public, Patient, change rooms, showers, and Staff Washrooms as required in accordance with the applicable high quality hospital standards. Determine the type, size, and number of accessories and placement on walls with regard for the numbers and categories of users, in consultation with the Authority.

6.9.10.2 Install washroom accessories to allow cleaning and maintenance of the accessory and surrounding wall area.

6.9.10.3 Ensure that washroom accessories for Patient accessible areas will comply with New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines.

6.9.10.4 Do not use recessed dispensers (such as those for paper towels, soap and waste receptacle).

6.9.10.5 Use commercial and hospital grade accessories free from imperfections in manufacture and finish.

6.9.10.6 Use fittings with concealed fastening for security and discouragement of tampering.

6.9.10.7 Staff and Patient/Public Washrooms accessories will include the following:

6.9.10.7(1) soap dispensers;

6.9.10.7(2) toilet paper dispensers;

6.9.10.7(3) paper towel dispensers – “hands free” type;

6.9.10.7(4) paper towel disposals;

6.9.10.7(5) mirrors;

6.9.10.7(6) grab bars (with integral tactile grip finish);

6.9.10.7(7) coat hooks;

6.9.10.7(8) sanitary napkin dispensers (in Public Washrooms only);

6.9.10.7(9) sanitary napkin disposals;

6.9.10.7(10) baby change table (in Public Washrooms only); and

6.9.10.7(11) utility shelf.

6.9.10.8 Ensuites and Patient Washrooms, except in the Secure room, will include the following washroom accessories:

6.9.10.8(1) soap dispenser;

6.9.10.8(2) toilet paper holder;

6.9.10.8(3) not used;

6.9.10.8(4) two (2) towel hooks;

6.9.10.8(5) mirror;

6.9.10.8(6) grab bars (with integral tactile grip finish);

6.9.10.8(7) two (2) coat hooks; and

6.9.10.8(8) utility shelf.

6.9.10.9 Showers in Ensuites will include the following accessories:

6.9.10.9(1) shower curtain track;

6.9.10.9(2) grab bars (with integral tactile grip finish);

6.9.10.9(3) not used;

6.9.10.9(4) recessed anti-ligature shelf for soap and shampoo in shower stall; and

6.9.10.9(5) shower curtain.

6.9.10.10 Staff Showers and Change rooms will include the following accessories:

6.9.10.10(1) shower curtain track or rod as appropriate;

6.9.10.10(2) grab bars (with integral tactile grip finish);

6.9.10.10(3) mirror;

6.9.10.10(4) shower curtain;

6.9.10.10(5) not used;

6.9.10.10(6) utility shelf: and

6.9.10.10(7) Fold-down seat.

6.9.10.11 Shower curtain tracks in Patient accessible showers will meet the following requirements:

6.9.10.11(1) track will be recessed in the ceiling in one piece of extruded aluminum running from wall to wall and secured with tamper-proof screws; and

6.9.10.11(2) track is not permitted to “break-away”.

6.9.10.12 In addition to the required backing for washroom accessories, provide additional backing at all washrooms for future installation of additional washroom accessories by the Authority.

6.9.10.13 Selection of Washroom accessories for Staff Washrooms, Staff Change rooms, and Public Washrooms will be from the Authority's approved list of Washroom accessories in further consultation with the Authority during the user consultation process described in Schedule 2 [Review Procedure].

6.9.11 Not used

6.9.12 Operable Partitions – Vertically Folding

6.9.12.1 Use only vertically folding partitions. Provide vertically folding partitions with the following requirements:

6.9.12.1(1) The folding partition will have a minimum sound rating of STC 49 tested in accordance with ASTM E90-Upon request a copy of the test result will be submitted to the Consultant.

6.9.12.1(2) The design life of the folding partition will be 10,000 complete closed to opened to closed cycles.

6.9.12.1(3) Components and finishes will be tested in accordance with CAN-ULC S102, Class A.

6.9.12.1(4) The folding partition will be visibly flat and rigid in the down (closed) position.

6.9.12.1(5) There will be no exposed hinges, brackets, screws, and no part of the mechanical system will be visible when the folding partition is in the down (closed) position.

6.9.12.1(6) Lifting equipment:

6.9.12.1(6)(a) The lifting equipment will be sized properly so that it will open and close the wall effectively over the cycle design life of the wall, at the minimum design speed specified.

6.9.12.1(6)(b) The lifting mechanism will be designed to function smoothly, quietly and safely. Wherever possible, ball bearings will be used instead of bushings and wear surfaces. In no circumstance will chain or belt drive systems be acceptable.

6.9.12.1(7) Safety equipment:

6.9.12.1(7)(a) The folding partition will employ an electromagnetic type of brake which will activate firmly, without hesitation, when power is lost to the system.

6.9.12.1(7)(b) The folding partition will employ electrical or other limit switches in order to stop the wall at its up and down travel limits.

6.9.12.1(7)(c) The entire length of the bottom edge of the folding partition will be equipped with a continuous pressure sensing strip which will cut power to the lifting equipment, if the sensing edge comes in firm contact with an object, before the wall is in the full down (closed) position.

6.9.12.1(8) Operation:

6.9.12.1(8)(a) The folding partition will be opened and closed using a spring return, 3 position key switch.

6.9.12.1(8)(b) The folding partition will automatically and acoustically seal against the floor, the two end walls and ceiling without the need for any manual intervention.

6.9.13 Electric Fireplace

6.9.13.1 Provide manufactured electric fireplaces in the locations identified in the Appendix 1A [Clinical Specifications].

6.9.13.2 Fireplaces will have all components and accessories for a complete, functional unit listed to UL or WHI and will be front view, opening-sealed unit and non-venting, with a fire on/off switch, log set and log grates.

6.9.14 Mail Slots

6.9.14.1 Provide mail slots that are a minimum of 25mm wide, 350mm high and 400mm deep, in locations identified in the Appendix 1A [Clinical Specifications].

6.9.15 Wire mesh partitions – Tech room

6.9.15.1 Wire mesh partition, without limitation to other applicable standards, will meet the following standards:

6.9.15.1(1) American Society for Testing and Materials (ASTM): ASTM A 510 – General Requirements for Wire Rods and Coarse Round Wire;

6.9.15.1(2) Federal Specifications (FS): FS QQ-W-461H for Carbon Steel Wire; and

6.9.15.1(3) Woven Wire Products Association (WWPA).

6.9.15.2 Wire mesh partition panels shall be minimum 10gauge crimped and woven steel wire securely welded to steel framing

6.9.15.3 Sliding doors will be constructed of the same materials as the panels and equipped with trolley truck wheels on door tracks. The sliding doors will have a minimum width of 1530mm. Include pathway and access for wiring and power transfer hardware to electrically operated door hardware. Provide egress mechanism to unlock the door as required by code on the egress side of the door.

6.9.15.4 Provide building access control system to each of the two sliding doors. The card reader will control both doors simultaneously.

6.9.15.5 Non-plated parts will receive one coat of gray acrylic enamel.

6.9.15.6 Fabricate frames and mesh to be rigid, neat in appearance, and free from defects, warp or buckle. Wherever practical, fit and assemble units in the manufacturer's plant.

6.9.15.7 Provide clear, unobstructed cable and hardware pathways for low voltage cables and power cables for the complete functionality of the gate hardware specified and intended.

6.10 Equipment (Division 11)

6.10.1 Refer to Appendix 1P [Equipment List] and Appendix 1I(ii) [Equipment List – IMIT].

6.10.2 Equipment Supports

6.10.2.1 Provide supports for equipment outlined in Appendix 1P [Equipment List] and Appendix 1I(ii) [Equipment List – IMIT], with proper backing and structural reinforcing as required.

6.10.3 Ceiling Mounted Patient Lifts

6.10.3.1 The Design-Builder will provide ceiling mounted Patient lifts at the room locations specified in Appendix 1A [Clinical Specifications]. The Design-Builder will provide all equipment, components, backing and structural reinforcing in the ceiling to support the installation and integration of the ceiling mounted Patient lift equipment into the Building.

6.10.3.2 The Design-Builder will provide ceiling mounted Patient lifts that:

6.10.3.2(1) have a Patient load bearing capacity of 454 kg;

6.10.3.2(2) is a ceiling mounted monorail lift (single track) system; and

6.10.3.2(3) allows for Patient pick up and care functions (turning, boosting, re-positioning, supporting/holding limbs) from all areas of the Patient bedroom designed for Patient use or access with coverage as indicated in Appendix 1A [Clinical Specifications].

6.10.3.3 The Design-Builder will design and construct the Building so that Ceiling Heights in all rooms containing ceiling mounted Patient lifts will accommodate Patient mobility tasks using lifts for example, when using walking slings, and so that a Patient's lower limbs will clear the edge of bed/stretcher/tub during seated transfers.

6.10.3.4 The Design-Builder will undertake final design of all ceiling mounted Patient lift systems in consultation with the Authority and ceiling mounted Patient lift equipment suppliers.

6.10.4 Patient Bed Headwalls

6.10.4.1 The Design-Builder will design the headwalls to:

6.10.4.1(1) allow for medical gases connections as indicated in Section 7.4.7.2(1),

6.10.4.1(2) meet or exceed all relevant CSA and ULC codes and regulations for the full range of requirements for an Acuity Adaptable Direct Patient Care Area and environment;

6.10.4.1(3) provide all rails, accessories and backing required for mounting monitors, baskets, and other equipment as required,

6.10.4.1(4) provide bed dock locators behind the bed,

6.10.4.1(5) allow for data, communication and electrical power outlets on both sides of the bed for the required number of devices as indicated in this Schedule;

6.10.4.1(6) provide one nurse call station button and one code blue button; and

6.10.4.1(7) so that medical gases, service outlets, rails, equipment and accessories are provided in a horizontally configured modular system, which may be either a horizontal modular headwall strip or a complete wall unit.

6.10.4.2 The Design-Builder will provide Patient bed headwalls at those locations as indicated in Appendix 1A [Clinical Specifications].

6.10.5 Safe Box

6.10.5.1 Provide a Safe Box in the locations indicated in Appendix 1G [Millwork Casework and Systems Furniture].

6.10.5.2 The Safe Box will be integrated and securely fastened to the millwork piece they are required to be placed in.

6.10.5.3 The Safe Box will have, as a minimum, the following features:

6.10.5.3(1) LED display;

6.10.5.3(2) 3 to 6-digit PIN code options;

6.10.5.3(3) Mechanical key override – single key for all Safe Boxes;

6.10.5.3(4) On hold time after 4 wrong consecutive attempts;

6.10.5.3(5) Anti-drill rotating bolts;

6.10.5.3(6) Battery powered;

6.10.5.3(7) Power status display on screen;

6.10.5.3(8) ADA compliant keyboard;

6.10.5.3(9) “Code to close” technology;

6.10.5.3(10) Approximate external dimensions: 190mm in height, 430mm in width, and 460mm in depth; and

6.10.5.3(11) Approximate volume: 38 lt

6.10.6 Window Washing Systems

6.10.6.1 Provide equipment or appropriate anchors to facilitate window washing.

6.11 Furnishings (Division 12)

6.11.1 Millwork, Casework, Clinical Systems Furniture, Systems Furniture, and Furniture

6.11.1.1 The Facility and its components must be accessible by people with different functional capacitates including, children, the elderly, Persons with Disabilities. The Design-Builder will apply “Universal Design” principles in the design and planning to ensure the furnishings are usable by all people without the need for specialized design or adaptation. Counters, desks, and work surfaces in non-office areas will include wheelchair access for both Patients and the public.

6.11.1.2 The Design-Builder will provide Millwork, Casework Clinical Furniture and Systems Furniture in accordance with applicable requirements of:

6.11.1.2(1) the Fraser Health Ergonomic Standards for Sitting and Standing Workstations;

6.11.1.2(2) the Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving and Racks; and

6.11.1.2(3) WorkSafe BC Occupational Health and Safety Regulation.

6.11.1.3 Products, including foam and upholstery, will be fire retardant to meet applicable building code requirements.

6.11.1.4 In addition to the Design-Builder's obligation to provide equipment and furniture as indicated in this Schedule and its corresponding Appendices, the Design-Builder will provide and install all millwork, casework, clinical systems furniture, systems furniture and accessories as required to support the programs and functions described in the Appendix 1A [Clinical Specifications] or as required to support the operation of the Building.

6.11.1.5 Appendix 1G [Millwork, Casework, Fixtures and Fittings] lists the locations in which millwork, casework, clinical systems furniture or systems furniture are required. The Design-Builder may use millwork, casework, clinical systems or systems furniture interchangeably to satisfy the requirements of Appendix 1G [Millwork, Casework, Fixtures and Fittings]. The Design-Builder will submit an initial layout and configuration for review by the Authority.

6.11.1.6 The Design-Builder, in consultation with the Authority and during the user consultation process described in Schedule 2 [Review Procedure], will establish which option (millwork, casework, clinical systems or systems furniture) best meets the Authority's functional needs for each space and will achieve the most appropriate level of flexibility, re-configurability, serviceability, and reusability between all areas of the Facility.

6.11.1.7 Millwork means custom fabricated wood or metal cabinetry and counter components and accessories that are installed with little or no modification. Millwork or casework may require mechanical, electrical power and data service connections.

6.11.1.8 Millwork or casework components will include but are not limited to work surfaces such as counters, work benches, Nourishment Station, the Security Office, the Care Team Base, and storage (such as cabinetry, files, drawers, wardrobes and cabinets).

6.11.1.9 All millwork doors and drawers will be lockable. Keyed locks are acceptable; keying will be reviewed in consultation with the Authority.

6.11.1.10 Modular Casework means a composition of factory produced, quickly installed parts that are easily replaceable, reconfigurable and interchangeable. Casework will be rearranged to change configuration or to include additional modules as needed.

6.11.1.11 Clinical systems furniture means a factory produced, component system designed to be replaceable, reconfigurable, and interchangeable, and designed for specific use in health care facilities and it is the preferred system by the Authority over millwork. Clinical furniture systems will be rearranged to change the configuration or to include additional modules and accessories as necessary. Clinical systems furniture requires electrical power and data service connections. Without limitation, the Design-Builder may use clinical systems furniture for the following:

6.11.1.11(1) nursing workstations;

6.11.1.11(2) charting alcoves;

6.11.1.11(3) triage desk;

6.11.1.11(4) unit clerk stations;

6.11.1.11(5) team care stations;

6.11.1.11(6) registration cubicles;

6.11.1.11(7) adjustable height workstations;

6.11.1.11(8) reception desks;

6.11.1.11(9) information desks; and

6.11.1.11(10) triage desks.

6.11.1.12 The Design-Builder will provide all accessories, storage, cabinetry, upper and lower shelving, and counters necessary to facilitate efficient clinical operations.

6.11.1.13 Systems furniture means a composition of factory-produced wall mounted or partition components that are easily reconfigurable and interchangeable and it is the preferred system by the Authority over millwork. Systems furniture is designed for office or commercial use and includes accessories and attachments which complete its functionality. Systems furniture requires electrical power and data service connections. Without limitation, the Design-Builder may use systems furniture for the following:

6.11.1.13(1) office workstations including desks, shelving, cabinets, keyboards and accessories;

6.11.1.13(2) cubicle partitions;

6.11.1.13(3) reception desks;

6.11.1.13(4) information desks; and

6.11.1.13(5) work/study carrels.

6.11.1.14 Furniture means loose or unattached items that can be rearranged to suit various activities and includes:

6.11.1.14(1) coffee tables and side tables;

6.11.1.14(2) unattached seating (such as chairs and stools); and

6.11.1.14(3) office desks.

6.11.1.15 All furniture and millwork supplied by the Design-Builder will meet the following requirements:

6.11.1.15(1) Flexibility

6.11.1.15(1)(a) Products must offer modular solutions that will enable flexibility and Lean principles to be practiced. Furniture pieces will:

(a).1 allow for individualization;

(a).2 possess the ability to be used in different applications or flex easily for future use;

(a).3 use non-handed solutions that work in multiple configurations, when possible.

6.11.1.15(2) Durability

6.11.1.15(3) Activity, waiting, and dining room furniture will be engineered for high traffic use.

6.11.1.15(4) Patient Bedroom furniture will be designed in conjunction with healthcare professionals and be tested to ensure durability and function.

6.11.1.15(5) Furniture will conform to the Upholstery Section under “Cleaning and Ease of Maintenance” for additional criteria related to durability.

6.11.1.15(6) Construction

6.11.1.15(6)(a) The quality and make of the product (its construction, finish materials, and maintenance requirements) will be suitable for long term use and be designed for intense performance.

6.11.1.15(6)(b) Products with replaceable components are preferred.

6.11.1.15(6)(c) Wood furniture will be avoided in Patient Bedrooms, waiting rooms, unit offices, Care Team Bases, treatment rooms, staff rooms and conference rooms. Where utilized, wood pieces will be constructed of:

(c).1 Solid wood frames of kiln dried wood for added strength and long term durability.

(c).2 A frame capable of supporting varying weights and body types and offering ease and reassurance to both Patients and care providers.

(c).3 Plastic laminates will be used in place of real wood when a wood-look is desired.

6.11.1.15(7) Seating

6.11.1.15(7)(a) In waiting room and Patient seating, steel tube construction and spring-seat construction are preferred.

6.11.1.15(7)(b) Seating with wall-saver legs or a wall-saver back design is preferred.

6.11.1.15(7)(c) Seating products with arms will include polyurethane arm caps rather than upholstered arm caps.

6.11.1.15(7)(d) See upholstered notes referenced throughout this document for information on upholstered seating products.

6.11.1.15(7)(e) See Section 6.11.1.15(11) and 6.11.1.15(13) for additional requirements.

6.11.1.15(8) Tables

6.11.1.15(8)(a) For durability in waiting rooms and high traffic areas, horizontal table surfaces of solid surface material tops or plastic laminate are preferred.

6.11.1.15(8)(b) Low VOC polyurethane sealed woods will be used on vertical surfaces if plastic laminate is not available.

6.11.1.15(8)(c) Front edges will feature a profile for user comfort and be of durable material composition and construction.

6.11.1.15(9) Workstations/Desks

6.11.1.15(9)(a) Refer to individual specifications for material composition and finish information.

6.11.1.15(9)(b) When installed, two adjoining end panels of work surfaces will be leveled so work surfaces sit at the same height.

6.11.1.15(9)(c) Tackboard, if specified with desk and/or workstation, between hutch and worktop, will span from work surface top to underside of overhead cabinetry leaving no visible gaps, while, at the same time, managing task light wires, if specified with assembly.

6.11.1.15(9)(d) Any “smart” or “hardwired” furniture will be fully coordinated for proper circuitry and any other building requirements.

6.11.1.15(10) Filing / Storage

6.11.1.15(10)(a) Filing is for letter filing, unless specified otherwise. In order to maximize filing capacity, files will be set up for side-to-side filing.

6.11.1.15(10)(b) During installation, the conversion parts of the files will be left in the file to allow for front-to-back / side-to-side conversion at a later time.

6.11.1.15(10)(c) Filing will be equipped with hanging frames at the time of installation.

6.11.1.15(10)(d) At a minimum, two-drawer files will include a counter-balance package as recommended by the product manufacturer.

6.11.1.15(10)(e) Lockable storage will be keyed as per the building keying system. Keying schedule to be determined with the Authority.

6.11.1.15(11) Cleaning and Ease of Maintenance

6.11.1.15(11)(a) The size, shape, and design of the furniture will allow easy access for cleaning.

6.11.1.15(11)(b) Materials, upholstery, and finishes will be capable of withstanding institutional grade detergents, cleaners, and disinfectants with no effect on the appearance, integrity, or life of the product. Selection will be based on the understanding of the principles of decontamination and maintenance requirements (able to withstand multiple applications of diluted disinfectants over time).

6.11.1.15(11)(c) The Design-Builder will request that manufacturers provide detailed cleaning and disinfection guidelines prior to The Design-Builder's purchase along with a thorough listing of which cleaning products will be used on their products. The Design-Builder will review instructions to ensure they are clear and cleanable with Authority approved detergents and disinfectants.

6.11.1.15(11)(d) Other upholstered soft furnishings will have the following characteristics:

- (d).1 Be seamless where possible or have double stitched seams located on the non-contact areas of the furniture or sealed.
- (d).2 Limited pleating.
- (d).3 Upholstered furniture in care areas will be covered with fabrics that are fluid-resistant, non-porous and will withstand cleaning with hospital grade disinfectants.
- (d).4 Seating will have removable seat cushions for cleanability and/or "clean-out" spaces between the seat and back for lounge seating applications.
- (d).5 Seating will have removable upholstery covers for both the seat and back, if applicable. Attic stock of the removable upholstery covers will be ordered with the original purchase, in the amount of 5% of the total waiting room and Patient Bedroom seating.
- (d).6 Have high-destiny foam cores with a moisture barrier and resistance to mold.

6.11.1.15(11)(e) Upholstery will:

- (e).1 be impermeable to water and quick-drying;

(e).2 be anti-microbial, and/or have anti-microbial inhibitor technology;
(e).3 have a good abrasion rating for high-use areas (with a minimum of 100,000 DR (ASTM D4157-02 Wyzenbeek Test Method);
(e).4 have a high-rating for color-fastness, exceeding 40 hours (AATCC Method 16A);
(e).5 be stain-resistant;
(e).6 be latex-free;
(e).7 have low volatile organic compounds;
(e).8 contain no heavy metals;
(e).9 have no halogenated flame retardant materials or perfluorinated chemicals;
(e).10 have limited use of polyvinyl chloride, avoiding use of polyvinyl chloride where possible.

6.11.1.15(12) Environmentally Sensitive

6.11.1.15(12)(a) Products will be GREENGUARD certified, and be designed to achieve reduced environment impact.

6.11.1.15(12)(b) If wood products are used, lumber will come from responsibly managed forests, with each piece utilized to its full capacity. Wood will have low formaldehyde emissions with little to no CFC's used in the production of the materials.

6.11.1.15(12)(c) Furnishings will follow the Lean Design principles outlined in this Schedule.

6.11.1.15(13) Comfort, Efficiency, and Safety

6.11.1.15(13)(a) Waiting room furniture will be designed to promote comfort and long term durability.

6.11.1.15(13)(b) The product construction and design will avoid stress and fatigue to the Patient.

6.11.1.15(13)(c) Seating will have the stability to assist the Patient or visitor in entering and exiting the chair.

6.11.1.15(13)(d) All items of furniture (including tables) will be stable and will not move or tip over when touched by a person requiring support.

6.11.1.15(13)(e) Furniture will not constitute a hazard for persons who have visual limitations and will be usable by persons with varying abilities and disabilities.

6.11.1.15(13)(f) Products will accommodate and facilitate comfort and well-being.

6.11.1.15(13)(g) Back support will be provided on seating pieces, through the use of a high or mid back, to provide adequate back support to various populations.

6.11.1.15(13)(h) A minimum of 20% of seating will be designed to meet bariatric requirements of 600 lbs.

6.11.1.15(13)(i) The overall dimensions will be appropriate for the vast majority of Fraser Health users. Task seating will include:

- (i).1 Adjustable seat pan height, depth and angle;
- (i).2 Adjustable backrest height, angle and tension adjustment;
- (i).3 Independent backrest and seat pan angle adjustment;
- (i).4 Adjustable height and width armrests; and
- (i).5 Seat pan waterfall edge or radius front seat cushion.

6.11.1.15(13)(j) General meeting room seating will have a backrest recline function, be stackable, mobile, cleanable and durable.

6.11.1.15(13)(k) Boardroom seating will be height adjustable, feature a backrest recline function, be stackable, mobile, cleanable and durable.

6.11.1.15(13)(l) Waiting room seating will include armrests to aid sitting and standing and have a raised seat pan for hip and knee considerations.

6.11.1.15(13)(m) All Patient areas will receive furniture that are not harmful or will not allow Patients to injure themselves or others. Security and safety are the main concern.

6.11.1.15(13)(n) The Design-Builder will be responsible for verifying field measurements to ensure proper clearance for fitting items per the specifications and drawings.

6.11.1.15(14) Not used.

6.11.2 Window Coverings

6.11.2.1 Provide window coverings as follows:

6.11.2.1(1) all exterior windows are to receive shading devices providing privacy, sun and heat control, that are easy to clean and do not support or provide a surface that encourages spread of infectious disease (e.g. do not become electrostatically charged);

6.11.2.1(2) roller shades are preferred for use on exterior windows, except at Patient accessible areas;

6.11.2.1(3) all interior windows to receive blinds where privacy may be a concern, as identified by the Authority; and

6.11.2.1(4) in Multimedia rooms and all other rooms where video conferencing is required as indicated in this Schedule and its corresponding Appendices.

6.11.2.2 Window coverings will allow control of exterior light entering the room during daylight hours and provide privacy during daylight and non-daylight hours.

6.11.2.3 Where window coverings are required for black-out functions, provide materials, tracks, seals, and operation suited to that purpose.

6.11.2.4 Use window coverings manufactured from materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control.

6.11.2.5 Horizontal venetian blinds are also discouraged other than for between-glass installation in Patient accessible areas. Roller shades and vertical blinds are preferable.

6.11.3 Window Shade Systems

6.11.3.1 Use manual and motorized roller shades with one piece extruded aluminum roller tube, extruded vinyl fabric spline, aluminum profile hem bars.

6.11.3.2 Install recessed in ceiling pockets, facilitating easy removal and replacement. Use galvanized or zinc-plated steel mounting brackets and non-corrosive fasteners.

6.11.3.3 Use shading fabric of non PVC coated fibreglass yarn and that:

6.11.3.3(1) is waterproof, washable, rot-proof, flame-resistant, fungal and bacteria-resistant, colourfast to light, glare-reducing, and able to control heat gain and provide external visibility;

6.11.3.3(2) conforms to CAN/CBSB-4.162-M, “Hospital Textiles - Flammability Performance Requirements”; and

6.11.3.3(3) is tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.

6.11.3.4 Audiovisual Light Blocking Shades: Fabricated from black-out shade panel material, designed to eliminate all visible light gaps when shades are fully closed.

6.11.3.5 Manual shade operation with continuous loop bead chain, clutch, cord tensioner and bracket lift operator.

6.11.3.6 Motorized operation utilizing in-tube motor dive, externally located control wheels and manual switch control.

6.11.4 Venetian-Type Blinds between Glazing

6.11.4.1 Provide integral blinds, manually operated, mounted between sealed glass unit and protective Security Glazing as indicated in Section 6.7.2.7(1)(a).

6.11.4.2 Integral blinds will be operated by durable, anti-ligature operators with removable control knob.

6.11.4.3 Integral blinds will be capable of blocking exterior lighting that is bright enough to disturb sleep and block night time views from outdoors into the Patient Bedroom.

6.11.4.4 Conceal blind raise-lower controls.

6.11.4.5 Blinds will consist of tempered aluminum alloy slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape. Use tapes with no special end rails required to attach the suspension members from the window opening to the blind.

6.11.4.6 Use a hardware/window design that does not allow air movement from a room to adjacent rooms. Openings in the glazing plane are not allowed.

6.11.4.7 The operator will be a specially constructed, permanent magnet capable of moving the blind assembly from a closed position in one direction to a closed position in the opposite direction.

6.11.5 TV Housing

6.11.5.1 Provide secure, transparent, anti-ligature, tamper proof, and, to the extent possible, unbreakable housing for TVs, except in the Staff Lounges. Refer to Appendix 1A [Clinical Specifications] for locations. Maximum size of TVs will be 152.4mm (60”). Final sizing of the TV housings will be coordinated in further consultation with the Authority.

6.12 Special Construction (Division 13) – For future use

6.13 Conveying Equipment (Division 14)

6.13.1 Basic Requirements

6.13.1.1 The Design-Builder will provide an elevator study to demonstrate how it established the number, type and distribution of elevators required to meet the needs of the Facility. Although the total number of elevators will be established by the Design-Builder, as a minimum supply and install in the Facility three elevators which access all sub-grade and above-grade levels (including Roof/Penthouse), one elevator serving the sub-grade levels and main entry level, and one freight elevator serving all levels of the Energy Centre and all other levels with delivery areas (e.g., loading docks, service/delivery entries) and service rooms/areas that contain main equipment in them (such as, but not limited to, mechanical rooms, electrical rooms, UPS rooms, Campus Communication Hub, Bridges/Corridors with service functions). Use good design practice taking into consideration infection prevention and efficient flow, while also addressing movement control requirements.

6.13.1.2 The Design-Builder will design the elevator and systems to accommodate the Authority Activities in a manner which contributes to the overall efficiency and effectiveness of the hospital operations.

6.13.1.3 The Design-Builder will design the elevator systems to ensure there is sufficient capacity to accommodate the wide range of user and functionality requirements, in a manner which satisfies expectations for safety, reliability, responsiveness, accessibility and operational efficiency.

6.13.1.4 The Design-Builder will include provisions for persons with special mobility needs and other forms of disabilities, such as learning difficulties.

6.13.1.5 The Design-Builder will ensure that elevators will support access provisions, for people and materials, to all functional areas. Elevator access to all building levels, including the Roof/ mechanical levels, will be provided. The Design-Builder will provide a security card reader inside each elevator for access restrictions. Security card readers will be programmed in accordance with requirements of the Authority.

6.13.1.6 The Design-Builder will ensure that:

6.13.1.6(1) Any equipment provided will be non-proprietary and have a proven track record of at least five years field operation in Canada in similar environments and of similar configuration.

6.13.1.6(2) Access to technical support and spare parts will be readily available to any qualified elevator company within a reasonable timeframe, appropriate to the product, equipment or service and at fair market value.

6.13.1.6(3) Provision of spare parts and technical information will be provided directly to the Authority or Authority's designate (without limitation) for a period of not less than 25 years.

6.13.1.6(4) Software upgrades will be provided at no cost, when required, for the life expectancy of the component.

6.13.1.7 The Design-Builder will provide durable elevator cab finishes (including stainless steel on elevations with access doors as well as bar type hand and bumper rails for all elevators serving clinical floors). For the single freight elevator, elevator cab finishes must be durable and reinforced to sustain the associated rigours of loading, together with being equipped with two sets of bumper rails on all non-access walls.

6.13.1.8 The Design-Builder will provide emergency power operation of elevators such that all elevators are fed with emergency power and they are all capable of operating simultaneously. The Design-Builder will coordinate with electrical design and requirements to ensure that all singe phase and 3-Phase power supplies are fed from the emergency power system.

6.13.1.9 The Design-Builder will configure elevators used for materials with platforms to accommodate easy movement of material carts. Requirements for transport of heavy equipment will be accommodated by the designated service elevator, with this elevator engineered for Class C3 loading based on a single piece load equivalent to the elevator's rated capacity and single axle loads of 1135 kg, and by the freight elevator engineered for Class C2 loading.

6.13.1.10 The Design-Builder must clearly demonstrate how elevators and controls will be configured to maintain a distinction and separation between public (Patient and visitor) and non-public (staff, service) routes and uses.

6.13.1.11 Configure service elevator to avoid crossing public circulation areas and to ensure service elevator will not be used by the public.

6.13.2 Performance Criteria

6.13.2.1 The Design-Builder will provide elevators as required to meet the following performance requirements:

6.13.2.1(1) Elevators in the Facility will consist of conventional overhead traction elevators with geared or gearless machines. For the parking shuttle(s), the Design-Builder will be permitted to utilize holeless hydraulic equipment or machine room less (MRL) traction equipment with a gearless machine.

6.13.2.1(2) In cases where the Design-Builder elects to use a holeless hydraulic product for the parking shuttle, elevator will use a roped hydraulic with twin-post (single stage) jacks located on either side of the platform in which:

6.13.2.1(2)(a) Maximum system working pressure will not exceed 3400 kPa.

6.13.2.1(2)(b) Equipment will be rated for a minimum rated speed of 0.76 m/s.

6.13.2.1(2)(c) Equipment will be provided with an oil cooler which is direct vented outside of the machine room. Oil cooler.

6.13.2.1(3) Building Elevator Cabs: Elevators will accommodate a bariatric stretcher with up to four staff. Overall stretcher dimensions will be 1067 mm wide x 2375 mm long.

6.13.2.2 The Design-Builder will arrange the equipment such that there are no timers, dates, trip counters, or other counters that would shut down the equipment or change its operation.

6.13.3 Scope of Work

6.13.3.1 Provide all necessary components to make elevator systems fully operational and functional, whether or not specifically referenced in this Schedule.

6.13.3.2 Provide all permits, labour, materials, products, equipment, services and all else necessary for the design, manufacture, delivery, installation and services required for a complete and fully functioning elevator system.

6.13.3.3 Obtain and pay for design submission, registration, inspection and permit, as required (except for Authorities and operating license), and make such tests as required by the British Columbia Safety Authority prior to licensing.

6.13.3.4 Codes

6.13.3.4(1) Provide equipment and perform work in accordance with the B44 Safety Code for Elevators and any other code and standards which may govern the installation.

6.13.3.5 Training

6.13.3.5(1) At the completion of the job, provide training sessions for the Authority consisting of a review of the documentation and complete installation. Participants required as part of the training sessions will be established by the Authority without limitation or restriction who can attend. The installer shall provide a minimum of one month advance notice on a day suitable to the Authority for the training unless the Authority subsequently advises that addition notification is required.

6.13.3.6 Programming

6.13.3.6(1) Include programming of elevators to integrate with communication, networks, fire alarms and other systems in the Building.

6.13.3.7 Barrier-Free Access

6.13.3.7(1) Arrange the controls and fixtures to meet barrier-free access requirements of the B44 Safety Code for Elevators Appendix E and any other code which may govern the installation. This requirement is not applicable to the freight elevator.

6.13.3.8 Luminaires

6.13.3.8(1) Unless indicated otherwise in these Schedules, provide a choice of luminaires from a third party supplier and the manufacturer’s standard products. Luminaires for the freight elevator will be vandal resistant type including faceplates.

6.13.3.8(2) Provide luminaires with LED illumination and stainless steel targets. Able to withstand Authority approved cleaning and infection control solutions, agents and products.

6.13.3.9 Operating Conditions

6.13.3.9(1) Provide equipment that will operate normally when the machine room and hoistway temperature is between 5 and 35 degrees Celsius with relative humidity levels not exceeding 95% non-condensing.

6.13.3.9(2) Provide equipment that will operate normally when the power supply is within 10 percent of its rated voltage.

6.13.3.10 Seismic requirements

6.13.3.10(1) Comply with Section 8.4 (Elevator Safety Requirements for local Seismic Risk Zone) of the B44-13 Safety Code for Elevators and any other code which may govern the installation.

6.13.3.11 Maintainability

6.13.3.11(1) Arrange the equipment such that there are no timers, dates, trip counters, or other counters that would shut down the equipment or change its operation.

6.13.3.11(2) Elevator equipment The Design-Builder provides under this specification will not contain proprietary features which limit the ability to engage a registered elevator maintenance contractor, other than the original manufacturer/installer, to provide routine maintenance services.

6.13.3.11(3) If specialized tools or software are required to perform routine maintenance services, provide such tools with the elevator equipment as permanent “on board” equipment, or as separate devices. Such tools or software will become the property of the Authority.

6.13.3.12 Equipment Summary

6.13.3.12(1) Elevators serving the above grade levels will, at a minimum, meet the requirements set out in the table below:

Building Public/Patient Transfer Elevators	
Number	Two (2) or more to suit the needs of the Building
Type	Passenger Elevators
Type of Machine	Geared or Gearless Overhead Traction
Machine Room Location	Directly overtop of the elevator hoistways.
Drive	AC VVVF
Load (Capacity)	Min. 2270 kg (5000 lb) to suit the performance requirements
Class of Loading	Passenger Classification and Class A General Freight Loading
Car Speed	Minimum of 1.78 m/s (350 fpm)
Operation	Group Supervisory System; Full Selective Collective
Control	Microprocessor
Number of Stops	Provide service to all floors above and below grade to suit the Building
Openings	Front and rear openings to suit the Building
Hoistway Size	To suit the equipment
Cab Inside Dimensions	Min. 1740 (5’-8”) w x 2590 (8’-6”) d
Hoistway Overhead Clearance	To suit the equipment
Pit Depth	To suit the equipment
Cab Height	3050 (10’-0”)
Door Type	Two Speed Side Opening
Door Size	Min. 1370 (4’-6”) wide x 2134 (7’-0”) high
Car Operating Panel	Two (2) per car
Car Position Indicator	Two (2) per car
In-Car Riding Lanterns	None
Hall Buttons	Min one (1) riser for up to three (3) cars,
Hall Lanterns	At all Landings
Hall Position Indicators	At all landings in combination fixture with hall lanterns

6.13.3.12(2) Service Elevator will at a minimum, meet the requirements set out in the table below:

Service Elevator	
Number	Single car or more to suit the needs of the Building
Type	Passenger / Service Elevator
Type of Machine	Geared or Gearless Overhead Traction
Machine Room Location	Directly overtop of the elevator hoistway
Drive	AC VVVF
Load (Capacity)	Min. 2270 kg (5000 lb)
Class of Loading	Class C3 loading to accommodate single piece load equivalent to rated capacity of elevator with single piece axle load equivalent to 50% of rated capacity.
Car Speed	1.78 m/s (350 fpm) minimum
Operation	Simplex Selective Collective
Control	Microprocessor
Number of Stops	Provide service to all floors above and below grade to suit the Building inclusive of any mechanical floor levels.
Openings	Front and Rear Openings to suit the Building
Hoistway Size	To suit the equipment
Cab Inside Dimensions	Min. 1740 (5’-8”) w x 2590 (8’-6”) d.
Hoistway Overhead Clearance	To suit the equipment
Pit Depth	To suit the equipment
Cab Height	3050 (10’-0”)
Door Type	Two Speed Side Opening
Door Size	1370 (4’-6”) wide x 2134 (7’-0”) high
Car Operating Panel	Two (2) locating one in each front and rear return panel.
Car Position Indicator	One (1) per car operating station.
In-Car Riding Lanterns	Flush mounted in each car entrance post
Hall Buttons	Min one (1) riser for up to three (3) cars
Hall Lanterns	None
Hall Position Indicators	Main lobby Public side only.

6.13.3.12(3) Parking Shuttle Elevator will at a minimum, meet the requirements set out in the table below:

Parking Shuttle Elevator	
Number	Single car or more to suit the needs of the Building
Type	Passenger Elevator
Type of Machine	Gearless Machine Room Less (MRL)Traction or holeless roped hydraulic with twin-post single stage jack units

Machine Room Location	Adjacent to hoistway at lowest landing although permitted to be up to 15 metres remote from the elevator hoistway (at lowest landing)
Drive	AC VVVF or hydraulic with two-way levelling
Load (Capacity)	Min. 1360 kg (3000 lb)
Class of Loading	Passenger Classification and Class A General Freight Loading.
Car Speed	0.76 m/s (150 fpm) minimum
Operation	Simplex Selective Collective
Control	Microprocessor
Number of Stops	Provide service to all below grade levels and main entry.
Openings	Front and Rear Openings to suit the Building
Hoistway Size	To suit the equipment
Cab Inside Dimensions	Min. 2030 (6'-8") w x 1524 (5'-0") d.
Hoistway Overhead Clearance	To suit the equipment
Pit Depth	To suit the equipment
Cab Height	2440 (8'-0")
Door Type	Single Speed Centre Opening
Door Size	1067 (3'-6") wide x 2134 (7'-0") high
Car Operating Panel	Two (2) locating one in front return panel and one in rear return panel.
Car Position Indicator	One (1) per car operating station.
In-Car Riding Lanterns	Flush mounted in each car entrance post
Hall Buttons	Min one (1) riser for up to three (3) cars
Hall Lanterns	None
Hall Position Indicators	None

6.13.3.12(4) Freight elevator will at a minimum, meet the requirements set out in the table below:

Freight Elevator	
Number	Single car to suit the needs of the Building
Type	Freight Elevator
Type of Machine	Geared or Gearless Overhead Traction
Machine Room Location	Directly overtop of the elevator hoistway
Drive	AC VVVF
Load (Capacity)	Min. 2270 kg (5000 lb)
Class of Loading	Class C2 loading.
Car Speed	1.01 m/s (200 fpm) minimum
Operation	Simplex Selective Collective
Control	Microprocessor
Number of Stops	Provide service to all floors.

Openings	Provide openings in vertical alignment.
Hoistway Size	To suit the equipment
Cab Inside Dimensions	Min. 2335 (7'-8") w x 2615 (8'-7") d.
Hoistway Overhead Clearance	To suit the equipment
Pit Depth	To suit the equipment
Cab Height	3050 (10'-0")
Door Type	Power operated vertical bi-parting landing doors and power operated car gate. Provide pass-type vertical bi-parting doors as required.
Door Size	2335 (7'-8") wide x 2440 (8'-0") high
Car Operating Panel	One (1) recessed in side wall within 610 mm of car gate.
Car Position Indicator	One (1) per car operating station.
In-Car Riding Lanterns	Flush mounted adjacent to car operating panel.
Hall Buttons	One (1) riser at all levels served including security card readers to restrict access and operation of elevator to trained freight handlers.
Hall Lanterns	None
Hall Position Indicators	At FEO recall level only.

6.13.3.13 Machine Room Less (MRL) Elevator Equipment

6.13.3.13(1) Provide a gearless traction hoisting machine located within the hoistway rated for a minimum of 180 motor starts per hour.

6.13.3.13(2) Provide an automatic reset governor located in the hoistway that will be maintained from the car top. When the governor has tripped, arrange that it will be reset when the car is moved in the up direction and provide means to remotely activate the governor for testing purposes.

6.13.3.13(3) Provide an electronically released and monitored brake system, to permit momentary nudging of elevator within the hoistway under test or emergency conditions.

6.13.3.13(4) Provide a control room that allows full body access and permits maintenance and other work to be done with the control room door in the closed position, while maintaining minimum electrical and equipment clearances imposed by Code.

6.13.3.13(5) Locate control room adjacent to the elevator hoistway at the lowest landing served, although room can be remote from hoistway by up to 15 metres provided there are valid reasons why an adjacent room cannot be accommodated.

6.13.3.14 Conventional Overhead Traction Elevator Equipment

6.13.3.14(1) Provide a geared or gearless traction hoisting machine located within the machine room rated for a minimum of 240 motor starts per hour.

6.13.3.14(2) Locate machine room overtop of the elevator hoistway. Machine room will be configured to ensure that Code compliant clearances are achieved throughout the room with access provisions consistent with local codes and standards.

6.13.3.15 Holeless Hydraulic Elevator Equipment

6.13.3.15(1) Provide a hydraulic power units located within the machine room rated for a minimum of 80 motor starts per hour.

6.13.3.15(2) Locate machine room adjacent to hoistway at lowest landing served or up to a maximum of 15 metres remote from the elevator hoistway provided there are valid reasons why an adjacent room cannot be accommodated. Machine room will be configured to ensure that Code compliant clearances are achieved throughout the room with access provisions consistent with local codes and standards.

6.13.3.15(3) Unit will be provided with a solid state starter to limit starting current to a maximum of 250% of the full load up running current.

6.13.3.15(4) Unit will be provided with a pressure and temperature compensated valve to ensure that down speed can be maintained within 5% of the rated speed in the down direction regardless of load inside cab. Equipment will be engineered to ensure that running speed in up direction with rated load varies from rated speed by a maximum of -3%.

6.13.3.15(5) Unit will be provided with an overspeed pipe / rupture valve in the elevator pit.

6.13.3.16 Elevator Machine and/or Control Room Equipment

6.13.3.16(1) Provide a non-proprietary elevator control system that is microprocessor-based with sophisticated group dispatching capability. Control platform will consist of Motion Control Engineering products with iControl products for the conventional overhead traction elevators, Motion 4000 for MRL equipment and Motion 2000 for hydraulic equipment.

6.13.3.16(2) For traction elevators provide a spring applied electric brake, held open by an electro-magnet actuated by the controller. Design the brake to automatically apply in event of interruption of power supply from any cause.

6.13.3.16(3) Provide sound and vibration isolation pads such that there is no direct (rigid) contact between the machine (motor and drive system as well as tracks) and the building structure.

6.13.3.16(4) For traction elevators provide an emergency brake to address prescribed requirements of the Code for ascending car overspeed speed protection and unintended car movement protection.

6.13.3.16(5) For traction elevators provide a solid state drive complete with isolation transformers, filters (to meet IEEE Standard 519 for Special Applications), and vibration isolation pads.

6.13.3.16(6) For traction elevators provide a digital velocity encoder on the motor, giving feedback to the controller on motor speed and position.

6.13.3.16(7) Provide a microprocessor based controller consisting of relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static drive units, wiring terminal strips, and related components all enclosed in a cabinet with hinged door panels.

6.13.3.16(8) Control platform for all elevators will be engineered to support future connection to an internet protocol based interactive remote monitoring system and integration with a Building Management System.

6.13.3.16(9) Controller cabinets shall be seismically restrained.

6.13.3.16(10) Controls for elevators serving clinical floors will be provided with Medical Emergency Operation in accordance with prescribed requirements of the Lower Mainland Facilities Management, Technical Guidelines, Division 14 – Vertical Transportation, with feature only being active for the public / Patient transfer elevators initially. Patient transfers from the Sally-Port level will be arranged to utilize either of the public / Patient elevators with the Medical Emergency Operation feature through a dedicated elevator lobby which is not accessible to the public.

6.13.3.16(11) Control platform for elevators serving the Building floors will be engineered to support the future activation of Priority Service Operation in accordance with prescribed requirements of the Lower Mainland Facilities Management, Technical Guidelines, Division 14 – Vertical Transportation.

6.13.3.16(12) Control platform for elevators serving the Building floors will be engineered to support the future activation of Wandering Patient Operation in accordance with prescribed requirements of the Lower

Mainland Facilities Management, Technical Guidelines, Division 14 – Vertical Transportation.

6.13.3.16(13) Control platform for the centre elevator serving the Building will be engineered to support swing service operation such that elevator can function in duplex operation for public / Patient transfer operation or as a simplex unit only providing access to landings served by the dedicated service car. When elevator is in service mode, it will only respond to landing calls registered on the service elevator hall button riser and doors on the above grade public corridors will not be active, although these restrictions will be automatically overridden by Firefighters' Emergency Operation, Medical Emergency Operation and Priority Service Operation (should this feature be activated).

6.13.3.17 Hoistway Equipment – All Elevators

6.13.3.17(1) Provide commercial grade entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibs, and all other equipment required for a complete installation. Provide entrance doors and frames finished in brushed stainless steel. For the centre elevator in the Building, in addition to entrances on the Public side corridor, provide entrances on the service corridor side, with openings on the service corridor side only being functional when elevator is in swing service mode operation operating as a simplex unit, Firefighters' Emergency Operation, Medical Emergency Operation and Priority Service Operation (should this feature be activated). Dedicated service elevator shall be provided with an entrance on the public side of the hoistway at Level 4 with controlled access from inside the car and lobby, while at the main floor this elevator shall be provided with an opening into the Main Lobby. Service elevator opening to the main floor shall have restricted access from inside the car, with this opening serving as the recall level on Firefighters' Emergency Operation. For the service elevator opening at the main floor, lobby fixture shall only contain: FEO key switch, indicators and engraving; emergency power indicator and engraving; communication failure indicator, engraving, audible element and reset key switch.

6.13.3.17(2) Provide standard 'T' section steel guide rails for the car (and counterweight). Install guide rails using brackets fastened to the building structure. Clamp the guide rails to the bracket with clips arranged to prevent any horizontal movement of the rail. Join the rail sections using steel backing plates.

6.13.3.17(3) For traction elevators provide hoist ropes of sufficient size and number to lift the load and ensure proper wearing qualities. Provide steel ropes consisting of at least six strands wound around a hemp core centre. Ensure that all the ropes for a particular elevator are from the same manufacturing run.

6.13.3.17(4) For traction elevators provide a counterweight to counterbalance the elevator for smooth and economical operation with cast iron or steel plate weights contained in a structural steel frame. Provide a counterweight equal to the weight of the elevator car plus between 40 and 50 percent of the rated capacity.

6.13.3.17(5) Provide for the car (and counterweight) spring mounted roller guides located at the top and the bottom of the car (and counterweight frame).

6.13.3.17(6) Provide fascia panels from each hall sill to the entrance header below. Extend the fascia panels into the pit and the overhead. Fascia panels shall be provided on the front and rear walls for elevators with front and rear openings.

6.13.3.17(7) Provide a car frame constructed of steel channels and a platform constructed of steel channels with a wood or metal sub-floor. Isolate the frame and platform from one another so that there is no metal to metal contact in order to prevent the transmission of noise and vibration. Mount the elevator cab shell on the platform in alignment with the hoistway entrances. Isolate the cab from the car frame and platform.

6.13.3.17(8) Provide counterweight guarding consistent with requirements of the B44 Code where a counterweight is located between elevators.

6.13.3.17(9) Flat travelling cables are not permitted to be used. Travelling cables shall be round and run directly from each elevator cab to the respective controller without splices or intermediate junction boxes.

6.13.3.18 Cab Equipment

6.13.3.18(1) For Public/ Patient Transfer and Parking Shuttle Elevators provide cab interior panels (on non-access walls) comprised of phenolic raised panels finished in a standard pattern. Phenolic material to be installed in a horizontal layout. Provide sectional stainless steel ceiling panels, with acrylic perimeter LED lighting, with no use of direct down lighting or suspended ceiling configurations. Lighting will maintain uniform distribution throughout the cab. Access wall elevations will be stainless steel (with vertical grain direction) and 6 mm thick x 100 mm high bar type stainless steel handrails will run the full length of cab non-access

walls. For elevators in the Building provide bumper rails matching the handrail design on cab non-access walls. Rail ends will be radiussed to return to the adjacent wall finish. Flooring will be selected to address needs of facility including hygiene and air quality standards, static control and resistance to heavy traffic, water and chemicals, and ease of maintenance.

6.13.3.18(2) For service elevators provide Factory Standard Cab Interior Finishes, Rigidized Stainless Steel 5WL Cab Wall Panels, stainless steel door panels (with vertical grain direction), 100 mm flat bar stainless steel handrails and bumper rails running the full length of non-access walls with ends radiussed to return to the adjacent wall finish. Provide sectional stainless steel ceiling panels, with acrylic perimeter LED lighting, with no use of direct down lighting or suspended ceiling configurations. Lighting will maintain uniform distribution throughout the cab. Flooring will be selected to address needs of facility including hygiene and air quality standards, static control and resistance to heavy traffic, water and chemicals, and ease of maintenance.

6.13.3.18(3) Provide three dimensional type Infrared light beam type door detector edges that reliably detect carts and wheelchairs of varying heights and finishes, including chrome. The depth of the infrared zone will be field adjustable.

6.13.3.18(4) Provide car doors, jambs, headers, hangers, tracks, door closers, gibs, electrical contacts and all other equipment required for a complete installation. Provide commercial grade car doors panels to withstand damage or deformation.

6.13.3.18(5) Provide swing return or applied faceplate car stations incorporating floor push buttons, door open and close buttons, an alarm button, call initiation cancellation buttons, and other fixtures required for normal operation. Provide for each floor button a call registered light and momentary audible tone. Provide a Firefighters' Emergency Operation panel. Provide a locked service cabinet containing devices other than those used for normal operation. Engrave the car station with the elevator capacity, identification number, government installation number, and other markings required by code. Car operating stations will have a video display screen in accordance with the following:

6.13.3.18(5)(a) Screen will be capable of displaying programmable messages and video content, complete with interfacing software and hardware for designing and organizing the display.

6.13.3.18(5)(b) Screen will have a minimum visible screen size of 381 mm measured corner to corner.

6.13.3.18(5)(c) Equipment will be capable of displaying standard video formats, including mpeg, avi and swf.

6.13.3.18(5)(d) An interface is to be provided in the respective machine / controller room permitting connection to the building host computer via the base building Ethernet network, and install the software interface tool on the host computer.

6.13.3.18(6) Not used

6.13.3.18(7) Provide Door Hold Open Push Button in Car Operating Panels.

6.13.3.18(8) Provide a 120 V power outlet in each locked service cabinet

6.13.3.18(9) Provide a car position indicator as part of the video display screen, ensuring that the characters have a minimum 50 mm (2") height.

6.13.3.18(10) Do not install any certificates or licences in the cab.

6.13.3.18(11) Provide a voice announcer for each elevator with automatic verbal announcement of each floor at which the elevator stops. Provide a system that will handle a variety of other messages and indications as may be required by the Authority at a later date.

6.13.3.18(12) Provide a two speed exhaust fan mounted in the cab top.

6.13.3.18(13) Provide one set of fire resistant cab protective pads for each elevator type designed to cover all walls and return panels. Provide stainless steel pad hooks in each elevator to accommodate protective pads.

6.13.3.18(14) Provide non-proprietary heavy duty closed loop door operators engineered to open and close the car and hoistway doors simultaneously.

6.13.3.18(15) Provide a hands-free two-way non-proprietary voice communication system complete with a lobby rescue station inside the MHSU Fire Command Centre and remote handset in each machine/controller room. Program communication system to ensure that calls initiated from inside the elevator cabs are automatically directed to the emergency call centre in the Existing Hospital. In cases where calls are not responded to within 30 seconds, system shall be programmed to automatically redirect call to another number confirmed by the Authority. Communication stations in machine/controller rooms will as a minimum permit two-way

communication with elevators with equipment in the respective room. The two-way communication means within the car will include a means to verify operability of the telephone line consistent with requirements of the B44 Elevator Safety Code.

6.13.3.18(16) Keys used throughout installation will use the same configuration provided for other elevators at the Existing Hospital in accordance with prescribed requirements of the Lower Mainland Facilities Management, Technical Guidelines, Division 14 – Vertical Transportation.

6.13.3.18(17) For the single freight elevator provide manufacturer's standard freight finishes, with cab enclosure, ceiling, platform and flooring engineered and adequately braced to accommodate Industrial truck Class C2 loading. Provide two 300 mm high bumper rails on each cab non access wall. Lower bumper shall be located to offer a clearance of 150 mm to cab floor while upper bumper shall be located to offer a clearance of 800 mm from under of bumper to cab floor. Ceiling shall incorporate fluorescent fixtures mortised into the ceiling panels such that the protective lens offers a substantially flush finish with the ceiling. Engineer protective lenses to allow lamp replacement to occur from inside the cab.

6.13.3.19 Hall Equipment

6.13.3.19(1) Provide hoistway access switches located in the entrance frame or in the hall door sight guard at the top and bottom landing for each elevator regardless of the rated speed or floor to floor heights. Provide unlocking devices for all lobby door panels at all landings.

6.13.3.19(2) Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button) located with their centreline 1070 mm ± 25 mm (42" ± 1") above the floor.

6.13.3.19(3) For elevators serving the Building floors, security card reader restrictions will be provided at all sub-grade levels to ensure that landing calls can only be registered after an authorized card has been presented to the reader device. In addition, the Building service elevator will be provided with security card reader restrictions at all landings served to ensure that landing calls can only be registered after an authorized card has been presented to the reader device.

6.13.3.19(4) For the freight elevator, provide security card reader restrictions at all levels to ensure that landing calls can only be registered after an authorized card has been presented to the reader device.

6.13.3.19(5) Security card readers will be incorporated as part of the landing fixture and configured to offer a flush finish with the faceplate.

6.13.3.20 Electric Wiring – All Elevators

6.13.3.20(1) Provide copper wiring to connect the equipment.

6.13.3.20(2) Run the wire in metal conduit, duct or electrical metallic tubing.

6.13.3.20(3) Provide travelling cable between car stations and the controller in the machine and/or control room.

6.13.3.20(4) Provide at least four (4) spare pairs of shielded conductors (20 AWG minimum), two (2) spare 14 AWG gauge conductors, ten (10) spare 18 AWG conductors, three (3) 62/125 micron multimode optical fibers, two (2) single mode optical fibers, and two (2) spare RG6/U coaxial conductors in the travelling cable for each elevator. This is in addition to the wiring required for the basic operation of the elevators including those allowances for future features as specified.

6.13.3.20(5) Provide at least ten percent spare wires in each travelling cable in addition to those specified elsewhere.

6.13.3.21 Operational Features and General Requirements – All Elevators

6.13.3.21(1) All Public Passenger and Service Elevators *will* serve all floors except interstitial floors or mechanical levels that are accessed infrequently.

6.13.3.21(2) Provide Firefighter's Emergency Operations Phase I & II, including remote/duplicate keyed switches at building CACF. A minimum of one elevator will be designated as a firefighters' elevator, complying with prescribed requirements of active Codes and standards.

6.13.3.21(3) Provide Barrier Free Access in Accordance with Appendix "E" of latest B44 Elevator Safety Code including Voice Announcers.

6.13.3.21(4) Provide restricted access via electronic card access for any elevators which provide access to mechanical levels including the roof and other secure access that will not be accessible to the general public.

6.13.3.21(5) Provide for installation of security cameras in the elevators. Install and wire the security cameras supplied by another trade. Provide the required wiring in the travelling cable run between the car top and the controller as well as power to the car top for the camera.

6.13.3.21(6) Provide equipment and labour for installation of security card readers on the inside of each cab and in lobby fixtures requiring controlled access. Provide the required wiring between the card reader and the elevator security box in the machine room along elevator controller connections and circuits for the security system (including floor tracking). Security card readers will be incorporated as part of the car operating station and landing fixture and configured to offer a flush finish with the faceplate.

6.13.3.21(7) Provide independent service.

6.13.3.21(8) Provide emergency power operation of the elevators such that all elevators are fed with emergency power and are capable of operating simultaneously.

6.13.3.21(9) Provide means to call elevators that provide access to interstitial, mechanical levels, etc. that may not be served by all elevators in a group. This will be by a separate call button, keyed switch or electronic access card reader as reviewed by the authority.

6.13.3.21(10) For public / Patient transfer elevators serving the Building above grade levels provide Medical Emergency Operation with activation means at all floors served and in remote locations as specified in this Schedule. Provide Medical Emergency (code blue) key switches in the respective cabs and at each hall call location for elevator code-blue override. For additional elevator(s) serving the Building above grade levels provide infrastructure for future activation of Medical Emergency Operation including but not limited to car and lobby fixtures designed to accept associated features and wiring in travelling cables and wiring ducts.

6.13.3.21(11) For all elevators providing access to Patient care areas, the elevator will not operate when a Patient Tracking / Wandering system tag is present in the elevator cab.

6.13.3.21(12) Each elevator cab will be provided with an 802.11 wireless network access point to ensure full coverage of the Authority's wireless network. Provide all necessary wiring.

6.13.3.21(13) Each elevator cab will be provided with a RTLS wireless network access point to ensure full coverage of the RTLS wireless network. Provide all necessary wiring.

6.13.3.21(14) For elevators serving the Building above grade levels provide infrastructure for future activation of Priority Service Operation including but not limited to car and lobby fixtures designed to accept associated features and wiring in travelling cables and wiring ducts.

6.13.3.22 Operating Performance

6.13.3.22(1) Levelling - Arrange that the car stops within 3 mm (1/8") of the floor level for traction elevators and 6 mm (1/4”) for hydraulic equipment.

6.13.3.22(2) Operating Time:

6.13.3.22(2)(a) For traction elevators serving the Building floors adjust the equipment so that the operating time is 14.0 seconds or less (based on 1370 mm 4' 6") wide two speed side opening doors and a floor height of 4.2 m (13'-9")). Measure the operating time from the time that the doors begin to close until they are 3/4 open at the next floor.

6.13.3.22(2)(b) For parking shuttle adjust the equipment so that the operating time is 12.0 seconds or less with MRL equipment and 14.0 seconds or less with hydraulic equipment. Time accounts for 1067 mm (3'-6") wide centre opening doors and a floor height of 3.0 m (10'-0"). Measure the operating time from the time that the doors begin to close until they are 3/4 open at the next floor.

6.13.3.22(3) Ride quality - Arrange that the lateral acceleration (front to rear and side to side) measured during express runs is less than 150 mm/s/s (0.5 f/s/s) peak to peak.

6.13.3.22(4) Adjust the door equipment so that the noise level throughout the inside of the cab is less than 63 decibels during a full door open and door close operation. Measure the noise levels using a decibel sound level meter set to the "A" scale for a fast response.

6.13.3.22(5) Arrange the machine room equipment so that the noise level with the elevator running is less than 80 decibels. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

6.13.3.23 Wiring Diagrams and Manuals

6.13.3.23(1) Prior to substantial performance, supply to the Authority three sets of manuals which include information itemized below:

6.13.3.23(1)(a) Design Submission documents submitted to Regulatory Authority for permit

6.13.3.23(1)(b) Final Shop drawings

6.13.3.23(1)(c) Description of special features such as firefighters' emergency operation, independent service, emergency power operation, two-way voice communication, and security operation.

6.13.3.23(1)(d) As-built wiring and schematic diagrams

6.13.3.23(1)(e) Schedule of recommended routine maintenance procedures, inclusive of a site specific Maintenance Control Program consistent with prescribed requirements of B44 Code.

6.13.3.23(1)(f) Description of diagnostics procedures, including complete Fault Code listing and troubleshooting instructions.

6.13.3.24 Trademarks

6.13.3.24(1) Arrange that no equipment visible to the public has any trademark, company name, or logo.

6.14 Pneumatic Tube System

6.14.1 Overall System Description

6.14.1.1 Provide a fast and secure on-demand light material transport system for the Building through a pneumatic tube system or air tube system.

6.14.1.2 The system is to be a 152 mm pneumatic tube system.

6.14.1.3 The system will be capable of transporting sensitive Patient care products such as pharmaceuticals, red blood cells, blood plasmas, whole blood, IV bags and Patient specimens without degradation.

6.14.1.4 The system will be capable of providing a soft delivery at each station destination by reducing the speed of the carrier before it arrives in the station.

6.14.1.5 The system will be comprised of user stations to dispatch and receive carriers, carriers to contain and transport light weight unit-load materials, and a strategically designed network of piping and carrier sensors to ensure optimal performance.

6.14.1.6 The system will be interconnected with the Existing Hospital system thus allowing each station in the system to send and receive carriers to and from all other station locations.

6.14.1.7 The system will be expandable to allow additional stations, diverters and blowers.

6.14.1.8 The system will be capable of collecting a minimum of 30 days of historical traffic data to include but not limited to source station address, destination station address, send request time, carrier dispatch time, carrier wait time (the time it takes for the carrier to leave the source station after the send button is pressed), carrier transit time and the time the carrier reached its destination station.

6.14.1.9 Provide pneumatic tube user stations as outlined in Appendix 1A [Clinical Specifications]. Each station is to be equipped with a control panel with a touch-screen display allowing carrier dispatch requests.

6.14.1.10 Provide four (4) leak resistant carriers for every new station with replicable rubbing bands and foam liners with a secure, lockable integral seal to transport fluid containers, including, but not limited to, IV bags, blood products, bodily fluid samples and pharmaceutical products.

6.14.2 Design of System

6.14.2.1 Provide a pneumatic tube study that outlines the capacity, anticipated wait times, anticipated transit times, and anticipated daily transactions of the pneumatic tube system.

6.14.2.2 The average allowable wait time for transactions within the Building will be 45 seconds from the time the user presses send until the carrier leaves the station.

6.14.2.3 The maximum allowable transit time for transactions is 600 seconds from the time of the transaction request at the source station, until the carrier arrives at the destination station.

6.14.2.4 95% of all transactions within a 24-hour period will leave the station within 2 minutes on average of pressing the send button.

6.14.2.5 Outline the number of transactions within a 24-hour period based on the clinical demands outlined in Appendix 1A [Clinical Specifications], for the Authority's approval.

6.14.2.6 Outline the proposed training for users to ensure optimal performance of the system.

6.14.2.7 The sound generated by the passage of carriers through tube and bends will not exceed 58 dBA in any area.

6.14.2.8 Provide structural bracing as required by code.

6.14.2.9 Provide samples of materials/components to be used upon request by the Authority.

6.14.2.10 Ensure the Building is equipped with secure receiving stations that are compatible with the rest of the Existing Hospital. Stations will restrict unauthorized users from retrieving the carrier or gain access to the contents.

6.14.2.11 Provide the ability to remotely monitor the system through a main system control center located within the Building or the Existing Hospital. Exact location of the main system control center to be determined and coordinated in further consultation with the Authority.

Part 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Mechanical Systems Design Principles

7.1.1 The Design-Builder will provide mechanical systems that:

7.1.1.1 comply with the applicable sections of ASHRAE, ASTM, ASPE, CSA, NFPA, all local, provincial, and national codes;

7.1.1.2 are designed to provide a healing, comfortable and productive environment for the Facility Users and meet the required environmental conditions for all equipment;

7.1.1.3 are located and designed to meet the requirements set out in Appendix 1D [Sound Transmission Ratings] from outdoor spaces / places of respite intended for staff / Patient use; and from adjacent properties surrounding the Site;

7.1.1.4 minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems;

7.1.1.5 are configured and located in such a way to minimize disruption to clinical areas to perform maintenance and repairs. Do not run major distribution services above Patient Bedroom ceilings; use space above corridor ceilings.

7.1.1.6 Are configured and located such that all components which require maintenance are positioned to be accessible from standing or when using a maximum 2500 mm tall ladder. When this is not possible, provide access by means of a fixed access system, such as moving gantry or overhead catwalks;

7.1.1.7 are configured and located to provide sufficient clearance around equipment and components for servicing and replacement including:

7.1.1.7(1) comply with manufacturers service clearance requirements;

7.1.1.7(2) allow a minimum of 1500 mm floor space clearance at all locations where maintenance is to be performed;

7.1.1.7(3) pathways for service personnel and maintenance carts, equipment removal and replacement sized to accommodate the largest piece of equipment designated to be moved along this pathway with a clear space not less than 2500 wide and 2500 high;

7.1.1.8 are vibration isolated to minimize noise and vibration through the structure or other components of the Facility;

7.1.1.9 incorporate flexibility and adaptability for future expansion without major disruption or alteration to the Facility operations or infrastructure. All systems will be designed and sized to suit the consumption and discharge needs of the Facility at peak operational requirements, with the ability to increase the flow or capacity as follows:

7.1.1.9(1) branch piping and ducting will be sized to meet the requirements of current demand.

7.1.1.9(2) main piping and ductwork will be sized for 10% additional capacity. Shafts and pipe risers shall be designed to accommodate the additional 10% increased capacity;

7.1.1.9(3) air handling equipment, exhaust fans, and pumps will be sized for 10% additional capacity;

7.1.1.9(4) provide designated space within the mechanical rooms for 10% additional future equipment;

7.1.1.9(5) design piping, ductwork, heating/cooling coils, air filters, and louvres to meet the following minimum parameters:

7.1.1.9(5)(a) hydronic pressure drop – maximum piping friction loss: 4 m/100m;

7.1.1.9(5)(b) hydronic velocity – maximum velocity based on pipe manufacturer’s recommendations;

7.1.1.9(5)(c) supply and return ductwork will be sized within the ASHRAE Fundamentals upper and lower limits for duct air velocities and pressure drop. Duct velocity will be limited to achieve and acoustical design criteria of RC(N) 35;

7.1.1.9(5)(d) Heating/ cooling coil face velocity – maximum velocity 2.0 m/s; and

7.1.1.9(5)(e) Air filter face velocity – maximum velocity 2.0 m/s.

7.1.1.9(5)(f) Ventilation system air intake louvre free area face velocity – maximum velocity 2.5 m/s.

7.1.1.10 are developed to provide reliability of continual operation. Adequate standby capacity and redundancy shall be included in system design.

7.1.2 Energy Centre

7.1.2.1 Energy Centre must be sized to ultimately serve the entire site with heating hot water, steam and chilled water. The final loads include current buildings, Phase 1 loads, Phase 2 loads, renovations to existing buildings and allowance for future developments.

7.1.2.2 Energy Centre capacity at the end of Phase 1 is based on criteria outlined in subsequent sections.

7.1.2.3 The design and construction of the structure, space and systems must facilitate the installation of future equipment to bring the plant up to the final plant capacities without disruption to the ongoing operations. All supporting services must be sized for the final plant capacity including but not limited to incoming services, space heating, cooling and ventilation systems, interconnecting piping and control systems.

7.1.2.4 Hot water heating plant shall be designed based on meeting the final plant capacity. Redundancy shall be based on meeting the final plant capacity with one boiler out of service.

7.1.2.5 Steam boiler plant shall be designed based on meeting the final plant capacity. Redundancy shall be based on meeting the final plant capacity with one boiler out of service.

7.1.2.6 Primary chilled water cooling plant shall be designed based on meeting the final plant capacity. Redundancy shall be based on meeting 90% of the final plant capacity with one chiller or cooling tower out of service.

7.1.2.7 24/7 chilled water cooling plant shall be designed based on meeting the final plant capacity. Redundancy shall be based on meeting the final plant capacity with one chiller module out of service.

7.1.2.8 Fuel oil storage shall be based on a final tank capacity for generators of 180,000 Litres and a tank capacity for heating and steam boilers of 135,000 Litres. Refer to

Appendix 1B(I) Energy Centre Technical Specifications, Mechanical Specification Section 23 11 13 Fuel Oil Piping and Accessories, Sections 3.13 and 3.14.

7.1.2.9 Energy Centre design shall accommodate seasonal part load demands to avoid frequent cycling of equipment or forced shutdown of equipment due to light loads.

7.1.2.10 Provide a service link between the Energy Centre and the Existing Hospital. This dedicated service link will be a conditioned and accessible space in which services will be routed to and from the Energy Centre and the Existing Hospital. Services will initially include steam, condensate, chilled water (main and 24/7, supply and return), and heating hot water (supply and return). Space shall be reserved for future services which may include domestic water, fire protection, gases, pneumatic tube and electrical. This service link shall be a minimum of 2500 mm x 2500 mm in cross sectional area, and shall connect to the upper level of parking in the HCC within 4000 mm of the northeast corner of the building. Terminate services with valved and capped connections just inside the wall of HCC at the upper level of parking for extension as part of the scope of the steam to hot water conversion. Personnel access must be provided along the full extent of the service link.

7.1.2.11 Provide a service link between the Energy Centre and the future development. This dedicated service link will be a conditioned and accessible space in which services are to be routed to and from the Energy Centre and the future development. Services will initially include one set of valved and capped connections 1000 mm east of the “red line” for steam, condensate, chilled water (main and 24/7, supply and return), and heating hot water (supply and return). Space shall be reserved for future services which may include a second set of steam, condensate, chilled water (main and 24/7, supply and return), and heating hot water (supply and return) as well as domestic water, fire protection, gases, pneumatic tube and electrical. Allow a clear cross sectional area of 4000 mm wide and 2500 mm high with a knockout panel of the same area facing west at the “red line” on the west side of the alley. Bottom of knockout panel shall be located no lower than elevation 14500, and top of knockout panel no higher than elevation 22000. The point where the service link must connect in future is as generally indicated on the Indicative Design Drawings. Provide structural inserts for future pipe racks at 3000 mm centres. Personnel access must be provided along the full extent of the service link.

7.1.2.12 The service link space for the Existing Hospital and the future development may be combined provided the cross sectional area requirements are maintained.

7.1.2.13 The service links shall be constructed to meet post disaster standards, and must be seismically independent of any existing structures.

7.1.2.14 Provide a central Control Room for the Energy Centre that allows observation of both the boiler room and chiller room. Control room shall be elevated a minimum of 2500 above the finished floor of the both the boiler room and chiller room.

7.1.3 Mechanical services are not permitted to be installed within Communication Rooms. Refer to Division 27, Section 7.9.4. for further details. All mechanical services installed within electrical and UPS rooms will maintain a minimum clear height of 2000 mm above finished floor. Do not install any equipment requiring a water connection in the ceiling of these spaces. Do not route plumbing, drain pipes or hydronic distribution piping in the ceiling of these spaces.

7.1.4 Equipment pipes, ducts and fittings will be insulated to BCICA and ASHRAE standards to conserve energy, prevent condensation, attenuate noise and prevent accidental burns. All services in the Energy Centre including tunnels shall be painted or finished as required for exposed services.

7.1.5 Equipment, pipes and ducts shall be clearly labelled.

7.1.6 Integrate requirements for energy incentive programs into the mechanical systems. Apply for relevant Provincial and Federal incentives, including but not limited to PowerSmart and Fortis incentives. Refer to Design Build Agreement Section 11 (Energy) for details.

7.1.7 Coordinate with the electrical and communications specification for all mechanical systems that must maintain operation during an expected or unexpected shut down of the Building's main electrical service. UPS power provided to mechanical equipment will not be provided from the UPS dedicated for low voltage and communications systems.

7.1.8 Coordinate all mechanical systems with requirements of all Equipment, and provide all connections required from mechanical systems. Provide dielectric isolation between pipes of dissimilar metals.

7.1.9 Make allowances within the mechanical systems' designs so all equipment will be removed or replaced without disrupting the operation of other equipment connected to the mechanical systems.

7.1.10 Campus Heating and Cooling Services

7.1.10.1 The Building's heating and cooling services will be supplied from the Energy Centre.

7.1.10.2 The heating and cooling services for the Campus will be supplied from the Energy Centre at the completion of Phase 1.

7.1.10.3 The new Energy Centre must be able to operate concurrently with the existing heating and cooling plant during start up and commissioning of the Energy

Centre, and until such time it has been demonstrated to the Authority that the new Energy Centre heating and cooling systems are operating in a reliable manner.

7.1.10.4 Provide manual valves on the steam, condensate, hot water heating and chilled water piping to allow changeover between supply and return from either the existing heating or cooling plants and the new Energy Centre

7.1.10.5 Extension of the steam, condensate and hot water heating from the new Energy Centre to the existing buildings is described in 7.1.16 Steam to Hot Water Conversion.

7.1.10.6 Extend chilled water from the new Energy Centre to the existing buildings. New NPS 10 chilled water supply and mains will be routed from the new Energy Centre through a new mechanical room at the upper level of parking in HCC and connect to the existing NPS 10 mains in this room or in the adjacent mechanical room north of the upper level of HCC parking.

7.1.10.7 At the completion of Phase 1, permanently disconnect and remove the steam, condensate and supplies from the former heating and cooling plant. Remove any valves and permanently cap piping with a minimum dead leg.

7.1.11 All computer based systems required to operate or supervise mechanical systems will comply with the Authority's IMIT standards and policies identified in this Schedule including applicable Appendices.

7.1.12 Post-Disaster Design

7.1.12.1 For the Energy Centre, Campus Communications Hub (CCH), Entrance Facility room and Tech Room, all mechanical piping, ductwork, conduit, equipment, and systems must be seismically restrained in accordance with the requirements for post disaster buildings. Refer to Section 5.2.

7.1.12.2 Provide isolation valves and allow for seismic restraints and system expansion where there is a separation between the Energy Centre and the Building, and any other location where services cross a seismic or expansion joint.

7.1.13 Location of mechanical services and equipment shall be coordinated with other trades to ensure that access clearances are maintained.

7.1.14 Unless otherwise specified, all components in the same category must come from the same manufacturer, or be made with parts that are interchangeable from one manufacturer to the next.

7.1.15 Commissioning

7.1.15.1 Demonstrate a complete and operating Energy Centre capable of meeting Phase 1 and final plant capacities.

7.1.15.2 Demonstrate operation in emergency or failure modes to show automatic operation of redundant components including prioritizing of loads.

7.1.15.3 Minimum standard for commissioning shall be CSA Z8001.

7.1.16 Steam to Hot Water Conversion

7.1.16.1 The Steam to Hot Water Conversion scope consists of changing the primary heating source in the existing Health Care Centre, Columbia Tower and Emergency Wing from the steam provided by the existing central heating plant to hot water provided by the new Energy Centre and potential future District Energy System.

7.1.16.2 New NPS 10 hot water heating supply and mains will be routed from the new Energy Centre to a new mechanical room at the upper level of parking in HCC. Two NPS 6 connections shall be provided for HCC existing radiation heating zones, and NPS 6 mains routed through the HCC interstitial space to connect to the Columbia Tower mechanical rooms (NPS 4 to lower mechanical room, NPS 4 to penthouse). A NPS 4 branch connection shall be provided to the Emergency Wing penthouse. Flowrates to each building based on a 17 °C differential to be as follows: Emergency mechanical room = 4.1 L/s; Columbia Tower Lower mechanical room = 8 L/s; Columbia Tower penthouse = 14 L/s.

7.1.16.3 The existing steam to hot water convertors in the Health Care Centre shall be removed and replaced with indirect NPS 6 connections to the new hot water heating distribution system in the existing mechanical room adjacent the upper level of HCC parking. Provide two plate and frame heat exchangers operating in parallel each with a capacity of 2051 kW, source 68.3°C supply, 19.4°C temperature drop, output 66.7°C supply, flow 25.9 l/s. The plate and frame heat exchangers shall be provided with 1200 micron strainers on both inlets.

7.1.16.4 Provide NPS 6 valved and capped connections in the new mechanical room at the upper level of parking in HCC for the future conversion of the HCC air handling unit coils from steam to hot water.

7.1.16.5 The existing steam to hot water convertors in Columbia Tower lower mechanical room, Columbia Tower penthouse and the Emergency Wing shall be removed and replaced with direct connections to the new hot water heating distribution systems. Connection of hot water supply and return to each building's hot water distribution loops to use a decoupling branch and modulating temperature control valve, such that each building will operate as a secondary loop to the Energy Centre's hot water loop.

7.1.16.6 Replace the two domestic hot water system source units in HCC and Columbia Tower with source units that are primarily heated by hot water and boosted by steam. The new source units shall have 750 USgal storage, and 110F temperature rise. The units shall have an external plate and frame hot water heat exchanger with a minimum capacity of 400,000 BTU and an approach temperature of 2.5°C. The units shall have a 200,000 BTU steam booster to be activated only when the hot water heating system cannot meet the domestic hot water setpoint temperature. The plate and frame heat exchangers shall have strainers on primary side inlet with mesh size of U.S. Mesh 14 (1400 microns).

7.1.16.7 The existing steam PRVs in the lower mechanical room and penthouse Columbia Tower shall be replaced with lower capacity units matched to the load.

7.1.16.8 Installation of the systems and equipment, and transition of the heating source from steam to hot water is required in the least disruptive way to the Existing Hospital's operations.

7.1.16.9 At the completion of Steam to Hot Water Conversion, permanently disconnect and remove existing services no longer required, including but not limited to steam and condensate piping. Remove any valves and permanently cap piping with a minimum dead leg.

7.1.17 Installation of Phase 2 equipment

7.1.17.1 Make allowances in the design such that Phase 2 equipment can be installed without the need for demolition and subsequent rebuilding or the removal of services required for the ongoing operation of the Facility. Refer to Sections 7.1.2.3 and 7.1.9.

7.1.17.2 Installation of equipment shall ideally be through doors and/or hatches, and or hinged or openable panels.

7.1.17.3 Where removal of a wall panel or louvre is required, it shall be done without heavy machinery other than what would be required to install or remove the piece of equipment.

7.2 Mechanical General Requirements (Division 20)

7.2.1 Refer to mechanical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications.

7.3 Fire Suppression (Division 21)

7.3.1 Fire Protection

7.3.1.1 Basic Requirements

7.3.1.1(1) Provide fire protection services as required and sized to suit the code requirements of the Facility.

7.3.1.1(2) Provide a sprinkler system and equipment that is designed for the applicable occupancy classification.

7.3.1.1(3) Provide a detector double check valve assembly on the sprinkler system take-off connection from the water supply. The assembly will be complete with OS&Y gate valves on both sides and tamper proof switches.

7.3.1.1(3)(a) Incorporate redundancy in the installation to maintain uninterrupted building operation while cleaning, repairing, or replacing devices.

7.3.1.1(4) Provide a fire pump system if required to meet the fire pressure and flow requirements. Base the design on the lowest incoming pressure of the two water mains during peak summer operation.

7.3.1.1(5) Provide a fire pump, if required, with a transfer switch that is part of the fire pump controller. Mount the switch package in a separate mechanically attached enclosure that is approved by UL, ULC, FM and CSA and built to NFPA 20 standards for this application.

7.3.1.1(6) Provide dry type sprinkler heads and / or a dry type sprinkler system in areas that may be subject to freezing temperatures, including but not limited to the underground parking area.

7.3.1.1(7) Ensure sprinkler heads are vandal proof and anti-ligature in all areas accessible to Patients.

7.3.1.1(8) Provide fire extinguishers complete with recessed or fully recessed cabinets. Locate each fire extinguisher within the space it serves, and ensure it is of appropriate size and hazard classification for that space. To the extent possible minimize fire extinguishers in Patient areas. Do not use water extinguishers or other limited types. Coordinate fire extinguisher locations with the local authority having jurisdiction during design. All fire extinguishers will be lockable. Fire cabinet keys shall be standard HEX type cylinders. Provide 1 key per cabinet, plus 1 spare key per cabinet to the Authority.

7.3.1.1(9) Provide zone shut-off valves that are readily identifiable and accessible from the floor level, but not located in Patient Bedrooms. Locate zone valves within the zone served.

7.3.1.1(10) Provide fire department connections at a location that is approved by the local authority having jurisdiction.

7.3.1.1(11) Provide pre-action sprinkler systems for the Main Electrical Room, UPS Room all Communications Rooms, and the CCH. Refer to Division 27, 7.9.4.3(3)(I) for further details.

7.3.1.2 Performance Criteria

7.3.1.2(1) Ensure all equipment is CSA or ULC approved.

7.3.1.2(2) Install equipment installation in compliance with manufacturers' requirements.

7.3.1.2(3) Ensure fire protection systems and equipment are installed, tested and certified by a qualified and licensed contractor who is regularly engaged in such installations.

7.4 Plumbing (Division 22)

7.4.1 General

7.4.1.1 Refer to mechanical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.4.2 Site Services

7.4.2.1 Basic Requirements

7.4.2.1(1) Provide water, fire protection, natural gas, sanitary, and storm services as required and sized to suit the usage needs of the Facility, plus the required additional capacity as per Section 7.1.1.8.

7.4.2.1(2) Water supply to the Facility will be by separate domestic water and fire protection services. Provide two separate fire protection services as well as two separate domestic water services for full redundancy, complete with a separate water meter on each domestic water service. Provide two physically separate water entry locations not in the same room, each to include as a minimum the components listed in 7.4.2.1(3) as well as devices associated with incoming fire protection water services listed in 7.3.1.1(3). Design the piping to avoid dead-leg lengths of piping in the redundant service and to allow both feeds to be used at the same time. Provide a domestic water inlet connection on the exterior of the Facility for supply water through a tanker truck connection. The system shall be designed in such a way that that the tanker truck connection may be used as a backup should the primary services fail. Calculate and submit

to the authority having jurisdiction the estimated maximum flow requirement for the domestic water supply.

7.4.2.1(3) Provide a strainer, water meter, two reduced pressure backflow preventers in parallel, two filters in parallel, and independent shut-off valve on each of the domestic water supplies to the Facility.

7.4.2.1(3)(a) Installation will incorporate redundancy to maintain uninterrupted building operation while cleaning, repairing, or replacing devices.

7.4.2.1(4) Provide subsurface drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs. Size and design subsurface drainage in accordance to the geotechnical conditions.

7.4.2.2 Performance Criteria

7.4.2.2(1) For any point of use filtration implemented, use stainless steel filter casings to minimize the occurrence of equipment failure and leaks. Provide pressure gauges before and after filters, if not factory equipped.

7.4.2.2(2) Provide utilities-commission approved meters for domestic water and natural gas. Use the meters to accurately measure water flow and natural gas consumption in all flow conditions.

7.4.2.2(3) Ensure water and gas meter have remote access capability for connection to the BMS.

7.4.2.2(4) Ensure all piping is accessible. No in slab piping is permitted. No under slab piping is permitted except drains.

7.4.3 Plumbing Distribution Systems

7.4.3.1 Basic Requirements

7.4.3.1(1) Design the plumbing systems to avoid disruption to the operation of the Facility during maintenance or repairs and so that, as much as possible, rooms do not need to be entered when performing these functions. Locate all isolation, maintenance, balancing, and other service valves in the corridor ceiling spaces or behind lockable security access panels and ensure they are accessible.

7.4.3.1(1)(a) Process water distribution shall be independent of the rest of the domestic system past the point of connection.

Provide backflow prevention. Point of connection shall allow supply from either water entry.

7.4.3.1(1)(b) Process water system including storage tank(s), pumping and piping supplying the steam boiler system, cooling towers and CCH cooling units shall be based on the final plant size. Provide two independent sources in an N+1 configuration for process water serving the CCH cooling units. Process water pumps and piping serving CCH cooling units to have N+1 redundancy. Provide isolation valves to accommodate future installation of CCH cooling units for subsequent phases.

7.4.3.1(1)(c) Process water storage shall be based on a minimum usable water storage volume of 330 cubic metres. Water storage tank shall have a minimum of two independent compartments to allow safe cleaning of one while the other remains in full operation. Provide double valves on connections between tanks. Tank interior shall be smooth without obstructions and all corners shall be rounded. Tank shall be covered and vents shall be filtered.

7.4.3.1(1)(d) The process water storage shall be supplemented with water from an onsite drilled well. Well system water supply shall pump to storage tank. Allow a design flow for well water system of 12.6 l/s (200 USgpm).

7.4.3.1(1)(e) Process water storage tank shall be provided with:

(e).1 a water treatment system to maintain water quality and a circulation system to promote mixing and ensure stagnation does not occur.

(e).2 Filters on water entering tank shall be filtered.

(e).3 Pump suction complete with anti-vortex inlet and designed to minimize ingestion of sediment.

(e).4 External still tube for level transmitter/switch and alarms (Low, Low/Low, High, High/High).

(e).5 Safe access on inside and outside of tank for maintenance and cleaning

7.4.3.1(2) Distribute domestic water and recirculation by means of risers to each floor area to a maximum of 50% of the total floor area. Provide isolation valves to limit on-floor areas served to a maximum of 25% of the total floor area.

7.4.3.1(3) Incorporate flexibility in the system designs to accommodate future alterations and allow for future expansion in accordance with Section 7.1.1.8.

7.4.3.1(4) Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Facility labeling system shall follow the same standard of the Hospital labeling system.

7.4.3.1(5) Design the water systems to ensure that water is supplied at the required pressures to all water outlets.

7.4.3.1(6) Provide a domestic water booster pumping system in an N+1 configuration if required to meet water supply requirements. Base the design on the lowest incoming pressure of the two water mains during peak summer operation.

7.4.3.1(7) Provide durable materials to allow for 24 hour a day operation with minimal downtime and which ensures an operational life of at least 20 years. The following pipe materials acceptable by the Plumbing Code for above ground potable and non-potable water distribution systems are acceptable:

7.4.3.1(7)(a) Stainless steel pipe with stainless steel Victaulic fittings and galvanized couplings; and

7.4.3.1(7)(b) Uponor PEX-a with ProPEX couplings and Uponor PEX-a pipe support.

7.4.3.1(8) Design all systems to meet the infection control requirements of the Facility.

7.4.3.1(9) Provide natural gas and fuel gas piping for all uses within the Facility.

7.4.3.1(10) Provide plumbing connections to all medical and food services equipment.

7.4.3.1(11) Not used.

7.4.3.1(12) Cross-connect both water service mains within the Facility to allow for seamless building operation from either water service.

7.4.3.1(13) Ensure the domestic cold water and domestic hot water quality is within the required conditions of the applicable codes, standards, and manufacturer’s recommendations for all equipment.

7.4.3.1(14) Plumbing system design, fixture and values shall comply with requirements of CSA-Z8000 for the following room types: Exam, Medication Room.

7.4.3.2 Performance Criteria

7.4.3.2(1) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout. Where piping and/or piping components are subject to freezing, provide insulation and thermostatically-controlled heat tracing. Ensure Life-Safety systems are not installed in locations subject to freezing.

7.4.3.2(2) Provide flushing and disinfection of domestic water systems in accordance with CSA Z317.1 and LMFM Flushing and Sanitation of Potable Water Systems. Provide soda ash treatment where source water pH is lower than 7. Provide independent testing of piping systems once flushing and cleaning has been completed. Supply the testing reports to the Authority.

7.4.3.2(3) Ensure all piping is accessible. No in slab piping is permitted. No under slab piping is permitted except drains.

7.4.3.2(4) Provide isolation valves for all plumbing services and clearly identify the location of all valves. Isolation valves shall be ball valves with solid bronze body and chrome plated bronze ball. Locate valves at a minimum of each set of piping branches from the main distribution line, and at all locations where the branches serve a group of rooms with similar uses. At Patient Care Units provide isolation valves within the public area in an easily accessible area to allow access without the need for a ladder.

7.4.3.2(5) Provide manual shutoff valves in the cold water and hot water supply to the following rooms and install valves behind a lockable security access panel in a location which is accessible by the Care Team without entering the room:

7.4.3.2(5)(a) all washrooms accessible to Patients;

7.4.3.2(5)(b) Tub rooms;

7.4.3.2(5)(c) Laundry Facilities; and

7.4.3.2(5)(d) Life Skills Assessment rooms.

7.4.3.2(6) Provide solenoid type water shutoff valves to fixtures in each Secure Room. Valves are to be controllable from the Care Team Base. Install

manual valves upstream of solenoid valves for maintenance purposes. Access to water shutoff valves is not permitted within the Secure Room.

7.4.3.2(7) Where possible, provide fixtures with anti-microbial coatings.

7.4.4 Domestic Hot Water Systems

7.4.4.1 Basic Requirements

7.4.4.1(1) The Energy Centre will provide steam and hot water as the heating sources for the domestic hot water. Provide a domestic hot water system capable of generating domestic hot water using hot water as the primary source of heat, with steam used as the secondary sources of heat when needed. The system shall have sufficient capacity and recovery rate for the hot water requirements of the Facility, plus the required additional capacity as per Section 7.1.1.8.

7.4.4.1(2) Hot water for generating domestic hot water will be supplied at 71.1°C (160°F) based on a maximum demand of 800,000 BTU. The domestic hot water heaters shall maximize the temperature drop on the heating hot water circuit using external plate and frame heat exchangers external to storage tanks. Plant steam will be provided to Mental Health at 125 psi with a maximum demand of 450 lbs/hr for temperature boosting or high temperature sanitization purposes only. Provide dedicated secondary pumping system as required.

7.4.4.1(3) The domestic hot water heating system shall be configured to provide N+1 redundancy.

7.4.4.1(4) Ensure the domestic hot water supply is of adequate temperature to serve the needs of the Facility. Provide automatic mixing valves where the supply temperature at the fixture is required to be less than the system temperature.

7.4.4.1(5) Locate thermostatic mixing valves serving plumbing fixtures as close as possible to the fixture it serves to minimize dead legs.

7.4.4.1(6) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the hot water generation plant, piping, fixtures, or any other component. Design methods include heat-based control active treatment systems; eliminating dead-leg piping; flush to drain valves; and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

7.4.4.1(7) Install copper-silver ionization systems on each existing and new domestic hot water system to treat the water and prevent the proliferation of legionellosis.

7.4.4.2 Performance Criteria

7.4.4.2(1) Provide a domestic hot water generating plant and hot water storage equipment to meet the requirements of CSA Z317.1. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 33 13.

7.4.4.2(2) Recirculate domestic hot water from the distribution system(s) back to the generating equipment. Piping and valves shall be appropriately sized to ensure adequate flow which does not promote stagnation or accelerated pipe erosion.

7.4.4.2(3) Monitor hot water temperatures at the storage tank and in the supply and return piping via the BMS and provide alarm outputs when the temperature exceeds or drops below the design setpoint range.

7.4.5 Plumbing Fixtures

7.4.5.1 Basic Requirements

7.4.5.1(1) Provide fixtures as described in the Appendix 1A [Clinical Specifications] and as needed to comply with all applicable codes and regulations.

7.4.5.1(2) Provide all plumbing fixtures made of impervious, durable materials suitable for a hospital facility. Select fixtures with proven acceptable hospital performance from previous installations. In all washrooms accessible to Patients use plumbing fixtures approved by the New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines. Hand held showers will not be used.

7.4.5.1(3) Consult with the Authority on the selection of fixtures, and give particular attention to performance relative to infection prevention and control.

7.4.5.1(4) Select all sink basin and faucet combinations to minimize the potential for splatter and contamination. Ensure the faucet does not discharge directly into the drain.

7.4.5.1(5) Provide anti-splash, anti-aerosolizing faucet fittings (i.e. laminar flow) that do not retain air. Where gooseneck faucet fittings are required, avoid low profile gooseneck faucet fittings.

7.4.5.1(6) Install sinks that are standalone wall hung type or have bowls integrally formed into countertops. Drop in or under mount style countertop sinks will not be used.

7.4.5.1(7) Install wall mounted sinks in bariatric washrooms with a minimum load capacity of 136kg and provide appropriate backing for the sinks to resist being pulled away from the wall when grabbed by a falling Patient.

7.4.5.1(8) Provide double or triple basin sinks where required.

7.4.5.1(9) Ensure hand hygiene sinks meet the requirements of CSA Z8000 including materials, size, construction, location, backsplash, soap and lotion dispensers and accessibility. Electronic sensor faucets for hand hygiene sinks shall not have means for user to adjust water temperature.

7.4.5.1(10) In Secure rooms provide a polycarbonate or a white power coated stainless steel, floor mounted, back discharge, anti-ligature, stainless steel one-piece sink / toilet combination unit with hemispherical penal filler/bubbler with mouth guard, integral seat, push button controls and in wall concealed flush valve. The Secure room fixture shall include anti-flood device and/or pneumatic controls on supplies/waste to toilet and/or lavatory components. Refer to the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act for additional requirements.

7.4.5.1(11) Provide barrier-free plumbing fixtures, fittings where required and ensure they are suitable for use by bariatric users. Toilets in non-Patient accessible public areas that are not designated specifically for bariatric users will be wall mounted.

7.4.5.1(12) Select toilets that will reduce the spread of infection. The bowl must be designed to accommodate the flow of the flush valve. Select toilet bowls that will not splash or spray water onto the toilet rim or anywhere outside the toilet bowl and are designed to minimize the aerosolization of the toilet contents.

7.4.5.1(13) Public toilets will consist of wall hung elongated bowls with an open front seat and electronic hands free flush valves with manual override.

7.4.5.1(14) Provide all Ensuites, Patient/Public Washrooms and Patient Washrooms with a floor mounted, back discharge, anti-ligature, porcelain toilet with integral seat, push button controls and in wall concealed flush valve. Select toilets that achieve a minimum MaP Performance Score of 800,

tested by a MaP-approved laboratory in accordance with MaP Toilet Fixture Performance Testing Protocol v.5.

7.4.5.1(15) Provide urinals that are wall-hung and low-consumption with electronic hands-free flush valve operation.

7.4.5.1(16) Provide washroom lavatory fixtures that are electronic hands-free type faucets with single temperature discharge set at 43°C, except as follows:

7.4.5.1(16)(a) for Ensuites, Patient/Public Washrooms and Patient Washrooms lavatory fixtures, provide an anti-ligature electronic faucet with no-touch flow control, no-touch temperature adjustment and control panel with stainless steel face plate. Supply a vandal proof protective enclosure to enclose the lavatory drain, supplies and mixing valve.

7.4.5.1(17) For handwashing sinks or hand hygiene stations for team centers, Patient care areas, examination rooms, food services, soiled utility rooms and other similar function rooms, provide electronic hands-free type faucets with gooseneck spouts and single temperature set at 43°C. Ensure basins are adequately sized for proper washing and scrubbing of hands. Refer to Best Practices for Hand Hygiene Facilities & Infrastructure in Healthcare Settings Appendix 5 and Appendix 1A [Clinical Specifications] for all requirements.

7.4.5.1(18) For equipment cleaning sinks and other utility sinks, provide stainless steel sinks with blade handle faucets and gooseneck spout. Ensure that sinks are large and deep to accommodate proper washing of equipment and that materials and piping are suitable for the intended application of the sink.

7.4.5.1(19) Supply the soiled utility rooms, as indicated in Appendix 1A [Clinical Specifications], with a wall mounted cleaning and disinfecting appliance for bedpan washing and a clinical service sink. Provide required plumbing and electrical services per manufacturer's recommendations. Supply all soiled utility rooms with a plumbed eyewash station at the hand-washing sink.

7.4.5.1(20) Provide Patient showers with electronically controlled pressure balanced and high temperature limit shower valves, for tempered water supply through single push button (Piezo) that are flush to ensure anti-ligature safety, and anti-ligature shower heads. Locate mixing valve away from Patient reach within secured cabinet while reducing dead-leg to shower. Design shower bases to ensure that the water is contained within the

shower area. ADA accessible Patient showers must be free of barriers with no lip between the washroom floor and shower. Install a floor drain at the drying area outside of each shower.

7.4.5.1(21) Provide suitable quantities of janitors' sinks, hose bibs, eye wash stations, and drinking fountains (with goose neck spout only) with bottle fillers to provide sufficient service to the Facility.

7.4.5.1(21)(a) Ensure eye wash stations are complete with a water receptor and drain piping or are of the swing out type located at sink.

7.4.5.1(21)(b) Design emergency showers to supply tempered water within an acceptable timeframe in accordance with the occupational health and safety legislation.

7.4.5.1(21)(c) Locate eye wash stations and emergency showers in accordance with WorkSafe BC regulations and all other applicable codes. Provide signs identifying location and directions for their use

7.4.5.1(21)(d) Exterior hydrants serving Outdoor Patio Spaces shall be encased non-freeze concealed type with lockable hinged doors. Apply and implement anti-ligature and vandal proof design features. The building water supply shall be protected by an approved backflow prevention device. Spacing of hydrants shall consider the maximum length of garden hose, 7.5m.

(d).1 Provide an irrigation system for automatic (via timed/condition controlled system) watering for all garden plots. Refer to Section 8.2.3.2(2) for further details.

7.4.5.1(22) Provide all appropriate services and connections to all equipment for Patient care areas and all other areas. Provide all accessories as needed.

7.4.5.1(23) Fixtures not equipped with overflows will be provided with tailpieces without overflows.

7.4.5.1(24) Provide bariatric Patient washrooms with floor mounted, back discharge, anti-ligature, porcelain toilet with integral seat, push button controls and in wall concealed flush valve (same as other Patient washroom toilets but with a minimum load capacity of 454kg).

7.4.5.1(25) Where possible, provide fixtures with anti-microbial coatings.

7.4.5.1(26) Supply each Bariatric Contact Isolation Ensuite with a wall recessed bedpan washer-disinfector. Provide required plumbing and electrical services per manufacturer's recommendations.

7.4.5.2 Performance Criteria

7.4.5.2(1) Ensure all electronic sensor activated fixtures meet the following requirements:

7.4.5.2(1)(a) all sensors will be hardwired and served by the essential electrical system so water is available during a power outage;

7.4.5.2(1)(b) the duration of sensor faucet flow will be adjustable. All sensors will be set at 10 seconds but will be able to operate for a minimum of 45 seconds without interruption of flow, to facilitate proper hand washing. Sensors will retain the ability to turn off automatically when hands are no longer in the sensor range; and

7.4.5.2(1)(c) the domestic hot water recirculation system will be connected to the fixture's hot water supply immediately next to the fixture shut-off at the wall.

7.4.5.2(2) Provide water hammer arresters at the cold water and hot water supply to each fixture or bank of fixtures served by a single branch.

7.4.5.2(3) Ensure fixtures with electronic flush valves also have a manual flush operator. Pressure assist flush valves shall not be used.

7.4.5.2(4) If system pressure exceeds the acceptable delivery pressure, then provide pressure reducing valves with 100% redundancy. Place the valves in accessible locations.

7.4.5.2(5) Provide plumbing fixtures that comply with the following requirements:

7.4.5.2(5)(a) Toilets (Patient) - 6.0 L/flush (1.6 gpf); dual flush with 4.2/6.0 L/flush capability is acceptable

7.4.5.2(5)(b) Toilets (public) - 4.8 L/flush (1.3 gpf)

7.4.5.2(5)(c) Urinals - 1.9 L/flush (0.5 gpf)

7.4.5.2(5)(d) Staff showers – 5.7 L/min (1.5 gpm)

7.4.5.2(5)(e) Patient showers – 5.7 L/min (1.5 gpm)

7.4.5.2(5)(f) Hand hygiene sinks – 6.8 L/min (1.8 gpm)

7.4.5.2(5)(g) Sinks and lavatories – 6.8 L/min (1.8 gpm)

7.4.5.2(5)(h) Metering faucets – 0.95 L/cycle (0.25 gallons/cycle)

7.4.6 Plumbing Drainage and Venting Systems

7.4.6.1 Basic Requirements

7.4.6.1(1) Provide sanitary, storm, specialty drainage, and venting systems to avoid disruption to the operation of the Facility or interference with other services during operation and maintenance activities. Design the systems so that, as much as possible, Type I and Type II rooms do not need to be entered when performing these functions. Refer to CSA Z317.2 for space Type definitions.

7.4.6.1(2) Design all drainage systems such that the system connects to the site drainage services, utilizing gravity drainage wherever possible.

7.4.6.1(3) Design pumping systems for subsurface, storm, or sanitary drainage with 100% redundancy (one redundant unit for each active unit) and supply related equipment with emergency power. Design the sump with twin compartments (separate chambers for settling and pumping) and size the sump to prevent short cycling of the pump. Provide engineered packaged system(s) complete with controls and alarms including high water level and pumps failure alarms. Provide local alarms annunciation with audible and visible alarms indication and remote connection via the BMS.

7.4.6.1(4) Provide drainage and venting piping and fittings of a material suitable for the expected effluent. All pipe materials acceptable by the Plumbing Code for drainage systems are acceptable. Consider using non-metallic sanitary drainage piping where possible. Drainage piping material may only be changed downstream at the following points where the hazardous property of the effluent is reduced so a different piping material is suitable:

7.4.6.1(4)(a) where the branch connects into a main drain line, such that the additional effluent flow dilutes the discharge; and

7.4.6.1(4)(b) where a device is placed in-stream to reduce the hazard of the discharge, such as an acid neutralizer.

7.4.6.1(5) Provide floor drains in all mechanical rooms and other rooms where water spillage from equipment or operations is reasonably expected. Floor drains shall be sized to receive maximum anticipated flows including sprinkler test full flow.

7.4.6.1(5)(a) Provide drains for all devices that may discharge water, including, but not limited to, emergency showers and backflow prevention devices.

7.4.6.1(5)(b) Install floor drains in Patient care areas only as needed for the specific use of the room. These rooms include but are not limited to: Tub Room, Laundry Facility, single (2-pc) washrooms.

7.4.6.1(5)(c) Ensure all equipment drain piping is terminated at floor drains with the proper air gap.

7.4.6.1(5)(d) Size floor drains serving backflow preventers, sprinkler test points or other devices to accommodate the discharge flow rate of the device.

7.4.6.1(5)(e) Any machinery/service rooms located below grade will be fitted with fast acting, free flowing drains to rapidly disperse flood waters arising from both outside the building (such as severe weather), and also from any internal fluid system breaches. Drainage flow capacity will exceed that of the calculated maximum flow from the worst case system breech. A means of cooling high-temperature heating water before it flows into public areas will also be included to minimise hazards of scalding. Drains will be configured such that water cannot back-flood up into machinery/service rooms (e.g. from river flooding).

7.4.6.1(6) Provide interceptors and sediment buckets to grease, dirt and solids where necessary.

7.4.6.1(6)(a) Provide interceptors in accordance with the manufacturer’s specifications.

7.4.6.1(6)(b) Provide grease interceptors to serve all sinks and floor drains in Food Services areas. Run an independent drainage system sloped at a minimum 2%. Locate interceptors outside of building for servicing.

7.4.6.1(6)(c) Drainage from parking areas shall be linked to sump pumps/panels and oil receptors as required.

7.4.6.1(7) Provide electronic trap primers or other equally effective means as approved by the AHJ at drains that are subject to losing the trap seal, including infrequently used fixtures and p-traps in negatively pressurized rooms. Locate trap primers in a location where they will easily be accessed, inspected, and repaired.

7.4.6.1(8) Provide vandal proof, trap-primed floor drains meeting Secure room design standards. Consider other equally effective means as approved by the AHJ in lieu of trap primers.

7.4.6.1(9) Provide accessible clean-outs for all sinks and lavatories above the flood-level of the sink.

7.4.6.1(10) Plumbing drainage in Ensuites, Patient/Public Washrooms and Patient Washrooms in the Inpatient areas will be designed in such a way as to limit or remove blockages such as clothing from the piping system.

7.4.7 Medical Gas Systems

7.4.7.1 Basic requirements

7.4.7.1(1) Medical gases will include Oxygen Medical Vacuum, Medical Air and Anaesthetic Gas Scavenging System (AGSS).

7.4.7.1(2) Provide manifold systems for Oxygen and Medical Air.

7.4.7.1(3) Provide an oil-free medical vacuum system.

7.4.7.1(4) Provide an Anaesthetic Gas Scavenging System (AGSS).

7.4.7.1(5) All medical gas systems will be designed and constructed to CSA Z7396.1 Medical gas pipeline systems - Part 1: Pipelines for medical gases, medical vacuum, medical support gases, and anesthetic gas scavenging systems.

7.4.7.1(6) Provide Diameter Index Safety System (DISS) type outlets for all medical gases.

7.4.7.1(7) Each medical gas outlet will have a permanently marked, colour-coded non-interchangeable index system so as to prevent the connection of the wrong gases. Provide a secondary check valve to hold the line pressure if the primary valve is removed for maintenance.

7.4.7.1(8) Medical gas piping to be type 'L' copper to ASTM B819.

7.4.7.2 Performance criteria

7.4.7.2(1) Provide one (1) oxygen outlet, one (1) medical air and one (1) medical vacuum outlet per bed in each of the following rooms: ECT Treatment Room, Recovery Room and ECT Exam Room.

7.4.7.2(2) Provide one (1) (AGSS) outlet in the ECT Treatment Room.

7.4.7.2(3) Provide a zone control valve box complete with zone alarm panel and removable window with pull-out ring at each zone.

7.4.7.2(4) Provide a main alarm panel to monitor all the medical gas systems installed in the Facility.

7.4.7.2(5) All alarms shall notify the BMS. Provide BMS alarm interface signal to the campus central system for critical alarms such as high or low pressure.

7.5 Heating, Ventilating and Air Conditioning (Division 23)

7.5.1 General

7.5.1.1 Refer to mechanical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.5.2 Heating:

7.5.2.1 Basic Requirements

7.5.2.1(1) Heating hot water and steam shall be produced in the Energy Centre.

7.5.2.1(2) The Energy Centre shall be designed to meet the peak coincident load with the largest heating source unit out of operation (N+1 redundancy).

7.5.2.1(3) Pumps, heat exchangers and other ancillary equipment redundancy shall match that of the main equipment. Ensure that no failure of any single pump, fan, variable frequency drive (VFD), or central system control valve will be able to prevent heating of the Facility to the required design conditions.

7.5.2.1(4) Heating and steam boilers shall be of dual fuel design and shall be capable of operating on natural gas or No. 2 fuel oil by operation of valves and controls only.

7.5.2.1(5) Not used

7.5.2.1(6) Apply energy heat recovery systems to offset plant heating requirements. Provide analysis of energy savings, life-cycle costing, and maintenance concerns.

7.5.2.1(7) Provide water treatment packages to meet Appendix 1B(I) [Energy Centre Technical Specifications] section 23 25 13.

7.5.2.2 Performance Criteria

7.5.2.2(1) Design the heating equipment to sufficiently meet the maximum simultaneous Building demand for all systems served by the Energy Centre plant.

7.5.2.2(2) Ensure the plant is capable of controlling and responding to periods of low usage.

7.5.2.3 Heating Hot Water System

7.5.2.3(1) Hot water for heating will be provided from the Energy Centre using a primary heating water loop running at a 71.1°C supply and 48.9°C return (160°F - 120°F delta) with a final plant capacity of 11.7 MW (40,000,000 BTU/hr). Redundancy shall be based on meeting the final plant capacity with one boiler out of service.

7.5.2.3(2) Plant capacity at the end of Phase 1 shall be 5.86 MW (20,000,000 Btu/hr). Redundancy shall be based on meeting the Phase 1 plant capacity with one boiler out of service.

7.5.2.3(3) Heating hot water for Mental Health Building use shall be provided from the Energy Centre at a maximum capacity of 0.9 MW (3,000,000 Btu/hr). Should the Mental Health Building require more capacity; increase Phase 1 and final plant capacity by corresponding capacities.

7.5.2.3(4) Heating hot water system shall make provisions for the future connection of a municipal District Energy System (DES) with a capacity of 3 MW (10,240,000 Btu/hr). The connection shall be configured such that the hot water heating system can receive heated hot water in conjunction with Energy Centre boiler and/or heat recovery operation. The Energy Centre boilers will not be used to supply the DES. Provide a minimum floor area of 5.0 m x 4.0 m, with a 3.5 m height clearance for CoNW DES heat exchangers and accessories. This space shall be enclosed in a room with full height walls, or if part of a larger mechanical room, with chain link fence. A route shall be provided for City access from the outdoors. Provision shall be made to route NPS 6 supply and return piping from the DES distribution to the DES entry area. In addition space

will be required for the Authority to provide minimum of two pumps along with associated piping and accessories to transfer heat from the DES heat exchangers in to the hot water heating loop.

7.5.2.3(5) Heating water boilers shall be of dual fuel design, high efficiency and configured for condensing operation when operated on natural gas, Provisions shall be made to allow the boilers to operate safely on fuel on fuel oil, condensing mode is not required. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 52 16.

7.5.2.3(6) Boilers shall be forced draft type, fully modulating, low NOx, complete with variable speed burner fan, continuous oxygen trim and utilizing electronic ignition and flame sensing. Boilers shall include a control package which shall monitor all safety functions and shall communicate with the overall process control system.

7.5.2.3(7) Provide primary hot water pumps with VFDs in a quantity that matches that of the boilers, plus one redundant, to distribute hot water throughout the primary campus loop. Primary pumps to be piped into common supply/ return headers such that any pump can serve any boiler. Boiler system to operate on variable flow principles governed by secondary loop demands.

7.5.2.3(8) Hot water heating distribution shall be configured to serve the Building, existing HCC and Columbia Tower, and future loads from supply and return headers located in the boiler room. Provide four valved connections for the Building, one each for the existing loads, and two connections for future loads. The connection for the existing load shall be routed to HCC as per 7.1.2.10. One future connection representing 60% of the final plant capacity shall be piped to as per 7.1.2.11. The second future connection representing 25% of the final plant capacity shall be left capped at the header. The system shall be configured to allow the static and dynamic head of future structures to a height of 100 metres above sea level without the use of pressure break heat exchangers.

7.5.2.3(9) Provide dedicated secondary pumping systems to serve the required loads and to maximize the temperature differential before the water is returned to the Energy Centre.

7.5.2.3(10) Reheat systems shall be based on low temperature distribution to maximize primary hot water loop temperature differential. Reheat loop temperature shall be 54.4°C (130°F) maximum.

7.5.2.3(11) Install flanged piping and valve arrangement in parallel to boilers to allow possible future heat source from CoNW District Energy System to be connected to the plant. Leave flanged connections blanked off.

7.5.2.3(12) Provide automatic isolation valves on the inlet of each boiler.

7.5.2.3(13) Provide coalescing type dirt and air separator on hot water supply main leaving the Energy Centre. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 21 11.

7.5.2.3(14) Provide energy metering to measure the heating load at the supply/ return mains.

7.5.2.3(15) Modular expansion tanks are to be provided in accordance with designed system volumes as well as future system volume. The allowance for future system volume is to be 150,000 L. Make-up water to the chilled water system shall be measured via flow meter.

7.5.2.4 Steam System

7.5.2.4(1) Steam boiler plant shall be designed based on a final plant capacity of 9,000 kg/hr at 125 psi with 60% makeup water. Redundancy shall be based on meeting the final plant capacity with one boiler out of service.

7.5.2.4(2) Steam for Mental Health Building use shall be provided from the Energy Centre. Plant steam will be provided at 862 kPA (125 psi) at a maximum capacity of 430 kg/hr (950 lbs/hr). Should the Mental Health Building require more steam; increase final plant capacity by a corresponding amount.

7.5.2.4(3) Steam distribution shall be configured to serve the Building, existing HCC and Columbia Tower, and future loads from a supply header located in the boiler room. Provide four valved connections, one each for the Building and existing loads, and two capped connections for future loads. The connection for the existing load shall be routed to HCC as per 7.1.2.10. One future connection representing 70% of the final plant capacity shall be piped to as per 7.1.2.11. The second future connection representing 20% of the final plant capacity shall be left capped at the header. Route condensate return piping from each of the aforementioned loads separately to the main condensate tank.

7.5.2.4(4) Steam boilers shall be fire tube-type. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 52 39.

7.5.2.4(5) Burners shall be high efficiency, forced draft type, fully modulating, low NOx, complete with variable speed burner fan, continuous oxygen trim and utilizing electronic ignition and flame sensing. Boilers shall include a control package which shall monitor all safety functions and shall communicate with the overall process control system. Provide both surface and drum blowdown systems and all safety features.

7.5.2.4(6) Provide stack heat recovery economizers for each steam boiler.

7.5.2.4(7) Provide steam separators to achieve ideal dryness on outlet of each boiler. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 22 11.

7.5.2.4(8) Blowdown collection tank shall be capable of recovering heat back into the boiler feed water. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 22 11.

7.5.2.4(9) Provide a main condensate tank with a minimum capacity of 3400 Ls (900 USgal). Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section .23 22 23.

7.5.2.4(10) Condensate transfer pumps shall be configured with at least one pump per boiler plus redundancy.

7.5.2.4(11) Provide a main deaerator with a minimum capacity of 3400 L (900 USgal). Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 53 16.

7.5.2.4(12) Boiler feed pumps shall be configured with at least one pump per boiler plus redundancy.

7.5.2.4(13) Pipe the condensate return system such that boiler operation can be maintained if the deaerator is out of service.

7.5.2.4(14) Where high pressure condensate accumulates in the plant space, provide flash tank with operating pressure of 35 kPa (5 psi) and recover steam to Deaerator. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 22 11.

7.5.2.4(15) Include steam flow meter on plant main outlet to measure production.

7.5.2.4(16) Include water flow meter to measure Steam Plant make-up water demand.

7.5.2.4(17) Supply Pressure Reducing Valve stations in a 1/3, 2/3, 2/3 arrangement when load exceeds 700 kg/hr (1500 pph). For loads below 700 kg/hr

(1500 pph), provide full size PRV and globe valve bypass. All PRVs shall have isolation valves up and down stream as well as strainers, relief valves, drip-pan elbows and vents to outdoors. Vents of different pressure reliefs shall not be combined. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 22 11.

7.5.2.4(18) PRVs for humidifier operation shall be installed locally and provide steam at 70 kPa (10 psi).

7.5.2.4(19) Blowdown tank size shall be in accordance with recommendations of National Board of Boiler and Pressure Vessel Inspectors.

7.5.2.5 Stack

7.5.2.5(1) Provide a structural stack for the boilers and generators that meets the current and future needs of the Energy Centre. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 51 19.

7.5.2.5(2) Provide flues based on meeting the final hot water heating boiler, steam boiler and generator plant capacities. Provide a minimum of one flue for each of four generators, one flue for the steam boilers, and two flues for the hot water boilers. Provide additional boiler flues if selected boilers require individual flues. Flues shall be guided within the outer shell of the stack to allow for expansion. Flues shall be individually insulated.

7.5.2.5(3) Flues shall terminate at a height of 64.0 metres above sea level based on a location adjacent to Brunette Avenue and approximately halfway between Allen and Keary Streets.

7.5.2.5(4) Stack material shall be of a uniform colour and finish, and not require ongoing maintenance. Refer to 5.3.1.1(11) for additional details.

7.5.2.5(5) Wind loading, seismic zone, exposure factor, and deflection shall be in accordance with British Columbia Building Code.

7.5.2.5(6) Stack shall be freestanding above the height of the Energy Centre.,

7.5.2.5(7) Provide lighting and marking in accordance with Transport Canada standards.

7.5.2.5(8) Provide external access ladders with safety rail system and platform(s).

7.5.2.6 Fuel Systems - Boilers

7.5.2.6(1) Provide 2 hour fire rated, protected tanks, in capacities not exceeding 45,000L each for the boiler systems backup. Refer to Appendix 1B(I)

[Energy Centre Technical Specifications] section 23 13 13. All fuel tanks to be in individual 2 hour fire rated rooms.

7.5.2.6(2) Final storage capacity shall be a minimum of 135,000 L. Plant capacity at the end of Phase 1 shall be minimum of 90,000.

7.5.2.6(3) Include duplex fuel pump package to supply 1.5X the flow of aggregate boiler demand. Duplex set to be run/ standby with dedicated pump control panels for true redundancy. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 13 15.

7.5.2.6(4) Provide anti syphon valve on the supply line from the storage tanks to the fuel supply header.

7.5.2.6(5) All storage tank fuel supply lines to be piped into a common header with individual automatic solenoid valves acting as tank selectors.

7.5.2.6(6) Duplex pump set to send fuel oil through supply loop disseminating fuel to all boilers in parallel.

7.5.2.6(7) Supply back pressure valve at end of supply main to maintain an upstream pressure on the suction of each burner of no more than 20 kPa.

7.5.2.6(8) All excess fuel pumped and returned from boilers shall be piped into a common header with individual return lines along with automatic solenoid valves returning fuel to each tank.

7.5.2.6(9) Provide fully automated fuel management system. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 15 13.

7.5.2.6(10) Individual fuel fill wall mounted cabinets with overfill alarm and vents shall be provided in accessible location for a fuel tanker yet as discreet as possible. Location to be approved by the Authority.

7.5.2.6(11) Provide new intermediary, let-down pressure station for natural gas to Energy Centre sized to supply all boilers at peak demand based on final plant capacity. Station outlet pressure to be 14 kPa (2 psi). Location to be screened from view and secured, and protected with bollards. Final location to be approved by the Authority.

7.5.2.6(12) Provide fully automated fuel filtration system for all fuel storage tanks. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 13 19 Fuel Filtration Systems

7.5.2.7 Provide 2 X 20 US gallon propane bottles with regulators and protective cage to feed pilots and facilitate fuel oil ignition.–

7.5.2.8 Fuel Systems - Generators

7.5.2.8(1) Provide 2 hour fire rated, protected fuel storage tanks, in capacities not exceeding 45,000L each for the backup generators. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 13 13. All fuel storage tanks to be in individual 2 hour fire rated rooms.

7.5.2.8(2) Final storage capacity shall be a minimum of 180,000 L. Plant capacity at the end of Phase 1 shall be minimum of 90,000 L.

7.5.2.8(3) Provide dedicated fuel oil day tanks for each generator along with all safeties, protections, and valves to meet CSA B139. Day tanks to be sized based on a minimum of 2.5 hours of full load fuel consumption.

7.5.2.8(4) Provide duplex fuel pump package supplying 2.5X the aggregate flow of 2 generators' demand. Duplex set to be run/ standby with dedicated pump control panels for true redundancy. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 13 15.

7.5.2.8(5) Provide anti syphon valve on supply line from the storage tanks to the fuel supply header.

7.5.2.8(6) All storage tank fuel supply lines to be piped to a common header with individual automatic solenoid valves acting as tank selectors. Header to be provided with drain and priming connection.

7.5.2.8(7) All day tank overflows shall be returned by gravity and piped into a common header. Thereafter, individual gravity return lines along with automatic solenoid valves, return fuel to each main storage tank.

7.5.2.8(8) Provide fully automated fuel management system. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 15 13.

7.5.2.8(9) Individual wall mounted fuel fill cabinets with overfill alarm and vents shall be provided in accessible location for a fuel tanker yet as discreet as possible. Location to be approved by the Authority.

7.5.2.8(10) Provide fully automated fuel filtration system for all fuel storage tanks. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 13 19 Fuel Filtration Systems.

7.5.3 Cooling:

7.5.3.1 Basic Requirements

7.5.3.1(1) Chilled water shall be produced in the Energy Centre. The design and operation of the Energy Centre must be optimized to allow energy recovery (for heating purposes) and to minimize the cost of operation.

7.5.3.1(2) Main Chilled Water System:

7.5.3.1(2)(a) Main chilled water cooling plant shall be designed based on a final plant capacity of 14,100 kW (4,000 tons) with an output temperature of 6.7°C and a return temperature of 14.5°C. Redundancy shall be based on meeting 90% of the final plant capacity with one chiller or cooling tower out of service.

7.5.3.1(2)(b) Plant capacity at the end of Phase 1 shall be 8,400 kW (2,400 tons). Redundancy shall be based on 4,200 kW (1,200 tons) capacity with one chiller or cooling tower out of service.

7.5.3.1(2)(c) Main chilled water for Mental Health Building use shall be provided from the Energy Centre at a maximum capacity of 980 kW (280 tons). Should the Mental Health Building require more capacity; increase Phase 1 and final plant capacities by corresponding capacities.

7.5.3.1(2)(d) Main chilled water distribution shall be configured to serve the Building, existing HCC and Columbia Tower, and future loads from supply and return headers located in the chiller room. Provide four valved connections in total, one each for the Building and existing loads, and two connections for future loads. The connection for the existing load shall be routed to HCC as per 7.1.2.10. One future connection representing 60% of the final plant capacity shall be piped to as per 7.1.2.11. The second future connection representing 20% of the final plant capacity shall be left capped at the header. The system shall be configured allow the static and dynamic head of future structures to a height of 70 metres above sea level without the use of pressure break heat exchangers.

7.5.3.1(2)(e) Energy Centre main chillers shall be high efficiency electrical centrifugal chillers. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 64

16. Chillers shall utilize non-CFC refrigerant and shall meet LEED requirements.

7.5.3.1(2)(f) Each main chiller shall have a dedicated transformer to step down the voltage from from 12.47kV to the rated voltage of the chiller.

7.5.3.1(3) 24/7 Chilled Water System:

7.5.3.1(3)(a) 24/7 chilled water cooling plant shall be designed based on an final plant capacity of 2,115 kW (600 tons) with an output temperature of 8.9°C and a return temperature of 14.5°C. 24/7 chilled water cooling plant shall be configured such that modules can be added to provide for an intermediate plant capacity of 1,410 kW (400 tons). Redundancy shall be based on meeting the final and intermediate plant capacities with one chiller module out of service. 24/7 cooling plant shall be configured such that 50% of the capacity will be fed from one electrical feeder, and 50% from a second feeder at both intermediate and final capacities.

7.5.3.1(3)(b) 24/7 chilled water cooling plant capacity at the end of Phase 1 shall be 705 kW (200 tons). Redundancy shall be based on meeting the Phase 1 plant capacity with one chiller module out of service.

7.5.3.1(3)(c) 24/7 chilled water for Building use shall be provided from the Energy Centre at a maximum capacity of 70 kW (20 tons). Should the Mental Health Building require more capacity; increase Phase 1 and final plant capacities by corresponding capacities.

7.5.3.1(3)(d) Provide continuously available (24/7) cooling for all areas containing specialized equipment (such as Diagnostic Imaging) and continuous internal heat gains such as electrical, UPS and Telecommunications Rooms via a process chilled water loop that can operate either independently or interconnected with the main chilled water system.

7.5.3.1(3)(e) 24/7 chilled water distribution shall be configured to serve the Building, existing HCC and Columbia Tower, and future loads from supply and return headers located in the chiller room. Provide four valved connections in

total including one for the Building sized for 20% of the final plant capacity. The connection for the existing buildings shall be sized for 20% of the final plant capacity and routed to HCC as per 7.1.2.10. One future connection representing 60% of the final plant capacity shall be piped to as per 7.1.2.11. The second future connection representing 20% of the final plant capacity shall be left capped at the header .

7.5.3.1(3)(f) Continuous cooling to be provided by separate, multiple-compressor chiller(s) capable of heat recovery operation. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 62 23. Chillers shall utilize non-CFC refrigerant and shall meet LEED requirements.

7.5.3.1(3)(g) 24/7 chiller redundancy shall be such that a failed chiller module can be repaired and/or removed and replaced without impacting ongoing operations.

7.5.3.1(3)(h) Optimize heat recovery from the 24/7 chiller system such that all the heat rejected can be recovered to provide heat to the Building, Energy Centre and the Campus based on the final plant capacity. Full or partial heat rejection to the cooling towers shall be enabled when the ability to use the recovered heat is reduced or not available.

7.5.3.1(4) Provide primary chilled water pumps with VFDs in a quantity that matches that of the chillers to distribute chilled water throughout the primary campus loop. Primary pumps to be piped into common supply/ return headers such that any pump can serve any chiller. Provide dedicated secondary pumping systems as required.

7.5.3.1(5) Provide condenser water pumps with VFDs in a quantity that matches that of the chillers. Pipe the condenser water pumps into common supply/ return headers such that any pump can serve any chiller.

7.5.3.1(6) The condenser water system shall be configured to utilize the cooling towers to generate 4,200 kW (1,200 tons) of chilled water via heat exchangers up to outdoor air conditions of 10.0°C DB / 7.0°C WB.

7.5.3.1(7) The Energy Centre shall be designed with sufficient back-up capacity and redundancy in accordance with CSA Z317.2.

7.5.3.1(8) Ensure that no failure of any single pump, fan, variable frequency drive (VFD), or central system control valve will be able to prevent cooling of the Facility to the required design conditions.

7.5.3.1(9) The chilled water system shall be configured to allow the static and dynamic head of future structures to a height of 100 metres above sea level without the use of pressure break heat exchangers.

7.5.3.1(10) Primary comfort cooling chilled water loop and the process chilled water loop to be connected together complete with modulating valves that allow for main chillers to provide cooling to the process chilled water loop should the 24/7 chiller be taken out of service or fail, and conversely allow for any spare capacity of 24/7 chiller to pre-cool the main chilled water return to the plant.

7.5.3.1(11) Provide induced draft cooling towers. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 65 13. Locate the cooling towers to ensure cooling tower discharge does not enter the Facility or any other buildings through air intakes or other openings. Provide maintenance access platform to service all sides of each tower. Make-up water to the cooling towers shall be measured via flow meter.

7.5.3.1(12) Provide energy meters on the main chilled water primary loop, process chilled loop and condenser water loop.

7.5.3.1(13) Provide energy meters on the low temperature condenser loop to measure the heat recovered from the 24/7 chiller.

7.5.3.1(14) Chilled water plant is to operate on variable primary flow principles governed by secondary loop demands. Chillers are to be selected to operate on variable flows through both the evaporator and condenser. Minimum flow limits to be provided by chiller and cooling tower manufacturer.

7.5.3.1(15) For winter operation of 24/7 chiller, sufficient cooling tower capacity in an N+1 arrangement shall be winterized and heat traced. The winterized tower section shall be easily isolated from the rest of the array when seasonal equipment is drained.

7.5.3.1(16) Provide automatic isolation valves on the inlet side of each chiller and cooling tower,

7.5.3.1(17) Provide coalescing type dirt and air separator on chilled water supply main leaving the Energy Centre. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 21 11.

7.5.3.1(18) Provide water treatment packages to meet Appendix 1B(I) [Energy Centre Technical Specifications] section 23 25 13.

7.5.3.1(19) Modular expansion tanks are to be provided in accordance with designed system volumes as well as future system volume. The allowance for future system volume is to be 200,000 L. Make-up water to the chilled water system shall be measured via flow meter.

7.5.3.2 Performance Criteria

7.5.3.2(1) Provide equipment for all necessary cooling, including the required redundancy in the cooling systems and cooling required by building systems in a post disaster event.

7.5.3.2(2) Provide 100% outdoor air for free cooling as the first means of space cooling.

7.5.3.2(3) Apply energy recovery systems to offset plant cooling requirements.

7.5.3.2(4) Cooling towers shall be provided with variable speed controllers on all motors. Provide sump heaters for cooling towers designed to operate in winter and to back up 24/7 cooling systems.

7.5.3.2(5) Chilled water plant to be controlled to optimize operation based on outdoor temperature and cooling demand.

7.5.4 Space Heating and Cooling

7.5.4.1 Basic Requirements

7.5.4.1(1) Provide all necessary space, ventilation and process heating for the Facility.

7.5.4.1(2) Space heating and cooling capacity must be sufficient to meet the required indoor design temperature and relative humidity to comply with the Standards referenced in and not limited to CSA-Z8000 and CSA Z317.2.

7.5.4.1(3) Space heating capacity must be sufficient to meet the required indoor design temperatures outlined in Appendix 1M [Space Design Comfort and Pressurization Criteria] while using the January 1% outside design temperature for New Westminster as outlined in the BC Building Code.

7.5.4.1(4) Space cooling capacity must be sufficient to meet the required indoor design temperatures outlined in Appendix 1M [Space Design Comfort and Pressurization Criteria] while using the July 2.5% outside design wet

and dry bulb temperatures for New Westminster as outlined in the BC Building Code

7.5.4.1(5) Connect sources of heating that serve Type I and Type II spaces to electrical power in accordance with the table in Electrical section 7.8.4.2(20). Refer to CSA Z317.2 for space Type definitions.

7.5.4.1(6) Provide air curtains to all vestibules adjacent to the exterior to prevent cold drafts from entering the adjacent occupied space.

7.5.4.1(7) Design pumps to:

7.5.4.1(7)(a) operate at the system fluid temperature without vapour binding and cavitation;

7.5.4.1(7)(b) be non- overloading in parallel or individual operation;

7.5.4.1(7)(c) operate within 25% of the midpoint of published maximum efficiency curve.

7.5.4.1(8) Ensure pump construction and installation will permit complete pump servicing without disrupting piping or motor connections.

7.5.4.1(9) Insulate all piping, equipment and accessories in accordance with all applicable standards as a minimum.

7.5.4.1(10) Provide seismic mitigation and building separation devices for all piping that crosses buildings and/or utility corridors.

7.5.4.1(11) Provide adequate expansion compensation for heating piping. Locate anchors and guides, design expansion compensation loops and select expansion compensation devices based on a thorough review of piping layout and engineered piping stress analysis.

7.5.4.1(12) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dewpoint temperature.

7.5.4.1(13) Once through cooling is not permitted for any process or service within the Facility.

7.5.4.1(14) Provide continuously available chilled water or condenser water systems for all areas containing specialized medical equipment, Telecommunication Rooms and electrical rooms for managing continuous internal heat gains. Cooling and heat rejection for these critical loads may be served by the central cooling plant provided the system incorporates redundancy per CSA Z317.2 requirements and is

connected to the Delayed-Vital electrical system. Design HVAC terminal components in conjunction with equipment location in order to mitigate unnecessary heat gain into the space.

7.5.4.1(15) HVAC terminal components for cooling of Telecommunication Rooms and electrical rooms shall be N+1 redundancy.

7.5.4.2 Performance Criteria

7.5.4.2(1) Install piping in an orderly manner (aligned with structural elements and at right angles). Slope piping to permit complete drainage of the system. Make allowances in all pipe sizing to provide flexibility for future renovations in accordance with 7.1.1.8.

7.5.4.2(2) Install equipment and piping with adequate service space, access panels and the ability to remove equipment for servicing or replacement. Locate services that require access for regular maintenance above non-critical spaces, such as corridors, to minimize or eliminate disruptions to the delivery of health care services. Coordinate placement of ceiling devices to ensure sufficient access to ceiling spaces.

7.5.4.2(3) Equip all high points in piping with air removal devices such as air collection chambers and air vents. Do not locate automatic air vents above the ceilings of occupied spaces.

7.5.4.2(4) Provide isolation valves, unions, and bypass piping to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.5.4.2(5) Provide balancing valves, flow-measuring devices, and temperature and pressure sensors throughout the system to facilitate system balancing.

7.5.4.2(6) Ensure all piping is accessible. No under-slab piping is permitted.

7.5.5 Ventilation

7.5.5.1 Basic Requirements

7.5.5.1(1) Provide all necessary ventilation for all spaces to comply with the Standards referenced in SOR Section 1 General Design Requirements including and not limited to CSA Z8000 and CSA Z317.2.

7.5.5.1(2) Design the air handling equipment for the Building to provide 100% outdoor air capability at all times of the year. Refer also to Section 7.5.5.1(10) of this Schedule.

7.5.5.1(3) The clinical support spaces, administration spaces, meeting spaces, and Energy Centre ventilation systems may be designed to ASHRAE Standard 170 for Health Care Facilities provided these spaces are not served from a common ventilation system serving the Patient Care Units.

7.5.5.1(4) Provide HVAC systems that maintain appropriate pressure relationships between various areas of the buildings and provide necessary outdoor air quantity, air filtration, cleansing and exhaust to control the transmission of infection. Refer to applicable infection control standards and CSA Z317.2- for the relative pressurization and other minimum indoor air quality requirements for the Facility.

7.5.5.1(5) Provide HVAC systems with adequate backup capacity and equipment redundancy to ensure continuous Facility operations at all times.

7.5.5.1(6) Provide air handling units with sectional heating and cooling coils and manual isolation valves that will enable isolation and repairs to the damaged sections of coils without stoppage of the system.

7.5.5.1(7) Design and construct the Facility to comply with the requirements of CSA Z317.2 (Special requirements for heating, ventilation & air conditioning systems in health care facilities) for a Class B HCF (Health Care Facility), except as follows:

7.5.5.1(7)(a) airhandling systems will be provided with sufficient redundancy to ensure no disruptions in facility operation. Class I spaces will maintain 100% redundancy. Class II and III spaces will maintain 60% redundancy.

7.5.5.1(8) Provide standalone air distribution system for Campus Communications Hub (CCH). Standalone air distribution system to be sized for a full fit-out load. Refer to Scope Outline prepared by Annex Communications and Appendix 1B(I) [Energy Centre Technical Specifications] specifications sections 23 36 13, 23 65 15, 23 74 33, 23 82 19, and 23 84 13. Provide ducted split-system for Entrance Facility Room and Tech Room. Refer to Appendix 1B(I) [Energy Centre Technical Specifications] section 23 81 26. Provide make-up air at all times to the CCH, Entrance Facility and Tech Room. Apply ASHRAE 2015 Environmental Guidelines for Datacom Equipment for humidity levels in the Campus Communications Hub and Entrance Facility Room.

7.5.5.1(8)(a) Install two Indirect Evaporative Cooling units for Phase 1 in an N+1 redundancy. Install IEC units in subsequent phases to match the load increase.

7.5.5.1(8)(b) Provide isolation dampers to accommodate future installation of IEC units.

7.5.5.1(8)(c) Provide all necessary infrastructure to limit or eliminate disruption or impact to the Facility when the Phase 2 IEC units are installed. This includes, but is not limited to ducting, platforms/catwalks, structural steel support, footings, curbs and anchors.

7.5.5.1(9) Not used.

7.5.5.1(10) Provide air filtration in accordance with all applicable standards. Provide a minimum filtration level of MERV 8 on all outdoor air intakes with the exception of generator radiator cooling air intakes. Ensure all HVAC systems will perform such that any indoor contaminants are maintained at less than 50% of their occupational exposure limits (OELs).

7.5.5.1(11) Provide fans with Variable Frequency Drives (VFDs) for energy savings under part-load conditions. Select motor starters in accordance with Section 7.9.7.2.

7.5.5.1(12) Provide factory-fabricated air handling equipment complete with monitoring and controls ready for connection to the BMS to ensure the highest construction standard.

7.5.5.1(12)(a) Air handling units shall have double-walled construction with 100mm thick insulation, galvanized steel exterior, stainless steel or painted aluminum interior.

7.5.5.1(12)(b) Air handling unit floors shall be reinforced minimum 3mm aluminum or 14 ga stainless steel checker plate with continuously welded seams. Base shall be structural steel minimum 150mm C-channel around perimeter.

7.5.5.1(12)(c) Interior surfaces of air handling units shall be light in colour, washable, smooth, non-porous and free of obstructions which may impede airflow or the ability to thoroughly clean the unit.

7.5.5.1(12)(d) There shall be no standing water in air handling units. Install leak-proof drain pans with continuously welded seams and corners. Drain pans shall be 16 ga type 304 stainless steel, double sloped to drain. Drain size minimum 32mm (1-1/4”).

7.5.5.1(12)(e) The air handling unit shall have a 40mm perimeter collar around the entire unit and around each floor opening to ensure the unit is internally watertight. Each section of the air handling unit shall have a capped and threaded drain connection.

7.5.5.1(13) For Medical Gas Storage Rooms, provide ventilation systems in compliance with NFPA-99.

7.5.5.1(14) Provide vandal-proof, anti-ligature HVAC equipment and devices in Patient Bedrooms and other areas where Patients may be present and unsupervised.

7.5.5.1(15) Ensure the ventilation systems are designed to accommodate any additional ventilation supply needed for commercial spaces to maintain proper pressurization throughout the building.

7.5.5.1(16) Ensure the ventilation of residential dryers and range hoods exhaust air is ducted to the exterior. If the ducting exceeds the dryer's maximum allowable distance, provide an interlocked booster fan.

7.5.5.1(17) Provide ventilation systems for Energy Centre as follows:

7.5.5.1(17)(a) Boiler room combustion air and room ventilation system.

7.5.5.1(17)(b) Chiller room ventilation and exhaust system.

7.5.5.1(17)(c) Control room and staff area heating, cooling and ventilation.

7.5.5.1(17)(d) Fuel oil storage room exhaust.

7.5.5.1(17)(e) Water room ventilation.

7.5.5.1(17)(f) Generator room ventilation and exhaust.

7.5.5.1(17)(g) Electrical room ventilation and cooling.

7.5.5.1(17)(h) Bridge and corridor heating, cooling, and ventilation.

7.5.5.1(18) Not used.

7.5.5.1(19) Apply CSA-Z317.2and ASHRAE Standard 170 for space pressurization and minimum air change rates. If the standards differ apply the most stringent requirement.

7.5.5.1(19)(a) Provide capability of a minimum of 2 air changes per hour of outdoor air to ventilate main Mechanical and Electrical spaces.

7.5.5.1(19)(b) The ECT Treatment Room shall be considered equivalent to the General Minor Surgical Procedure function as listed in Table 1 of CSA Z317.2 with a minimum of 5 outdoor air changes and 15 total air changes. The ECT Recovery Room shall be considered equivalent to the Day Surgery (Stage 2 recovery) function as listed in Table 1 of CSA Z317.2 with a minimum of 3 outdoor air changes and 9 total air changes

7.5.5.2 Performance Criteria

7.5.5.2(1) Provide Indoor Air Quality (IAQ) management plans to meet the project's IAQ requirements.

7.5.5.2(2) Incorporate a strategy to allow the installation and removal of major HVAC equipment such as fans without disrupting Facility operations.

7.5.5.2(3) Locate fans, common filters (e.g. HEPA), and other equipment in the central mechanical rooms. Allow for adequate clearance for service access. Do not place this equipment in confined spaces and avoid small doors and hatch access.

7.5.5.2(4) Not used.

7.5.5.2(5) All equipment for exhaust systems located exterior to the building will be designed and constructed to withstand the exposure to outdoor conditions.

7.5.5.2(6) Provide fresh air intakes, cooling coil drain pans, air handling units, ductwork, and all other interconnected components to prevent moisture or contaminants from collecting within the system. Provide sufficient access panels to allow for inspection and cleaning. Avoid using duct mounted humidifiers.

7.5.5.2(7) Locate fresh air intakes so as not to entrain contaminants from outdoor sources, including existing exhaust points of adjacent buildings. Locate all intakes in areas that are not accessible by the public and are not near exhaust air outlets.

7.5.5.2(8) Ensure all supply, return, and exhaust air is fully ducted to the space being served. Ceiling area will not be used as return air plenums, except in the Campus Communications Hub.

7.5.5.2(9) Insulate all ductwork to all applicable standards as a minimum.

7.5.5.2(10) Provide seismic mitigation and building separation devices for all ductwork that crosses buildings and/or utility corridors.

7.5.5.2(11) No in-slab or under slab ductwork is permitted.

7.5.5.2(12) Allow food smells to enter dining area but with limited penetration to other areas on the unit.

7.5.5.2(13) In the ECT Treatment Room provide means for additional exhaust to quickly remove unwanted odours.

7.5.5.2(14) Ensure all ductwork that provides humid air into the Campus Communications Hub, Entrance Facility Room and Tech Room using duct-mounted humidifiers is constructed of welded stainless steel of a suitable alloy or of a material equally resilient to corrosion. Ensure all ducts are sloped to drain points and are accessible for inspection and cleaning.

7.5.6 Exhaust Systems

7.5.6.1 Basic Requirements

7.5.6.1(1) Design exhaust air discharges to ensure that there is no cross contamination with outdoor air intakes and operable windows for any new or existing buildings on the Site.

7.5.6.1(2) Provide exhaust fans and locate them at the end of the exhaust ductwork systems. Ensure that the fans will be readily serviceable and are separated from spaces that house other mechanical equipment.

7.5.6.1(3) Integrate control of the exhaust systems with the ventilation supply air systems for spaces with differential pressure requirements from adjacent spaces.

7.5.6.1(4) Provide exhaust air systems suitable for special venting requirements as per CSA standards. Interlock these systems with associated supply air systems.

7.5.6.1(5) Provide exhaust systems at the emergency generators for radiator cooling and engine exhaust. Ensure exhaust termination points are

located so flue gases are not entrained in air intakes, operable windows or any other building opening for the Building or adjacent buildings.

7.5.6.1(6) Provide refrigerant detection and exhaust system in accordance with Appendix 1B(II) [Campus Communications Hub Technical Specifications] section 23 61 09.

7.5.6.2 Performance Criteria

7.5.6.2(1) Provide dedicated exhaust systems as required for medical equipment. Do not use portable systems.

7.5.6.2(2) Ensure all ductwork that exhausts humid air at or near saturation is constructed of welded stainless steel of a suitable alloy or of a material equally resilient to corrosion. Ensure all ducts are sloped to drain points and are accessible for inspection and cleaning. Provide all recovery coils with drain pans and properly sloped drains.

7.5.7 Metering Requirements for Energy Measurement and Verification

7.5.7.1 Provide meters on all services connecting to the building from an external infrastructure including but not limited to: natural gas service, steam, domestic water and electrical service.

7.5.7.2 Provide all required meters, sensors, and trend logging equipment at end uses within the building to meet the energy monitoring requirements set out in Schedule 8 [Energy].

7.5.7.3 Connect all meters to the BMS to monitor, record, report and analyze energy consumption. Coordinate electrical metering and the energy management system with the applicable requirements of in this Schedule.

7.5.7.4 Design metering intervals to be fifteen minutes or less.

7.5.8 Sound Attenuation and Vibration Isolation

7.5.8.1 Design all mechanical systems to prevent sound and vibration transmission between spaces, to prevent transmission from mechanical equipment to the spaces, and to minimize sound and vibration transmission to the outside of the Building and Ancillary Buildings. Provide sound attenuation to limit sound levels in accordance with Appendix 1D [Sound Transmission Ratings].

7.5.8.2 All flexible rubber connections and isolators are to have been manufactured no more than one year prior to installation to ensure maximum service life. Date of manufacture is to be clearly shown on each device.

7.5.8.3 Provide vibration isolation devices on all equipment with rotating components.

7.5.8.4 Ensure all suspended equipment utilize spring isolators designed for the weight and vibration characteristics of the equipment.

7.5.8.5 Provide flexible connections to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

7.5.8.6 Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

7.5.8.7 Utilize fibre free internal insulation. Do not internally insulate supply ductwork.

7.5.8.8 Refer to Division 27, Sections 7.9.11(4), 7.9.11(12) and 7.9.11(13) for restrictions in multimedia rooms.

7.5.8.9 Structural vibration limits due to the operation of building mechanical and electrical systems are provided in the table contained in Section 5.6 Structural Design, Sub-Section 5.6.6.3(4).

7.5.9 Testing, Adjusting, Balancing (TAB) and Commissioning (Cx)

7.5.9.1 Without limiting the Design-Builder's commissioning obligations under Section 33 (Testing and Commissioning) of the Design-Build Agreement, the Design-Builder will:

7.5.9.1(1) perform TAB & Cx of all mechanical equipment;

7.5.9.1(2) configure the TAB & Cx plan so it will support a phased occupancy of the building, if required by construction conditions and approved by the Authority;

7.5.9.1(3) utilize a quality assurance system throughout the TAB & Cx process to ensure that TAB & Cx has been performed to all equipment and systems requiring TAB & Cx. Demonstrate the quality assurance system to the Authority prior to beginning TAB & Cx;

7.5.9.1(4) ensure any construction or installation errors are identified and remedied prior to the start of Cx functional testing;

7.5.9.1(5) perform follow-up TAB & Cx services during each season over the first year of the building's operation;

7.5.9.1(6) make all TAB & Cx reports available to the Authority. The reports will identify how much additional capacity is available for in all systems, as required by Section; and

7.5.9.1(7) retain complete records of all TAB and Cx data.

7.6 Reserved for Future Expansion (Division 24) – NOT USED

7.7 Integrated Automation (Division 25)

7.7.1 Controls

7.7.1.1 Basic Requirements

7.7.1.1(1) Provide an integrated building management system ("**BMS**") for the Facility that performs the following functions:

7.7.1.1(1)(a) automatically operates, monitors and manages the Facility's systems to provide a high level of occupant comfort and maintains a healthy, energy efficient and productive environment without disruption to the delivery of Patient treatment services;

7.7.1.1(1)(b) provides an internet based means of external monitoring by the Authority, including all associated hardware and software. Change or control rights by external access will not be allowed;

7.7.1.1(1)(c) interfaces with the Facility mechanical, electrical and communication systems and controls;

7.7.1.1(1)(d) meters, trends and archives all data related to the flow of services into and out of the Facility, including domestic water, gas, medical gases, steam, condensate, compressed air, chilled water, heating water and electricity, and takes into account seasonal variations in flow rate;

7.7.1.1(1)(e) annunciates building and equipment alarms, including fire alarm, security alarms, freezer alarms, lighting, UPS, emergency power systems. switchgear alarms, temperature and humidity setpoint deviation alarm;

7.7.1.1(1)(f) monitors the status, temperature, humidity and alarms for equipment identified in consultation with the Authority, including freezers, coolers, labs and medical equipment;

7.7.1.1(1)(g) acquires, collates and archives all data (minimum of 2 years) associated with energy measurement and verification as required by Section 7.5.7; and

7.7.1.1(1)(h) contains safeguards to prevent unauthorized external access.

7.7.1.1(2) Design the controls systems to allow monitoring and operation of the Facility from a BMS location in the Building, from the Energy Centre Control Room, or from any location with appropriate security controls in place via an integrated Building Automation System over IP.

7.7.1.1(3) Ensure the BMS is a completely integrated (front-end and back-end) Native BacNET DDC system and can facilitate integration of a wide range of building systems and via BACnet or protocol gateways to convert the data into BACnet.

7.7.1.1(4) Ensure the BMS is non-proprietary and designed with open protocol.

7.7.1.1(5) Provide the BMS as a complete package from Delta Controls.

7.7.1.1(6) Ensure the BMS:

7.7.1.1(6)(a) will optimize the system performance under all operating conditions to provide proper air quality, occupant comfort and minimize Facility energy usage;

7.7.1.1(6)(b) will accommodate future technological changes and that the architecture of the BMS will permit expansion of the system for future renovations providing a minimum 20% spare point capacity at each BMS Central HVAC system control panel; and

7.7.1.1(6)(c) is an independent system separate from the fire alarm and other control systems.

7.7.1.1(7) Not used.

7.7.1.1(8) Provide sensors to monitor outdoor air temperature, relative humidity, air volumes, space CO2 levels, and other levels as required.

7.7.1.1(9) Provide continuously-operating sensors between all spaces requiring differential pressurization to monitor that the required pressure differential is in place. In addition to BMS alarms, provide local audio and visual alarms at the room entrance and also at the local monitoring station if applicable.

7.7.1.1(10) Provide BMS complete with a Coppertree Analytics BACNet based Automated Fault Detection, Diagnosis and Reporting (AFDDR) software, hardware interface and communication devices. Configure and operate

the AFDDR software to ensure building systems remain continuously optimized and the need for fault diagnosis by the building operator is minimized in order to maintain the building system optimized. Ensure the AFDDR software will record and provide reports of BMS controller database software modification instances, facility air quality, Key performance indication of central system HVAC equipment control loops, key performance indication of zone control loops, occupant comfort, energy performance, ability to create virtual metering utilizing the HVAC DDC points to allow drill down capability from the main metering points to facilitate the operators in isolating poorly performing systems, operation/ machine fault, manual override and other customizable web-accessible reports available to the Authority. AFDDR software vendor shall advise BMS of all points necessary to meter or build virtual meters that optimize AFDDR function. Refer to General Requirements for Automated Fault Detection Diagnosis and Reporting Systems, and Automated Recommissioning Software for Optimization of Building Energy Efficiency for further details.

7.7.1.1(11) Not used

7.7.1.1(12) Provide a separate physical network and any required network equipment for the BMS.

7.7.1.1(13) Ensure all system critical server/head-end applications on which the BMS relies upon will reside on the Authority's equipment. Ensure all software systems, platforms and equipment comply with the Authority's standards and policies as described in this Schedule. Provide an interface to the Authority's network for alarm, notification, and other requirements as requested by the Authority.

7.7.2 Performance Criteria

7.7.2.1 Provide a BMS connected independent temperature control zone for each Patient Bedroom and office. The space thermostat will control supply air temperature to the room, and perimeter heating, if applicable. For type 3 spaces as defined in CSA Z317.2, base the zoning for HVAC systems on occupancy, room location, room orientation and room heating and cooling loads.

7.7.2.2 Zone floor areas to provide control of smoke in a fire situation. Zone floor areas to ensure infection control for each of the Care Team Bases.

7.7.2.3 Provide thermostats throughout the Facility to meet all space control requirements. Mercury containing components will not be permitted. Provide BMS veritable adjustable temperature by +/-2C within setpoint range listed in Appendix 1M [Space Design Comfort and Pressurization Criteria], with temperature read out

in all individual rooms that are also independent zones. The temperature range shall be controlled by the BMS.

7.7.2.3(1) Provide adjustable type recessed thermostats in all Patient Bedrooms with temperature read out. Ensure the temperature range may be controlled by the BMS. In Secure rooms, provide electronic, flat plate type (transducer) thermostats located flush mount on wall surface at minimum of 2.4m above finished floor. Temperature control for Secure rooms shall be controlled by the BMS - no User override is permitted.

7.7.2.3(2) Interior control zones will not exceed 180 m2 (1,500 sf) per zone for open areas Perimeter zones will be no more than 4.7 metres (15 feet) from an outside wall along a common exposure. Independent zones will be provided for each clinically unique space. Perimeter zones will not exceed 30m2 (300 sf).

7.7.2.4 Provide local pressure control for each negative pressure room and anteroom. Provide a local annunciator panel located in the corridor outside each of these rooms.

7.7.2.5 Design all components to default to a safe position upon failure, and install all components to ensure reliable operation at any failure situation.

7.7.2.6 Design the BMS to monitor, control and indicate alarms, and to provide trending where applicable for all connected sensors and control points.

7.7.2.7 Connect the BMS to UPS to ensure continued availability during utility power disruptions.

7.7.2.8 Design the BMS to monitor critical alarms for essential building and life safety systems. Critical alarms include:

7.7.2.8(1) fire alarm system for alarm, supervisory and trouble;

7.7.2.8(2) all temperature alarms resulting from setpoint deviations;

7.7.2.8(3) failure of any major HVAC or plumbing equipment;

7.7.2.8(4) all alarms relating to the fire protection system; and

7.7.2.8(5) all alarms related to the emergency power generators and transfer switch control system.

7.7.2.9 Include in the BMS documentation a detailed narrative description of the sequence of operation of each system.

7.7.2.10 Design user interface to be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.

7.7.2.11 Connect the energy management system to the BMS.

7.8 Electrical (Division 26)

7.8.1 Design Principles:

7.8.1.1 Provide electrical systems that meet the requirements of the identified program in an efficient manner with optimal utilization of space, staff and equipment resources, and provide a comfortable and safe working environment for Patients, staff and visitors.

7.8.1.2 Electrical Systems to be:

7.8.1.2(1) of a type and quality intended for use in a health care facility;

7.8.1.2(2) functional, new and implement the latest proven technologies in the design of equipment and systems;

7.8.1.2(3) integrated where integration provides efficiency, operational and cost advantage;

7.8.1.2(4) efficient;

7.8.1.2(5) reliable;

7.8.1.2(6) adaptable and expandable for future needs;

7.8.1.2(7) configured with redundancy to allow flexible operation and concurrent maintenance;

7.8.1.2(8) located to allow equipment to be serviced conveniently.

7.8.2 Basic Requirements

7.8.2.1 Comply with electrical general requirements included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.2.2 Electrical systems will be fully compatible with the Authority's existing region-wide metering system. Provide all necessary infrastructure, interfaces, modifications, programming, testing and commissioning to local and off-Site systems to ensure that there is seamless integration with remote facilities.

7.8.2.3 Incorporate into the design and construction the principle that change will be a constant and inevitable fact within the Facility. Completed electrical systems will

permit change while minimizing the cost of change and the amount of interruption to the regular Facility operations.

7.8.2.4 The electrical systems and equipment will be designed and installed in compliance with BCBC requirements for a post-disaster building.

7.8.2.5 Equipment:

7.8.2.5(1) will be located indoors unless noted otherwise.

7.8.2.5(2) will have enclosures suitable for installation in a sprinklered area with features such as:

7.8.2.5(2)(a) drip shields

7.8.2.5(2)(b) angled overhanging drip-proof louvres at ventilation openings

7.8.2.5(2)(c) hinged doors

7.8.2.5(2)(d) plexiglass bubble covers over power circuit breakers

7.8.2.6 Plan installation of equipment to facilitate easy access to equipment which may require inspection or maintenance.

7.8.2.7 Provide electrical distribution schemes which are sized and configured to achieve service continuity in the event of equipment failure. Failure of any electrical equipment, feeder or circuit will not impair Facility nor Existing Hospital operation nor deprive any area of electrical power.

7.8.2.8 Size and configure equipment to permit routine testing and servicing of power generation and distribution equipment with minimal loss of service continuity.

7.8.2.9 Utilize power distribution equipment that are robust, reliable, easily operated and maintained.

7.8.2.10 Design and construct all systems with protection, grounding, isolation and control to address the functional requirements where they are located.

7.8.2.11 Provide power distribution systems for the following utilization voltages:

7.8.2.11(1) 12.47kV, 3 phase, 3 wire for 12.47kV distribution:

7.8.2.11(1)(a) from the Energy Centre to individual buildings on site

7.8.2.11(1)(b) for large individual motor loads like chillers, except for chillers serving 24/7 loads.

7.8.2.11(2) 600V, 3-phase, 3 wire derived from 12.47kV-600V high-resistance grounded system for equipment and distribution within each building.

7.8.2.11(3) 208Y/120V, 3phase, 4 wire for distribution to branch circuit panels lighting, receptacles, and equipment.

7.8.2.12 Incorporate energy management systems to minimize demand pressures on the Building systems and minimize the anticipated increase to energy costs.

7.8.2.13 Integrate requirements for energy incentive programs into the electrical systems. Refer to Design Build Agreement Section 11 (Energy) for details.

7.8.2.14 Not used.

7.8.2.15 Provide services to the parking areas including lighting, housekeeping receptacles, video surveillance, duress and public address.

7.8.2.16 Lighting

7.8.2.16(1) Provide lighting schemes that support functional needs and activities and enhance safety for Patients, Staff and visitors.

7.8.2.16(2) Design lighting with the objective of creating a comfortable working environment and an environment conducive to healing and recovery.

7.8.2.16(3) Utilize a combination of natural light, luminaries and controls to optimize daylight.

7.8.2.17 Electrical Rooms

7.8.2.17(1) Locate electrical equipment and feeder routes to minimise the risk to service continuity resulting from fire, flood, adverse weather, seismic events, construction activities and vandalism.

7.8.2.17(2) Where electrical equipment is located below grade, provide protection against the risk of flooding.

7.8.2.17(3) Locate electrical rooms and power distribution equipment in order to minimize the distances for feeder runs, to provide easy access for equipment replacement and to avoid interference with other services and equipment.

7.8.2.17(4) Electrical equipment and feeders forming part of the Emergency Power Supply system and high-voltage distribution branch A will be separated from Utility Incoming Switchgear, high-voltage distribution branch B, and

other distribution equipment with a minimum 2-hour fire-resistance rated separation.

7.8.2.17(5) Electrical rooms will not have fuel lines, gas lines, steam lines, drain pipes, plumbing pipes or water-cooled fan coil units.

7.8.2.17(6) Install equipment, conduits, piping, ductwork etc., in electrical rooms such that a minimum clear height of 2133mm (7'-0") AFF is available.

7.8.2.17(7) Sprinkler heads in electrical rooms will be located such that the spray deflector of the lowest sprinkler head is at least 1220mm (4'-0") above the highest point of electrical equipment like switchgear, transformers, distribution panels, UPS, etc., in the room.

7.8.2.17(8) Protect electrical rooms and the emergency generator plant from flooding or ground water infiltration. To mitigate the risk, provide drainage and sump pumps (on Delayed-Vital power):

7.8.2.17(8)(a) within the electrical rooms and cable pull rooms where concrete encased duct banks interface with the building; and

7.8.2.17(8)(b) other electrical service areas as required.

7.8.2.17(9) All floor mounted equipment will be placed on minimum 100mm high concrete housekeeping pads.

7.8.2.17(10) Design the electrical rooms and generator plant to be readily accessible, secure, well ventilated and free of corrosive or explosive fumes, gases or any flammable material.

7.8.2.18 Equipment Replacement Strategy

7.8.2.18(1) Provide clear aisle ways and routes to permit removal of major electrical equipment from the building as well as to bring in new equipment into the electrical rooms without impacting hospital operation and site access.

7.8.2.18(2) The replacement pathways will allow new equipment to be brought into the building and its respective electrical room as an entire unit after factory testing, without being broken down into subcomponents requiring assembly on site.

7.8.2.18(3) Indicate on floor plans the removal aisle ways and routes for major electrical equipment such as diesel generators, transformers sized 300kVA and greater, switchgear sections, ATS and UPS cabinets.

7.8.2.19 Zoning

7.8.2.19(1) Zone the power distribution and systems with precise boundaries to restrict the extent of an outage, provide certainty for maintenance, and identify the limits of spare capacities. Avoid arbitrary connections. At the campus level, zone boundaries to coincide with the overall site and individual building outlines. Within buildings, zone boundaries to coincide with floor levels and fire compartments.

7.8.2.19(2) Zoning, sizing of power distribution systems and location of corresponding major equipment will be as noted in the sections below.

7.8.2.19(3) The energy centre will be sized to house all the equipment necessary to serve the present campus and planned redevelopments: the Existing Hospital, MHSU/CCH, the new EC, Phase 2, and an allowance for future development.

7.8.2.19(4) The Energy Centre will feed the individual buildings. Each building will have its dedicated main electrical room.

7.8.2.19(5) The following equipment will be located in the Energy Centre

- 7.8.2.19(5)(a) Utility main service entrance switchgear
- 7.8.2.19(5)(b) Diesel Generators and Paralleling switchgear
- 7.8.2.19(5)(c) HVATS
- 7.8.2.19(5)(d) HV switchgear serving Conditional and Vital/Delayed-Vital distribution
- 7.8.2.19(5)(e) 12.47kV-600V step-down transformers and 600V switchgear serving the EC.
- 7.8.2.19(5)(f) Ancillary equipment and systems required for the EC.

7.8.2.19(6) MHSU & CCH will be fed from the EC. A dedicated 12.47kV-600V substation located in the MHSU will serve both MHSU and CCH. The UPS system for CCH will be located adjacent to the CCH and be fed from the MHSU 600V switchgear.

7.8.2.19(7) HCC will be fed from the EC. Two liquid-filled padmount transformers will be located immediately adjacent the HCC and feed a new double-ended 600V switchgear in the building.

7.8.2.19(8) Columbia Tower will be fed from the EC. Two liquid-filled padmount transformers will be located immediately adjacent the CT and feed a new double-ended 600V switchgear in the building.

7.8.2.20 Integrated Controls for High Voltage Equipment in the Energy Centre

7.8.2.20(1) The control system for the following equipment will be integrated by a common vendor, and this integrated control system will be designed, supplied and commissioned by the control system integrator as a single package:

7.8.2.20(1)(a) Utility Incoming Switchgear

7.8.2.20(1)(b) Diesel Generators

7.8.2.20(1)(c) Generator Master Control Systems

7.8.2.20(1)(d) Generator Paralleling Switchgear

7.8.2.20(1)(e) High Voltage Automatic Transfer Switches

7.8.2.20(1)(f) High Voltage Switchgear 1A & 1B

7.8.2.20(1)(g) DC control system including Station Batteries and chargers

7.8.2.20(2) The control system integration will maintain the following equipment as discrete units without close-coupling to other equipment:

7.8.2.20(2)(a) Utility Incoming Switchgear

7.8.2.20(2)(b) Generator Paralleling Switchgear, each side of the double-ended arrangement

7.8.2.20(2)(c) High Voltage Automatic Transfer Switch 1A

7.8.2.20(2)(d) High Voltage Automatic Transfer Switch 1B

7.8.2.20(2)(e) High Voltage Switchgear 1A

7.8.2.20(2)(f) High Voltage Switchgear 1B

7.8.2.20(3) Integrated Control System:

7.8.2.20(3)(a) Compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications], Power Generation Diesel

7.8.2.20(3)(b) Include two fully redundant master control systems with PLC controllers, power supplies, HMI touchscreen display panels etc., as specified

7.8.2.20(3)(c) Designed to have no single-point of failure

7.8.2.20(3)(d) Designed such that the addition of future generators will not require the replacement, upgrade or retrofit of the system

7.8.2.20(3)(e) will remotely operate all circuit breakers in each equipment listed above

7.8.2.21 Provisions for Future

7.8.2.21(1) Provide 25% spare capacity in the sizing of:

7.8.2.21(1)(a) each 12.47kV-600V step down transformer based on its Air Natural rating (non fan-cooled rating).

7.8.2.21(1)(b) each 600V-208V step-down transformer

7.8.2.21(1)(c) each 600V switchgear

7.8.2.21(1)(d) each 600V distribution panel

7.8.2.21(1)(e) each 600V Motor Control Centre (MCC) and Mechanical Distribution Panel.

7.8.2.21(1)(f) each 208V Distribution Panel

7.8.2.21(1)(g) each 120/208V lighting/receptacle panel.

7.8.2.21(1)(h) each feeder

7.8.2.21(2) The 25% spare capacity will be in addition to the calculated demand or demand allowance required by the RFP, operating factors and safety factors. For example, if a 100A breaker is provided, the load capability is 100 x 80% = 80A / 1.25 for a maximum load of 64A. Submit load calculations to verify this is provided at each equipment noted above.

7.8.2.21(3) Provide clear physical space equal to the footprint of one vertical switchgear section beside each single-ended switchgear lineup for future expansion. Where switchgear is arranged in double-ended configuration provide the clear physical space on either side of the double-ended switchgear.

7.8.2.21(4) Provide clear physical space that will allow two (2) 600V, 1200A rated distribution panels to be installed in the future in each main electrical room.

7.8.2.21(5) Provide adequate physical space to facilitate the future installation of feeders which will utilise the spare electrical capacity. Space provided should allow the installation of future feeders without disruption to the Facility or Existing Hospital. Provide an additional space capacity of 25% in electrical shafts. Where electrical sleeves are grouped provide an additional quantity of 25% empty sleeves for future.

7.8.2.21(6) At each distribution panel and lighting/receptacle panelboard:

7.8.2.21(6)(a) provide the greater of one spare breaker or a quantity of spare breakers equivalent to 10% of the total number of installed breakers. Rating and features of the spare breaker(s) will match the most common breaker installed in the panel.

7.8.2.21(6)(b) provide the greater of one prepared space or a quantity equivalent to 15% of the total number of installed breakers as fully prepared space(s). Each prepared space will include all of the hardware and connectors necessary to add a circuit breaker into the panel in the future.

7.8.2.21(7) Include for additional future provisions noted elsewhere in this document.

7.8.2.22 Protective Device Co-ordination

7.8.2.22(1) The protective devices in the electrical distribution system shall be co-ordinated to provide selective tripping under any fault condition for the available short-circuit currents in the following scenarios:

7.8.2.22(1)(a) When the electric utility service is supplying the loads

7.8.2.22(1)(b) When emergency generators are supplying the loads

7.8.2.22(1)(c) When both electric utility service and generators are paralleled and supplying the loads

7.8.2.22(2) The coordination of protective devices will achieve selective tripping from the utility's protective device on the street or any generator main breaker up to and including the circuit breaker feeding the final (branch) panelboard in order to localize an overcurrent condition to restrict outage to the final feeder or equipment that is affected. The final feeder breaker

and the branch circuit breaker will be selectively coordinated in all areas of the time-current curves except in the instantaneous region to localize the overcurrent condition to the branch circuit.

7.8.2.22(3) Co-ordination shall be achieved through the choice of protective devices, their ratings, or the use of time and current trip settings, and through the reduction of fault levels through the system impedance.

7.8.2.22(4) Rate all distribution devices to handle available fault duty at line terminals. Perform and implement a short circuit and coordination study to ensure all protective devices provide selective coordination to ensure tripping of the downstream device nearest the fault and not a cascading effect to upstream devices. Implement measures based on the arc flash summary. All circuit breakers 150A and larger will be fully selective.

7.8.2.22(5) Provide circuit breaker type panelboards fully rated to handle calculated fault current level. Series rating of breakers and panel boards is not acceptable. Series-rated breakers or Integrated Equipment Rated breakers will not be provided.

7.8.2.22(6) Submit to the Authority a detailed protective device coordination study of the electrical system signed and sealed by a professional engineer registered in British Columbia

7.8.2.23 Arc Flash Hazard Reduction

7.8.2.23(1) Incorporate design features and practices to reduce arc flash hazards on electrical systems such that routine operations such as transfer switch operation, opening and closing distribution breakers, and inspection and maintenance activities will require (as defined in NFPA 70E) PPE Level 2. No activities will expose personnel to arc flash hazards that exceed the protection afforded by PPE Level 4.

7.8.2.23(2) Utilise technologies such as bus differential protection, arc flash protection relays, zone selective interlocking protection, limiting available fault current from transformers, maintenance mode settings of circuit breakers and providing remote control of switching and motorised racking devices.

7.8.2.23(3) Submit to the Authority a detailed arc flash study signed and sealed by a professional engineer registered in British Columbia.

7.8.2.23(4) In accordance with the approved arc-flash study, provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment.

7.8.2.24 Power Quality

7.8.2.24(1) The electrical distribution system will be protected from the disruptive effects of:

7.8.2.24(1)(a) lightning strikes,

7.8.2.24(1)(b) current surges (causing voltage drops)

7.8.2.24(1)(c) voltage surges

7.8.2.24(1)(d) overvoltage

7.8.2.24(1)(e) undervoltage

7.8.2.24(1)(f) harmonic currents

7.8.2.24(1)(g) ferroresonance

7.8.2.24(1)(h) switching transients

7.8.2.24(2) Provide equipment and systems which assure that electrical equipment and systems will not be harmed or impaired either by external events or conditions, such as lightning and disturbances on the utility service, or by internal events or conditions generated within the Facility or Existing Hospital.

7.8.2.24(3) Establish and maintain an overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the Facility and Existing Hospital.

7.8.2.24(4) Provide equipment, such as filters, SPDs (surge protection devices), etc, specifically designed to control and remove all adverse power quality conditions that could damage or impair function of sensitive electronic equipment used in the Facility or Existing Hospital. Adverse power quality conditions include voltage spikes, dips and droops, transients, harmonics, EMI and radio frequency interference.

7.8.2.24(5) Provide station class lightning arrestors at:

7.8.2.24(5)(a) High Voltage switchgear

7.8.2.24(5)(b) primary of 12.47kV – 600V transformers.

7.8.2.24(6) Provide RC snubber networks at the primary of 12.47kV-600V transformers to prevent circuit breaker switching-induced transients from affecting the transformers.

7.8.2.24(7) Provide Surge Protective Devices (SPD) at:

7.8.2.24(7)(a) Each Switchgear bus

7.8.2.24(7)(b) Each Distribution Panel

7.8.2.24(7)(c) Each Motor Control Centre

7.8.2.24(7)(d) Each 120/208V Lighting and Receptacle Panelboard serving the CCH and Telecommunication Rooms.

7.8.2.24(8) Surge Protective Devices:

7.8.2.24(8)(a) Will be connected to the bus by a circuit breaker on the line side for isolation and overcurrent protection.

7.8.2.24(8)(b) Will be internally mounted within 208V Distribution Panels and 120/208V panelboards.

7.8.2.24(8)(c) Will be internally or externally mounted at 600V Distribution Panels and Motor Control Centres. If externally mounted, SPDs will be installed in a manner that limits the cabling length to less than 1m.

7.8.2.24(8)(d) Will be internally mounted at 600V Switchgear.

7.8.2.24(8)(e) provided on 600V equipment will be suitable for application on a 600V high-resistance grounded system.

7.8.2.24(9) Harmonic Mitigation

7.8.2.24(9)(a) Motors rated 7.5HP or greater and provided with Variable Frequency Drives (VFD) will have an individual Passive Harmonic Filter connected on the line side of each VFD to limit the total harmonic current distortion (THiD) at the input terminals of the passive harmonic filter to:

(a).1 less than 5% of the full load fundamental current of the motor when operating at full load; and

(a).2 less than 8% when the motor is 30% loaded.

7.8.2.24(9)(b) Passive Harmonic Filter

(b).1 will treat all of the characteristic low frequency harmonics generated by a 3-phase, diode bridge rectifier load (5th, 7th, 11th, 13th, etc.).

(b).2 will suppress the characteristic harmonics without the need for individual tuning or the

requirement to phase shift against other harmonic sources.

(b).3 will achieve harmonic mitigation by passive inductor/capacitor network. Active electronic components will not be used.

(b).4 will never introduce a capacitive reactive power (KVAR) which is greater than 20% of its kVA rating to ensure compatibility with engine generators.

(b).5 will not resonate with system impedances in the power distribution system nor attract harmonic currents from other harmonic sources.

7.8.2.24(9)(c) Input line reactors and/or DC link chokes associated with VFDs will not be acceptable in-lieu of passive harmonic filters.

7.8.2.24(9)(d) Provide the ability to demonstrate to the Authority at any time that there are no potentially harmful power conditions present and that equipment intended to guard against such conditions is in proper working order.

7.8.2.25 Magnetic Field Strength

7.8.2.25(1) In the MHSU and CCH, provide magnetic shielding as required to limit magnetic fields to the following levels:

7.8.2.25(1)(a) 10 milligauss in any occupied area, or in any area containing computer or communications equipment,

7.8.2.25(1)(b) 5 milligauss in any Patient care area or any area where cathode ray tube displays are to be used,

7.8.2.25(1)(c) 2 milligauss in any area where medical electrical equipment is to be tested (i.e. biomedical workshop) or very sensitive medical electrical equipment is to be used (eg: electroencephalograph (EEG), electrocardiograph(ECG/EKG)).

7.8.2.25(2) Where extremely sensitive equipment is to be used, the room will likely require magnetic shielding and the maximum permissible magnetic field strength shall be obtained from the equipment manufacturer.

7.8.2.25(3) For the purposes of controlling magnetic field strength, an "area" shall be from wall to wall and from the finished floor to the greater of 2250 mm

above the finished floor or the maximum height that medical electrical equipment can reach, either fixed or arm mounted.

7.8.3 Utility Power supply

7.8.3.1 Basic Requirements

7.8.3.1(1) Provide a 12.47kV incoming utility service to the new Energy Centre.

7.8.3.1(2) The City of New Westminster to provide a new dedicated 12.47kV service to the Site that will terminate at the utility's switching kiosk which will be located along Keary Street. The Design-Builder will be responsible for extending the 12.47kV utility service from the utility switching kiosk along Keary Street to within the Energy Centre.

7.8.3.1(3) Coordinate with the City of New Westminster Electrical Department and the Authority for schedule, location, phasing. Coordinate with the City of New Westminster Electrical Department for duct bank and utility switcher base standards, and protective device coordination.

7.8.3.1(4) Provide an underground system of concrete-encased duct banks and cast concrete maintenance holes (manholes) for routing the incoming utility service into the Energy Centre.

7.8.3.1(5) Design and construct the Energy Centre with provisions to receive a second incoming utility service in the future.

7.8.3.1(6) Infrastructure and equipment for the incoming service, including provisions for the future incoming service, will be in conformance with the requirements of City of New Westminster Electrical Department.

7.8.3.2 Performance Criteria

7.8.3.2(1) Comply with Electrical Specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.3.2(2) Comply with the City of New Westminster "High Voltage Service Guide".

7.8.3.2(3) Comply with BC Hydro's "Interconnection Requirements for Closed-Transition Transfer of Standby Generators".

7.8.3.2(4) Comply with BC Hydro's "Requirements for Manually Read Primary Service Voltage Revenue Metering (4kW to 35kV)".

7.8.3.2(5) Design the electrical utility services and electrical rooms to be accessible to authorized personnel only. Route on-Site services underground in

concrete-encased duct banks sloped away from the building and drained to the Site drainage system. Pull boxes (manholes/maintenance holes) will have lockable hasps and will not be located in secure areas, on roadways, or in areas accessible to Patients. Provide security measures as required by the Authority including access controls, intrusion detection and video surveillance.

7.8.3.2(6) Provide incoming 12.47kV utility service to the Energy Centre utilizing high voltage cables sized to carry at least 6.3MVA at 80% of the feeder rating based on the method of installation. For consistency with the City of New Westminster standards, the HV cables utilized for incoming service between the City kiosk and the Energy Centre main service switchgear shall be 3 conductor, Triplexed, Aluminum Tape Shielded Cable with 100% insulation, and 1 separate Copper, poly-covered Neutral Cable of the same size as the feeder conductors.

7.8.3.2(7) Incoming feeder to terminate at a Utility Incoming Switchgear located within the Energy Centre, as close as practicable to the point where the incoming service cables enter the Energy Centre.

7.8.3.2(8) The Utility Incoming Switchgear will be metal-clad type rated for 1200A comprising of:

7.8.3.2(8)(a) a draw-out vacuum circuit breaker main breaker

7.8.3.2(8)(b) a dedicated compartment for utility metering instrument transformers

7.8.3.2(8)(c) Revenue grade in-house hospital metering at mains

7.8.3.2(8)(d) two draw-out vacuum circuit breakers at feeder positions

7.8.3.2(8)(e) 3-phase digital multi-function type protective relay at the main and feed breakers with ANSI protective functions 50/51, 50N/51N, 86 and additional protective functions as required; integral digital metering capable of displaying V, A, KVA, KW and harmonic parameters; and a communication port integrated with the Building Management System to indicate status of the main breaker.

7.8.3.2(8)(f) A bus differential protection between the incoming terminals of main breakers and outgoing terminals of ties and feeder breakers to reduce the arc-flash hazard.

7.8.3.2(8)(g) 125V DC battery-backed power supply with charger for protective relays and controls

7.8.3.2(9) The electrical room where the Utility Incoming Switchgear is located will be sized to accommodate the future addition of a second identical Utility Incoming Switchgear. A second system of concrete-encased duct banks and maintenance holes will be provided by this Design-Builder from Keary Street to this electrical room as provisions to facilitate the future addition of a second incoming utility service to the Energy Centre.

7.8.3.2(10) Arrange the two systems of duct banks to be separate such that the new utility feeder and the future utility feeder will not occupy the same maintenance hole or pull pit in the below-grade infrastructure outside, nor reside on the same cable tray when routed inside the Energy Centre.

7.8.3.2(11) Each utility incoming concrete-encased duct bank will have a minimum of 4 ducts.

7.8.4 Emergency Power Supply

7.8.4.1 Basic Requirements

7.8.4.1(1) Provide an emergency power supply system to provide power to the Essential loads and Normal loads in the event of utility power failure.

7.8.4.1(2) Emergency power supply system will include two (2) 12.47kV prime power rated diesel generator sets of equal capacity, minimum 2975kW each. Each diesel generator will also be sized to be able to supply power to 100% of the Vital loads, Delayed-Vital loads, Life-Safety loads, and the loads required to be supported on UPS.

7.8.4.1(3) Each 12.47kV generator will be resistance grounded to limit the ground fault current for equipment protection.

7.8.4.1(4) Design and construct the Energy Centre with a separate 2-hour fire rated shelled-in space able to accommodate two additional similarly sized generators and ancillary equipment in the future, and in such a way that the future addition can occur without disruption to the continued operation of the emergency power supply system.

7.8.4.1(5) Emergency power supply system will include a common double-ended Generator Paralleling Switchgear that is configured for the parallel operation of four (4) diesel generators such that the addition of two generators in the future will not require the replacement, upgrade or retrofit of the paralleling switchgear or control equipment.

7.8.4.1(6) The system will be designed and arranged in such a way that a failure, maintenance shutdown, or replacement of any generator or ancillary equipment will not jeopardize the continued operation of the other generator(s).

7.8.4.1(7) Provide clear paths for replacement which will allow any failed generator or ancillary equipment to be replaced without impacting the continued operation of the other generators.

7.8.4.1(8) Generators will be located at or above grade level inside the Energy Centre.

7.8.4.2 Performance Criteria

7.8.4.2(1) Comply with Electrical Specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.4.2(2) With both generators operating in parallel, the emergency power supply system will be sized to supply the peak power demand of the new buildings required by the Facility plus the following existing building projected demand loads:

7.8.4.2(2)(a) Health Care Centre – 1500 kW

7.8.4.2(2)(b) Columbia Tower – 1075 kW

7.8.4.2(3) Each generator will be sized to supply the peak essential power demand of the new buildings required by the Facility plus the following existing buildings' projected essential power demand loads:

7.8.4.2(3)(a) Health Care Centre – 1100kW, which includes peak demand load per power branch as follows:

(a).1 720kW Vital (including 340kW of IT load with a redundant feed from UPS).
(a).2 380kW Delayed Vital.
(a).3 340kW UPS

7.8.4.2(3)(b) Columbia Tower – 900 kW, which includes peak demand load per power branch as follows:

(b).1 450kW Vital (including 240kW of IT load with a redundant feed from UPS).
(b).2 450kW Delayed Vital.
(b).3 240kW UPS.

7.8.4.2(4) The Generator Paralleling Switchgear will be metal-clad type rated for 1200A.

7.8.4.2(5) The double-ended paralleling switchgear design will be devoid of single points of failure and configured as two physically separate switchgear lineups interconnected by two tie-breakers through a cable tie. Install these two switchgear lineups to be physically separate; do not install them in a contiguous manner.

7.8.4.2(6) Each half of the double-ended Generator Paralleling Switchgear will have:

7.8.4.2(6)(a) two generator main breakers

7.8.4.2(6)(b) One tie-breaker

7.8.4.2(6)(c) One feeder breaker providing emergency power input to a High Voltage Automatic Transfer Switch.

7.8.4.2(6)(d) One feeder breaker providing emergency power feed to a fire pump through a dedicated step-down transformer.

7.8.4.2(6)(e) two prepared spaces that will accept draw-out vacuum circuit breakers in the future.

7.8.4.2(6)(f) A bus differential protection between the incoming terminals of main breakers and outgoing terminals of ties and feeder breakers to reduce the arc-flash hazard.

7.8.4.2(7) Each vacuum circuit breaker position in the Generator Paralleling Switchgear will have:

7.8.4.2(7)(a) 3-phase digital multi-function type protective relay with ANSI protective functions 50/51, 50N/51N, 86 and additional protective functions as required;

7.8.4.2(7)(b) integral digital metering capable of displaying V, A, KVA, KW and harmonic parameters; and

7.8.4.2(7)(c) a communication port integrated with the Building Management System to indicate status of the breaker.

7.8.4.2(8) Two fully redundant master control systems will be provided, each arranged to control four engine-generators: two generators provided under this contract and two in the future (Phase 2). The master control

systems will be designed to have no single-point-of-failure and will include:

7.8.4.2(8)(a) Redundant PLC controllers operating in a hot/standby arrangement

7.8.4.2(8)(b) Redundant power supplies

7.8.4.2(8)(c) Separate enclosures to house redundant control equipment.

7.8.4.2(8)(d) Redundant HMI touchscreen display panels arranged such that if any one fails, or is taken out of service, the other seamlessly continues to provide full control of the system.

7.8.4.2(9) Master Controls System will include paralleling controls and load management controls.

7.8.4.2(10) The generators will normally operate in parallel and provide features including load sharing and base loading. It will be possible to select a pair of generators and use the building load as a base load for annual load testing of either generator.

7.8.4.2(11) Provide one complete set of spare power and controls raceways extending from the room(s) housing the generator paralleling switchgear and controls locations to future generator room. Cap off these raceways. Size and quantity of these raceways to be similar to the provisions for the 2 generators provided.

7.8.4.2(12) The BMS will monitor and record emergency loads and provide alarms and systems status associated with the generator plant and transfer switch system.

7.8.4.2(13) Locate the generators inside the Energy Centre to enable routine and emergency maintenance activities to be performed quickly and efficiently. Removal of the generators from the Site will be simple and will not require disassembly of the building or systems, nor special lifting equipment.

7.8.4.2(14) Do not locate generators outdoors or where they are subject to damage from vandalism, falling objects or debris, road traffic, fire, flood or adverse weather conditions. Generators packaged in outdoor weatherproof walk-in type enclosures are not acceptable.

7.8.4.2(15) Diesel generators to have engine-driven radiators for cooling the engine. The cooling airflow path to be designed such that overall static pressure loss from intake to exhaust through louvres, silencers and dampers does not exceed the external static pressure capability of the engine-driven radiator fan.

7.8.4.2(16) Design the emergency power generation plant so that the sound levels that it will create at the facades of neighbouring buildings within the Existing Hospital, or at exterior spaces associated with the Building (such as walkways, entryways, balconies or patios) will not exceed 60 dBA. In addition, provide high grade exhaust mufflers and other sound attenuation means, as necessary, to prevent generator plant noise from causing interior noise levels within the Building and within any buildings in the Existing Hospital (with windows closed), from exceeding the required interior noise levels thresholds (such as NC 35-40 for Patient Bedrooms) by more than 5 NC points. For the benefit of residents on Allen and Keary Streets, the Design-Builder will provide noise control measures, as necessary, to prevent generator plant noise from exceeding 55 dBA at the property lines of any existing residential properties. The Design-Builder will retain a professional acoustical consultant to assess generator plant noise levels at the facades of neighbouring buildings within the Existing Hospital and of neighbouring residential buildings and to develop noise control measures which will assure that the above noise limits are met. In carrying out these tasks, the acoustical consultant will employ industry standard sound source modelling and sound propagation techniques/software.

7.8.4.2(17) Generator plants will be mounted on spring isolators and/or inertia bases as deemed necessary and sufficient by the Design-Builder's professional acoustical consultant so as to adequately control the transmission of vibration into the building structure so that the resulting vibration levels experienced throughout the Building do not exceed the limits specified in the Table Vibration Limitations in Section 5.6.6.

7.8.4.2(18) Diesel generator exhaust emissions at full load on 100% diesel fuel shall not exceed the U.S. Environmental Protection Agency Non-Road 'Tier 2' limits. Locate the diesel generator exhaust outlet above roof level at a height of 67 metres above mean sea level to prevent re-entrainment of emissions into air-intakes of existing and future buildings planned on Site.

7.8.4.2(19) Essential power branches will serve essential loads as defined by CSA Z32 and as required to meet the Appendix 1A [Clinical Specifications], including:

7.8.4.2(19)(a) Vital branch loads:

(a).1 Exit signs.
(a).2 Medical gas alarm panels.
(a).3 Fire Fighter Elevator.
(a).4 Elevator cab and machine room lighting.
(a).5 Fire alarm and EVAC paging system.
(a).6 Telecommunications systems. (UPS to also serve Telecom Rooms)
(a).7 Smoke control systems.
(a).8 Automated dispensing cabinets for medication
(a).9 Path of egress lighting including lighting at all building entrances.
(a).10 50 % of stair and ramp lights.
(a).11 50% of receptacles and lights in all Patient care rooms.
(a).12 50% of receptacles in all common Patient areas including Dining Room/Lounge, Lounge (Quiet).
(a).13 Minimum 25% of main lighting in each room corridor and interior area.
(a).14 Selected lighting and receptacles in generator room, maintenance shops, medication, and Care Team Bases.
(a).15 Pharmacy dispensing areas, mechanical and electrical service rooms.
(a).16 Receptacle for computers.
(a).17 Equipment as indicated on Equipment List.

7.8.4.2(19)(b) Delayed-Vital branch loads:

(b).1 Fume hoods.

7.8.4.2(19)(c) Conditional branch loads:

(c).1 Food service equipment
(c).2 50 % of stair and ramp lights.
(c).3 50% of receptacles and lights in all Patient care rooms.
(c).4 50% of receptacles in all common Patient areas including Dining Room/Lounge, (Quiet).

7.8.4.2(20) Mechanical equipment to be connected to electrical power distribution branches in accordance with the following table:

MECHANICAL SYSTEM	VITAL	DELAYED VITAL	CONDITIONAL	NORMAL	UPS

DIVISION 14 - ELEVATORS					
Elevator (Fire Fighters Elevator)	●				
Elevator cab lighting	●				
Elevator (selective connection – one from each elevator bank in addition to fire fighters elevator)	●				
Elevators (remaining elevators in bank)			●		
PNEUMATIC TUBE SYSTEM					
Controls					●
Blowers and Transfer Stations		●			
DIVISION 21 - FIRE SUPPRESSION					
Fire Pump	●				
Pre-Action Systems	●				
DIVISION 22 - PLUMBING					
Domestic Hot Water System - All the components, notably the water heater and pumps, that are part of the domestic hot water production systems		●			
Sump Pumps		●			
Medical Gas Systems	●				
DIVISION 23 - HEATING, VENTILATION AND AIR CONDITIONING					
HEATING					
The heating plant equipment is to be connected to the essential electrical system in such a way that at least two-thirds of plant capacity is connected to conditional			67%	33%	
Steam Production - Boilers, pumps and all components of the system		●			
Diesel Fuel Pump	●				
District Energy System				●	
VENTILATION					

Smoke Control System	•				
Ventilation Systems serving Type 1 Areas as defined CSA Z317.2-10		•			
COOLING					
Critical Cooling Loads (*)per CSA Z317.2			•		
Cooling for '24/7 Loads' per CSA Z317.2 (Including Telecommunications Rooms and Electrical Rooms)		•			
Campus Communications Hub	•				
Campus Communications Hub Cooling Controls					•
Non-Critical Cooling loads (*)				•	
DIVISION 25 - BUILDING AUTOMATION					
Controls					•
Note : (*) Chiller loads connected at 12kV can be connected to either 'A' or 'B' side of the 12kV switchgear distribution to achieve load balancing.					

7.8.5 High Voltage Distribution

7.8.5.1 Basic Requirements

7.8.5.1(1) The high voltage distribution will consist of two branches, A & B.

7.8.5.1(2) Provide separate 12.47kV distribution systems for the A branch and the B branch.

7.8.5.1(3) Both A and B branches will be restored from the Emergency Power Supply generators if Utility Power is lost.

7.8.5.1(4) The two distribution branches will be arranged such that a failure or maintenance shutdown of any part of one system will not affect the other system nor deprive any area of electrical power.

7.8.5.1(5) Provide metal clad electrical equipment for the high voltage distribution systems.

7.8.5.1(6) Provide clear physical space equal to one vertical switchgear section at each switchgear lineup to allow expansion in the future

7.8.5.1(7) In addition to the equipment provided in this contract (Phase 1), design and construct each electrical room with sufficient space to accept a similar set of high-voltage equipment and feeders in the future (Phase 2).

7.8.5.2 Performance Criteria

7.8.5.2(1) Comply with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.5.2(2) High voltage distribution branch A will receive normal power input from the Utility Incoming Switchgear and generator power from the Generator Paralleling Switchgear. Provide a high voltage Automatic Transfer Switch (HVATS) to serve the A branch and designate as HVATS-1A. The preferred source input of this HVATS will be directly connected to one of the vacuum circuit breakers in the Utility Incoming Switchgear; the alternate source input of the HVATS will be directly connected to the Generator Paralleling Switchgear.

7.8.5.2(3) High voltage distribution branch B will also receive normal power input from the Utility Incoming Switchgear and generator power from the Generator Paralleling Switchgear. Provide a separate high voltage Automatic Transfer Switch (HVATS) to serve branch B and designate as HVATS-1B. The preferred source input of this HVATS will be directly connected to one of the vacuum circuit breakers in the Utility Incoming switchgear; the alternate source input of the HVATS will be directly connected to the Generator Paralleling Switchgear.

7.8.5.2(4) High Voltage Automatic Transfer Switch (HVATS) will be:

7.8.5.2(4)(a) A complete assembly that is purpose-built as automatic transfer switch equipment and listed to CSA 178.3 and/or UL 1008A.

7.8.5.2(4)(b) Metal-clad switchgear construction consisting of four draw-out vacuum circuit breakers and able to bypass and isolate the automatic transfer breaker-pair on both sides of the dual incoming sources.

7.8.5.2(4)(c) Capable of closed-transition transfer (make-before-break transfer) between the incoming sources, avoiding interruption to downstream loads during weekly testing or when retransferring to the utility source after a power outage.

7.8.5.2(4)(d) Rated for 1200A, including vacuum circuit breakers, internal bus and sensors

7.8.5.2(4)(e) A bus differential protection between the incoming and outgoing terminals to reduce the arc-flash hazard.

7.8.5.2(4)(f) Compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications]

7.8.5.2(5) High voltage switchgear 1A will receive input directly from its corresponding HVATS-1A. This switchgear will be 1200A rated and configured with a main breaker, a tie-breaker, and a quantity of feeder breakers as required to feed each of the following loads using dedicated radial feeders:

7.8.5.2(5)(a) A new 12.47kV-600V step-down transformer in the new Mental Health building. Provide a high-voltage load-break switch as local isolation means on the primary side of the step-down transformer.

7.8.5.2(5)(b) A new 12.47kV-600V step-down transformer in the new Energy Centre building. Provide a high-voltage load-break switch as local isolation means on the primary side of the step-down transformer.

7.8.5.2(5)(c) A new 12.47kV-600V step-down transformer for the existing Health Care Centre building

7.8.5.2(5)(d) A new 12.47kV-600V step-down transformer for the existing Columbia Tower building

7.8.5.2(5)(e) One (out of the three) new chillers in the new Energy Centre.

7.8.5.2(5)(f) In addition to the above feeder breakers, include one prepared space that will accept a draw-out vacuum circuit breaker in the future.

7.8.5.2(6) High voltage switchgear 1B will receive input directly from its corresponding HVATS-1B. This switchgear will be 1200A rated and configured with a main breaker, a tie-breaker, and a quantity of feeder breakers as required to feed each of the following loads using dedicated radial feeders:

7.8.5.2(6)(a) A new 12.47kV-600V step-down transformer in the new Mental Health building. Provide a high-voltage load-

break switch as local isolation means on the primary side of the step-down transformer.

7.8.5.2(6)(b) A new 12.47kV-600V step-down transformer in the new Energy Centre building. Provide a high-voltage load-break switch as local isolation means on the primary side of the step-down transformer.

7.8.5.2(6)(c) A new 12.47kV-600V step-down transformer for the existing Health Care Centre building.

7.8.5.2(6)(d) A new 12.47kV-600V step-down transformer for the existing Columbia Tower building.

7.8.5.2(6)(e) Two (out of the three) new chillers in the new Energy Centre.

7.8.5.2(6)(f) In addition to the above feeder breakers, include one prepared space that will accept a draw-out vacuum circuit breaker in the future.

7.8.5.2(7) Each vacuum circuit breaker position in high voltage Switchgear 1A and 1B will have:

7.8.5.2(7)(a) 3-phase digital multi-function type protective relay with ANSI protective functions 50/51, 50N/51N, 86 and additional protective functions as required;

7.8.5.2(7)(b) integral digital metering capable of displaying V, A, KVA, KW and harmonic parameters; and

7.8.5.2(7)(c) a communication port integrated with the Building Management System to indicate status of the each breaker.

7.8.5.2(8) The tie-breakers of Switchgear 1A and 1B will be interconnected by a cable tie. Interlocks will be provided between the mains and ties of Switchgear 1A and 1B to prevent paralleling of the incoming mains.

7.8.5.2(9) Switchgear 1A and 1B will each have bus differential protection between the incoming terminals of its main breaker and outgoing terminals of tie and feeder breakers to reduce the arc-flash hazard.

7.8.5.2(10) The high voltage branch A feeders and branch B feeders will be kept entirely independent of each other and will not occupy the same maintenance hole, pull pit, junction box, pull box or cable tray, etc.

7.8.5.2(11) Provide a redundant system of 125V DC battery-backed power supply and charger for protective relays and controls

7.8.5.2(12) Not used.

7.8.5.2(13) Power Transformers, dry-type

7.8.5.2(13)(a) will have copper windings. Delta connected primary windings and wye-connected secondary windings.

7.8.5.2(13)(b) kVA capacity indicated will be based on Class 220 degree C insulation, 150 degree C rise.

7.8.5.2(13)(c) will have ANN/ANF (air natural cooled / air force cooled) ratings and have cooling fans that will provide an additional 33% capacity over the base (air natural cooled) rating.

7.8.5.2(13)(d) suitable for interior installation with CSA type 2 sprinkler-resistant ventilated enclosure with overhanging drip proof louvers.

7.8.5.2(13)(e) will be compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.5.2(13)(f) power transformers provided for the Health Care Centre and Columbia Tower will have their secondary wye point solidly grounded.

7.8.5.2(13)(g) except as permitted in sentence (f), the secondary wye point of power transformers will be high-resistance grounded.

7.8.5.2(14) Power Transformers, liquid-filled

7.8.5.2(14)(a) padmount type

7.8.5.2(14)(b) with weatherproof tamperproof enclosure

7.8.5.2(14)(c) FR3 filled

7.8.5.2(14)(d) copper windings

7.8.5.2(14)(e) delta connected primary windings and wye-connected secondary windings. The secondary wye point will be solidly grounded.

7.8.5.2(14)(f) 65ºC temperature rise over 40ºC ambient

7.8.5.2(14)(g) compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications]

7.8.5.2(14)(h) power transformers provided for the Health Care Centre and Columbia Tower will have their secondary wye point solidly grounded.

7.8.5.2(14)(i) except as permitted in sentence (h), the secondary wye point of power transformers will be high-resistance grounded.

7.8.6 Buried Duct Bank System for Campus Distribution

7.8.6.1 Basic Requirements

7.8.6.1(1) Provide two physically separated buried concrete-encased electrical duct bank systems routed along the perimeter of the existing campus (Lane, E. Columbia St (to the farthest point required to service the Columbia Tower) and Keary St.). Minimize disruption on the hospital site by sequencing the construction of the electrical duct bank system and the Perimeter Pathway System to be concurrent, such that the excavation and construction of all below-grade infrastructure in any part of the site is completed concurrently.

7.8.6.1(2) Provide physically separated maintenance holes along each buried concrete-encased duct bank system including at locations required for power connections to the following buildings:

7.8.6.1(2)(a) Energy Centre (EC)

7.8.6.1(2)(b) Health Care Centre (HCC)

7.8.6.1(2)(c) Columbia Tower (CT)

7.8.6.1(2)(d) to the proposed location of the future building (Phase 2), north along the Lane.

7.8.6.1(3) High voltage distribution branch A feeders will be routed diversely and entirely separated from high voltage distribution branch B feeders. They will not follow the same route nor occupy the same duct bank, maintenance hole or pull pit.

7.8.6.1(4) At outdoor padmount transformers for HCC and CT buildings:

7.8.6.1(4)(a) provide a pre-cast base for each transformer

7.8.6.1(4)(b) terminate primary duct-bank at the transformer base

7.8.6.1(4)(c) provide concrete-encased duct bank for secondary feeders from each transformer base to the building.

7.8.6.1(4)(d) Include 2 x 103mm spare conduits in each secondary duct-bank.

7.8.6.2 Performance Criteria

7.8.6.2(1) Concrete-encased duct bank system including maintenance holes will be compliant with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.6.2(2) The Health Care Centre will receive two physically separated concrete-encased duct bank systems, each consisting of 4 x 103mm ducts, terminated at the concrete base of each outdoor padmount transformer.

7.8.6.2(3) The Columbia Tower will receive two physically separated concrete-encased duct bank systems, each consisting of 4 x 103mm ducts, terminated at the concrete base of each outdoor padmount transformer.

7.8.6.2(4) The proposed location of the future buildings will receive two physically separated concrete-encased duct bank systems, each consisting of 4 x 103mm ducts terminated in a pre-cast maintenance hole.

7.8.6.2(5) Maintenance holes to be minimum 4.2m long x 2.4m wide x 2.25m high with cast-iron covers.

7.8.6.2(6) Provide a maintenance hole with a sump pit and sump pump and lighting immediately before each duct bank enters (or exits) a building. Connect lighting to the vital branch and the sump pump to the delayed-vital branch.

7.8.7 Distribution Equipment – 600 Volts and below

7.8.7.1 Basic Requirements

7.8.7.1(1) Derive 600V locally in each building unless noted otherwise.

7.8.7.1(2) The main 600V switchgear serving each building will be double-ended and split into two busses: bus A and bus B. The double-ended switchgear design will be devoid of single points of failure and configured as two separate switchgear lineups, A and B, interconnected through two

tie-breakers by an external bus-duct tie. Install these two switchgear lineups to be physically separate; do not install them in a contiguous manner.

7.8.7.1(3) If utility power is lost, both bus A and bus B will be restored from the Emergency Power Supply generators through the main step-down transformers.

7.8.7.1(4) Provide a distinct 600V distribution branch to serve each load category indicated below, and connect the distribution branch to the main 600V switchgear busses as follows:

7.8.7.1(4)(a) Vital branch(es) to serve loads classified as Vital. Connect the Vital branch(es) to the 600V main switchgear bus A.

7.8.7.1(4)(b) Delayed-vital branch(es) to serve loads classified as Delayed-Vital. Connect the Delayed-Vital branch(es) to the 600V main switchgear bus A.

7.8.7.1(4)(c) Conditional branches to serve loads classified as Conditional. Connect the Conditional branches to the 600V main switchgear bus B.

7.8.7.1(5) Life-Safety loads, as defined by codes and standards, will be included in the Vital branch and Delayed-Vital branch as appropriate, or fed from a dedicated distribution branch connected to the 600V main switchgear bus A. A dedicated Life-Safety distribution branch, if provided, will originate with an Automatic Transfer Switch (ATS) and be capable of energizing the branch from either bus A or bus B of the 600V main switchgear. The preferred-source selector of the Life-Safety branch ATS will be set to bus A.

7.8.7.1(6) Life-Safety loads will not be connected to the Conditional branch(es). Individual Life-Safety loads, or a dedicated Life-Safety distribution branch, will not be directly connected to the 600V main switchgear bus B.

7.8.7.1(7) The Vital branch will be able to be energized from bus A or bus B of the main 600V switchgear through a dedicated Automatic Transfer Switch (ATS) designated ATS-V. The preferred-source selector of the ATS will be set to bus A. If there are multiple Vital branches, provide a dedicated ATS for each Vital branch.

7.8.7.1(8) The Delayed-Vital branch will be able to be energized from bus A or bus B of the main 600V switchgear through a dedicated Automatic Transfer Switch (ATS) designated ATS-DV. The preferred-source selector of the ATS will be set to bus A. If there are multiple Delayed-Vital branches, provide a dedicated ATS for each Delayed-Vital branch.

7.8.7.1(9) The Conditional branches will directly originate from bus B of the main 600V switchgear.

7.8.7.1(10) Each 600V distribution branch will be arranged such that a failure or maintenance shutdown of any part of one branch will not affect another branch nor deprive any area of electrical power.

7.8.7.1(11) Provide clear physical space equal to one vertical switchgear section at each switchgear lineup to allow expansion in the future.

7.8.7.1(12) Provide an automatic power factor correction system at each building to ensure that the overall campus power factor does not fall below 90% lag.

7.8.7.1(13) In accordance with Schedule 8 [Energy], separate the Facility electrical loads into ‘metered electrical components’ and ‘non- metered electrical components’. Provide dedicated panelboards, motor control centres, distribution centres, feeders and circuit breakers as necessary to segregate the electrical loads and facilitate the metering requirements.

7.8.7.2 Performance Criteria

7.8.7.2(1) Comply with electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(2) 600V distribution within each building:

7.8.7.2(2)(a) will be derived from two (2) 12.47kV-600V main transformers that are dedicated to the building. These transformers will in turn feed a double-ended 600V switchgear lineup.

7.8.7.2(2)(b) One main transformer will normally serve all the loads connected to 600V main switchgear bus A, the other will normally serve all the loads connected to bus B. The two main beakers will be normally closed, the two tie-breakers will be normally open.

7.8.7.2(2)(c) The main transformers will be sized for 100% redundancy such that any one transformer on its base rating (non fan-cooled rating) can support all of the loads

connected to the double-ended 600V main switchgear busses A and B when both tie-breakers are closed.

7.8.7.2(2)(d) Each 600V main switchgear lineup for bus A or bus B will have a main breaker, a tie-breaker and a quantity of feeder breakers as required.

7.8.7.2(2)(e) Key interlocks will be in place between the two main breakers and tie breakers of the separate switchgear lineups A and B to prevent paralleling of the two transformers.

7.8.7.2(3) The 600V main switchgear will:

7.8.7.2(3)(a) Directly feed distinct Automatic Transfer Switches (ATS) for: the Vital branch; Delayed-Vital branch; Life-Safety branch, if provided;

7.8.7.2(3)(b) Directly feed Distribution Panels serving the Conditional branch;

7.8.7.2(3)(c) Directly feed Motor Control Centres or Mechanical Distribution Panels serving Conditional loads;

7.8.7.2(3)(d) Directly feed automatic power factor correction systems, one on each side of the switchboard; and

7.8.7.2(3)(e) include the following requirements when serving the Health Care Centre:

(e).1 have 1600A frame power circuit breakers in bus ‘A’ and bus ‘B’ feeding a 1200A Automatic Transfer Switch for the Vital branch. The refeeding of the existing vital switchboard is described in section 7.8.18.

(e).2 have 1600A frame power circuit breakers in bus ‘A’ and bus ‘B’ feeding a 1200A Automatic Transfer Switch for the Delayed-Vital branch. The refeeding of the existing delayed-vital switchboard is described in section 7.8.18.

(e).3 have a power circuit breaker to directly feed the existing conditional switchboard. The refeeding of the existing conditional switchboard is described in section 7.8.18.

(e).4 have a power circuit breaker to directly feed the existing mechanical panel P1H6D. The

refeeding of the existing mechanical panel P1H6D described in section 7.8.18.

(e).5 will be sized and selected to co-ordinate with the existing distribution equipment that it will feed, achieving selective co-ordination of protective devices and minimizing arc flash hazard levels.

(e).6 have a spare 1600A frame power circuit breaker connected to the ‘A’ bus to feed a future UPS system.

(e).7 have a spare 1600A frame power circuit breaker connected to the ‘B’ bus to feed a future UPS system.

7.8.7.2(3)(f) Include the following requirements when serving the Columbia Tower:

(f).1 have 1600A frame power circuit breakers in bus ‘A’ and bus ‘B’ feeding a 1200A Automatic Transfer Switch for the Vital branch. The refeeding of the existing vital switchboard is described in section 7.8.18.

(f).2 have 1600A frame power circuit breakers in bus ‘A’ and bus ‘B’ feeding a 1200A Automatic Transfer Switch for the Delayed-Vital branch. The refeeding of the existing delayed-vital switchboard is described in section 7.8.18.

(f).3 have a power circuit breaker to directly feed the existing conditional switchboard. The refeeding of the existing conditional switchboard is described in section 7.8.18.

(f).4 will be sized and selected to co-ordinate with the existing distribution equipment that it will feed, achieving selective co-ordination of protective devices and minimizing arc flash hazard levels.

(f).5 have a spare 1600A frame power circuit breaker connected to the ‘A’ bus to feed a future UPS system.

(f).6 have a spare 1600A frame power circuit breaker connected to the ‘B’ bus to feed a future UPS system.

7.8.7.2(3)(g) have additional spare breakers as required elsewhere in this document.

7.8.7.2(4) 600V Switchgear:

7.8.7.2(4)(a) will be designed, factory-assembled and tested in accordance with:

(a).1 CSA C22.2 No.31-10 “Switchgear Assemblies”

(a).2 ANSI C37.20.1; and

(a).3 UL 1558

7.8.7.2(4)(b) Will have copper bus

7.8.7.2(4)(c) will be provided with motorized draw-out type power circuit breakers complying with ANSI/IEEE C37.13 and listed to UL 1066 at mains, ties, and outgoing feeder breaker positions and labeled to work continuously at 100% rated current. Fuses will not be used.

7.8.7.2(4)(d) will have circuit breakers with solid-state trip units with adjustable time and current elements for Long time, Short time, Instantaneous, and Ground fault pickup settings. The trip units will also have integral digital metering capable of displaying V, A, KVA and KW parameters and retaining the maximum recorded value of each parameter. The metering function of the circuit breaker trip units will be connected to the overall metering system and the building management system.

7.8.7.2(4)(e) will have circuit breaker auxiliary contacts connected to the building management system to indicate operational status of each breaker;

7.8.7.2(4)(f) will have a dedicated Zero Sequence Current Sensor at each circuit breaker for ground-fault detection,

7.8.7.2(4)(g) a pulsing type ground-fault detection and annunciation system capable of identifying the faulted feeder at the 600V switchgear.

7.8.7.2(4)(h) will have a white lamacoid mimic bus single line diagram riveted on the front;

7.8.7.2(4)(i) will have engraved lamacoid nameplates for cubicle and circuit identification on front and rear sections.

7.8.7.2(4)(j) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(4)(k) will have dual sensing arc-flash protection relay, with optical sensors and pressure sensors in each breaker compartment, bus compartment and cable compartment, that will provide a trip signal to the main breaker within 8 milliseconds of detecting an arc flash. Utilize point type and/or fibre optic type optical sensors to ensure proper coverage within compartments. In-lieu of pressure sensors, current sensors are acceptable as the second sensing elements to prevent false trips.

7.8.7.2(4)(l) The requirements included under sentences (f) and (g) are not required for Switchgear lineups in the Healthcare Centre and Columbia Tower.

7.8.7.2(5) Equipment enclosures will be CSA Type-2, sprinkler resistant, with drip shield and overhanging drip-proof louvres at ventilation openings. Provide plexiglass bubbles over power circuit breakers in Switchgear.

7.8.7.2(6) Automatic Transfer Switch (ATS):

7.8.7.2(6)(a) Will be listed to CSA C22.2 No.178.1 Transfer Switch Equipment

7.8.7.2(6)(b) Will be close-transition transfer type

7.8.7.2(6)(c) Will have integral dual-source bypass and isolation capability

7.8.7.2(6)(d) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(7) Distribution Panels will have:

7.8.7.2(7)(a) Moulded-case circuit breakers with electronic trip units having field-adjustable LSI elements and integrated metering functions.

7.8.7.2(7)(b) Copper bus

7.8.7.2(7)(c) CSA type 1 enclosure with additional overhanging drip hood.

7.8.7.2(7)(d) Hinged door with two-point latch and locks.

7.8.7.2(7)(e) Surge Protective Device.

7.8.7.2(7)(f) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(8) Distribution Transformers

7.8.7.2(8)(a) Harmonic Mitigating Type;

7.8.7.2(8)(b) 600V primary, 208V secondary

7.8.7.2(8)(c) Copper windings;

7.8.7.2(8)(d) Class H 220°C insulation with temperature rise not exceeding 150°C maximum in 40°C ambient.

7.8.7.2(8)(e) 3rd harmonic and other zero sequence currents to be treated in the secondary windings through flux cancellation and without coupling into the primary winding. Trapping these currents in the primary delta winding, as is the case for the delta-wye transformer configuration, is not acceptable.

7.8.7.2(8)(f) 5th and 7th harmonics are treated by introducing the appropriate primary-to secondary phase-shift in the transformer such that these currents subtract at the common bus with 5th & 7th harmonic currents produced by other similar harmonic current sources fed from the same bus;

7.8.7.2(8)(g) Fundamental current imbalance will be reduced on the primary side of the transformer compared to the secondary side;

7.8.7.2(8)(h) Load Compatibility: K-13 load current handling capability, crest factor up to 5; up to its nameplate kVA rating without derating;

7.8.7.2(8)(i) Electrostatic Shielding: Each winding is independently single shielded with a full-width copper electrostatic shield; and

7.8.7.2(8)(j) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(9) Lighting and Receptacle Panelboards:

7.8.7.2(9)(a) Copper bus;

7.8.7.2(9)(b) Neutral with same ampere rating as mains unless noted otherwise;

7.8.7.2(9)(c) Hinged door with two-point latch and locks;

7.8.7.2(9)(d) CSA Type 1 enclosure with overhanging drip shield suitable for surface mounting;

7.8.7.2(9)(e) Neutral bus rated at 200% of the mains, if the panel serves any of the following areas:

(e).1 Campus Communication Hub (CCH)
(e).2 Entrance Facility
(e).3 Telecommunication Rooms

7.8.7.2(9)(f) Surge Protective Devices (SPD) integrated within the panel, if the panel serves any of the following areas:

(f).1 Campus Communication Hub (CCH)
(f).2 Entrance Facility
(f).3 Telecommunication Rooms

7.8.7.2(9)(g) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(10) Select, configure, locate and install all components of transmission and distribution systems to minimize the transmission of noise, vibration or unwanted heat into other parts of the Facility and Existing Hospital. Provide shielding, isolation, grounding, bonding, harmonic filtration, or other means to prevent interference between systems or degradation of performance of an individual system.

7.8.7.2(11) Do not feed electrical panelboards from below. All feeders must be routed down from the ceiling for top entry into the panelboard.

7.8.7.2(12) All branch panelboards, except those in parking, will be located in electrical equipment rooms.

7.8.7.2(13) The Vital branch and Conditional branch will have the following equipment located in each electrical riser room on each floor level: [The Vital branch and Conditional branch will have the following equipment located on the same floor level as the loads they serve:]

7.8.7.2(13)(a) 600V-208V transformers.

7.8.7.2(13)(b) 208V Distribution Panels

7.8.7.2(13)(c) 120/208V Lighting and Receptacle Panels

7.8.7.2(14) The UPS branch will have the following equipment serving not more than three floors including the floor it resides, the floor above and the floor below:

7.8.7.2(14)(a) 600V-208V transformers.

7.8.7.2(14)(b) 208V Distribution Panels

7.8.7.2(14)(c) 120/208V Lighting and Receptacle Panels

7.8.7.2(15) Provide one Vital and one UPS panelboard in each telecommunication riser room to service room equipment loads including planned future cabinets.

7.8.7.2(16) Do not daisy-chain the feeders to panelboards. All panelboard feeders must be dedicated.

7.8.7.2(17) Motor Starters

7.8.7.2(17)(a) Provide individual enclosed motor starters for individual motors unless noted otherwise. Utilize motor control centers for groups of four or more motors that require individual motor starters.

7.8.7.2(17)(b) Provide combination starters for all motors 1/2 HP and larger that are not already controlled by adjustable frequency drive or include an integral control package. All motors of ½ HP or more will be 600 volt 3 phase.

7.8.7.2(17)(c) Provide motor starters that will be combination of magnetic MCP (Motor Circuit Protector) type with integral control power transformers, Hand-Off-Auto (HOA) or start/stop control and at least two auxiliary contacts in addition to seal-in contacts. HOA starters will include start/stop for Hand position. Include under voltage and single phase dropout protection devices. Provide “power on” and “running” LED type indicators on each motor starter.

7.8.7.2(17)(d) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(18) Power Factor Correction (PFC) Equipment

7.8.7.2(18)(a) Will provide automatic and dynamic correction of the each building’s power factor to ensure that the overall

campus power factor does not fall below the 90% lag threshold established for Utility surcharge.

7.8.7.2(18)(b) Will have automatic switched capacitor banks, and integral power factor controller which constantly measures the reactive power in the system and controls the connection and disconnection of capacitor steps.

7.8.7.2(18)(c) Will be anti-resonant (de-tuned) for application in the electrical system containing non-linear loads.

7.8.7.2(18)(d) Will comply with equipment specification included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.7.2(19) Provide parallel type voltage transient / surge protection with dedicated disconnect for the main 600V and 120/208V switchgear loads and all other panels serving sensitive electrical loads including diagnostic equipment, lab equipment and Variable Frequency Drives.

7.8.7.2(20) All receptacles in Patient Bedrooms that are accessible to Patients will be protected by dual purpose AFCI/GFCI circuit breakers. Receptacles located within hidden headwalls which are not accessible to unsupervised Patients do not require AFCI protection and only require GFCI protection when required by code.

7.8.7.2(21) Unless otherwise specified all receptacles accessible to Patients requiring GFCI protection will have the GFCI protection incorporated into branch circuit breaker.

7.8.8 Uninterruptible Power Supply (UPS) Systems

7.8.8.1 Basic Requirements

7.8.8.1(1) Provide a centralized UPS system and distribute UPS power to all areas, equipment and systems that require a continuous and uninterrupted source of power as required by this Schedule and all its applicable Appendices.

7.8.8.1(2) The centralized UPS system will be comprised of two separate UPS systems for 100% redundancy and arranged in a 2N configuration with redundant UPS power paths to loads.

7.8.8.1(3) The following areas, equipment and systems will be supplied from the central UPS:

7.8.8.1(3)(a) All Server Cabinets and Equipment Racks.

7.8.8.1(3)(b) All equipment and systems located in Tele-Communication Rooms (TRs), and Campus Communications Hub (CCH);

7.8.8.1(3)(c) Network equipment for the wired and wireless networks;

7.8.8.1(3)(d) wireless access points;

7.8.8.1(3)(e) nurse call system;

7.8.8.1(3)(f) public address system;

7.8.8.1(3)(g) video surveillance system;

7.8.8.1(3)(h) Building Management System (BMS);

7.8.8.1(3)(i) Staff duress system;

7.8.8.1(3)(j) access control systems;

7.8.8.1(3)(k) intrusion detection and perimeter system;

7.8.8.1(3)(l) power plant control system including load management system.

7.8.8.1(3)(m) All security systems equipment including ESS.

7.8.8.1(3)(n) All lighting, receptacles, and equipment at Security Office for monitoring, surveillance, and operations control of Patient care areas, and all associated data rooms equipment and remote devices.

7.8.8.1(3)(o) Networked low voltage control system.

7.8.8.1(3)(p) Voice Communication Systems

7.8.8.1(3)(q) Distributed Antenna System (DAS)

7.8.8.1(4) In addition to the dual UPS systems and distribution equipment provided to achieve 2N configuration for UPS power distribution in this contract (Phase 1), design and construct the UPS room and battery room with sufficient space to accept a similar set of dual UPS systems and associated feeders, transformers and distribution panels configured for 2N redundancy in the future (Phase 2). Provide power circuit breakers in the MH substation to for future connection of the Phase 2 UPS system.

7.8.8.1(5) All cabinets located in telecommunication riser rooms will be dual corded with one electrical supply feed from central UPS and one feed from Vital. In each telecommunication riser room provide one 120/208V UPS panelboard and one 120/208V Vital panelboard. Panelboards in telecommunication rooms to be minimum 30 circuit, 100A.

7.8.8.1(6) All Server Cabinets and Equipment Racks in the Campus Communications Hub will be dual corded supplied from two distinct central UPS systems.

7.8.8.1(7) Provide a Vital panelboard in the Entrance Facility Room to serve all communications equipment within the room.

7.8.8.2 Performance Criteria

7.8.8.2(1) Refer to electrical specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.8.2(2) Centralized UPS system:

7.8.8.2(2)(a) Will have modular architecture with no single, system-level point of failure.

7.8.8.2(2)(b) Will have multiple UPS modules connected in parallel to ensure UPS power to support 100% of the system load.

7.8.8.2(2)(c) UPS System serving the CCH will be arranged as a 2N system.

7.8.8.2(2)(d) Will have a dedicated battery string for each UPS module rated to provide 10 minutes of back up time when the UPS module is carrying 100% rated load.

7.8.8.2(2)(e) Will be online, double-isolation type having output power factor of minimum 0.9

7.8.8.2(2)(f) Will have passive harmonic filter at the input to each UPS module to limit the total harmonic current distortion to 5% at the line terminals of the filter when the UPS module is carrying 100% rated load.

7.8.8.2(2)(g) Will have static bypass to automatically bypass the UPS in the event of UPS failure.

7.8.8.2(2)(h) Will have external maintenance bypass switch for servicing the UPS system

7.8.8.2(2)(i) UPS modules will be suitable to receive input from a 600V high resistance grounded system.

7.8.8.2(3) The UPS system will connect to the MH substation as follows:

7.8.8.2(3)(a) UPS 1A input connected to bus A.

7.8.8.2(3)(b) UPS 1A static bypass connected to bus B.

7.8.8.2(3)(c) UPS 1A external maintenance bypass connected to bus B.

7.8.8.2(3)(d) UPS 1B input connected to bus B.

7.8.8.2(3)(e) UPS 1B static bypass connected to bus A.

7.8.8.2(3)(f) UPS 1B external maintenance bypass connected to bus A.

7.8.8.2(3)(g) Similarly, 6 power circuit breakers will be provided in the MH switchgear for future connection of the Phase 2 UPS system.

7.8.8.2(4) Provide an audible warning in the Energy Centre, FMO and CCH Tech room to indicate that the UPS battery supply has less than ten minutes of power remaining. Provide adequate labelling.

7.8.8.2(5) Provide monitoring of all alarm and trouble conditions of the UPS systems by the BMS. Include a countdown timer located in the FMO to display output alarm contacts triggered at 75%, 50%, and 25% battery life.

7.8.8.2(6) The UPS will be capable of providing adequate fault clearing current for a 200A circuit breaker without operation of the static bypass switch.

7.8.9 Metering

7.8.9.1 Basic Requirements

7.8.9.1(1) Provide a networked digital metering system that will provide detailed information about the power system parameters at specified points in the power distribution system.

7.8.9.1(2) The metering system will include, but not be limited to, the following:

7.8.9.1(2)(a) Advanced Power Quality Metres

7.8.9.1(2)(b) Digital protective relays or electronic trip units with integral metering functions, associated with circuit breakers

7.8.9.1(2)(c) Device communication interface hardware

7.8.9.1(2)(d) ancillary equipment.

7.8.9.1(2)(e) Software, licensing and programming.

7.8.9.1(3) Digital metering system will be fully compatible with and integrated to the Authority's existing Energy and Power Management System (EPMS) network, *Schneider StruxureWare Power Monitoring Expert*.

7.8.9.1(4) Compatible hardware, interfaces and software will be provided and the completed system will allow seamless data transfer for full-featured analytics functionality in the Authority's existing EPMS network.

7.8.9.1(5) The points in the power distribution system that need to be metered include:

7.8.9.1(5)(a) Utility Incoming Switchgear

7.8.9.1(5)(b) Generator Paralleling Switchgear, each bus

7.8.9.1(5)(c) High Voltage Automatic Transfer Switch

7.8.9.1(5)(d) High Voltage Switchgear 1A and 1B, mains and each feeder breaker

7.8.9.1(5)(e) Main 600V Switchgear in each building, mains and each feeder breaker

7.8.9.1(5)(f) UPS

7.8.9.1(5)(g) Distribution Panels, 600V and 208V

7.8.9.1(5)(h) Motor Control Centres

7.8.9.1(5)(i) Panelboards feeding mechanical equipment and elevators.

7.8.9.1(5)(j) Each panelboard in the CCH and each panelboard located within Telecommunication Rooms

7.8.9.1(6) Digital metres will locally display the measured values at each of the above-noted equipment in addition to transmitting the measured values over the network for viewing and/or reporting at remote locations.

7.8.9.1(7) In addition to the above, provide metering as necessary to support the energy calculations required by Schedule 8 [Energy]. Integrate this metering to the Site metering system and provide custom energy consumption reports as required by the Authority.

7.8.9.1(8) Provide metering equipment to calculate the CCH PUE (Power Usage Effectiveness) measurement. This measurement will be the total CCH energy divided by the CCH IT energy consumption.

7.8.9.1(8)(a) The CCH IT energy consumption includes the UPS energy consumed by each CCH Rack and Cabinet ePDU.

7.8.9.1(8)(b) The total CCH energy consumption includes all energy consumed solely by the CCH, which includes at a minimum:

(b).1 The CCH IT energy consumption.
(b).2 Energy consumed by Mechanical systems serving the CCH (pumps, indirect-air economizers, MUA unit, Humidifier, BMS control, Fire Protection System).
(b).3 Energy consumed by Electrical systems serving the CCH (Power transformers, UPS primary, Lighting)

7.8.9.1(9) Provide to the Authority device licenses to enable access to the existing regional metering system. These licences will enable the Authority to access real time data, peak demand data, etc., to produce custom reports on:

(a).1 Energy performance optimization
(a).2 Power reliability and availability
(a).3 Sustainability metrics

7.8.9.2 Performance Criteria

7.8.9.2(1) Comply with requirements for Energy and Power Management Specifications included in Appendix 1B(I) [Energy Centre Technical Specifications].

7.8.9.2(2) Provide an advanced Power Quality Meter at the following locations:

7.8.9.2(2)(a) Utility Incoming Switchgear

7.8.9.2(2)(b) Generator Paralleling Switchgear, each bus

7.8.9.2(2)(c) HV Switchgear 1A, mains

7.8.9.2(2)(d) HV Switchgear 1B, mains

7.8.9.2(2)(e) Each main breaker of the double-ended Main 600V Switchgear at each building

7.8.9.2(2)(f) Each mains of the Main 600V Switchgear at each building

7.8.9.2(3) The advanced Power Quality Meter will be capable of measuring:

7.8.9.2(3)(a) Voltage, Current, Power, Power Factor, Demand, Energy, and min/max of any measured parameter

7.8.9.2(3)(b) Power Quality:

(b).1 Harmonics;
(b).2 waveform capture, digital fault recording
(b).3 sag/swell detection;
(b).4 transient detection of voltage disturbance

7.8.9.2(3)(c) The power quality meter will be distinct from protective relays or circuit breaker trip units.

7.8.9.2(4) The feeder power circuit breakers at each Main 600V Switchgear in each building will have electronic trip units with integrated digital metering capable of measuring:

7.8.9.2(4)(a) Voltage, Current, Power, Power Factor, Energy, Harmonics, and min/max of any measured parameter.

7.8.9.2(5) Moulded-case circuit breakers of frame size 100A and larger will have integral electronic trip units capable of measuring:

7.8.9.2(5)(a) Voltage, Current, Power, Energy, Total voltage harmonic distortion, Total current harmonic distortion.

7.8.9.2(5)(b) The circuit breaker will be capable of:

(b).1 Displaying the measured parameters on the breaker itself;
(b).2 on a remote system via Modbus communication; and

(b).3 on a remote display.

7.8.9.2(6) Design the metering system network to store historical data and with the capability to generate user configurable electronic and printed real-time and trending reports on demand.

7.8.9.2(7) Support the metering system by a backup power source(s), which ensures operation when the metered circuit is de-energized. The metering system will not be dependent on power from the metered circuit for its operation.

7.8.10 Wiring Methods, Materials and Devices

7.8.10.1(1) Use wiring methods, materials and devices that result in a safe, reliable and flexible electrical power, lighting control, communication, data and life safety system.

7.8.10.1(2) Install all wiring in a neat and secure manner so that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.8.10.1(3) The Design-Builder will obtain approval from the Authority of the proposed classification of all Patient care areas in the Building per CSA Z32. The Authority will review these classifications and confirm the areas as basic, intermediate or critical care. Provide as a minimum the circuit and receptacle requirements identified in CSA Z32. Where this Schedule 1 identifies requirements beyond CSA Z32, comply with the requirements of this Schedule 1.

7.8.10.1(4) The following list is provided to illustrate the classification of Patient care areas described in the Clinical Requirements, according to their relationship to the criteria in the Code. The list may not be exhaustive:

7.8.10.1(4)(a)Intermediate Care:

- Exam Room
- Exam/Treatment Room
- Clinical Exam / Observation Room
- Consult / Exam Room (Clinical Skills)
- Exam / Procedure Room (Clinical Skills)
- Testing Rooms (Clinical Skills)
- Phlebotomy Station
- TMS Room
- Patient Bedroom
- Patient Bedroom Bariatric Contact Isolation Room
- Secure Room

- Tub Room

7.8.10.1(4)(b)Critical Care

- ECT Treatment Room
- ECT Recovery Room

7.8.10.2 Performance Criteria

7.8.10.2(1) Utilize non-alloyed copper for conducting components of electrical equipment including switchgear buses and transformer windings.

7.8.10.2(2) Utilize non-alloyed copper for all conductors which form part of the hospital's wiring system. Minimum conductor size will be #12AWG. Aluminum conductor may be used for 600V and 208V feeders greater than 120 Amps current rating, except for the bonding conductor in feeders serving patient care areas, which will be copper.

7.8.10.2(3) Wiring will have insulation of chemically cross-linked thermosetting polyethylene.

7.8.10.2(4) The Design-Builder may use Teck cable in mechanical plant rooms and service rooms for connection to mechanical equipment. Teck cable will be installed in perpendicular runs and will be neatly strapped to dedicated cable support systems or tray. Do not support armoured cabling from mechanical ducts, pipes or equipment. Where possible, Teck cable runs will be consolidated into common routes.

7.8.10.2(5) Provide a dedicated neutral conductor for each branch circuit.

7.8.10.2(6) Provide UPS distribution network feeders and branch circuiting with double neutral(s) capacity.

7.8.10.2(7) Provide feeders and branch circuiting with double neutral(s) capacity for loads in the following areas:

(a).1 Campus Communication Hub (CCH)
(a).2 Entrance Facility
(a).3 Telecommunication Rooms

7.8.10.2(8) Conceal all wiring and wiring support systems from public view except where approved by the Authority.

7.8.10.2(9) Separate all wiring for systems of different voltages and from different sources and do not run in common raceways. Maintain adequate shielding and separation between wiring for power and communication systems to prevent interference.

7.8.10.2(10) Do not install conduit or wiring in floor slabs, except where it is impossible to supply the device from the ceiling and specific approval has been granted by the Authority.

7.8.10.2(11) Route feeders to panelboards from the ceiling space above. Do not feed panelboards fed via the slab below, and do not 'daisy-chain' panelboards through floors.

7.8.10.2(12) Provide devices and systems to minimize the noise and vibrations of electrical equipment/ components (transformers, luminaries, cables etc.) to below an acceptable level as required in health care facilities. Design will comply with noise criteria identified in other sections.

7.8.10.2(13) Provide tamper resistant hospital grade receptacles with tamper proof screws for all Patient accessible areas. Receptacles in all other areas will be heavy duty specification grade.

7.8.10.2(14) Colour-code the power receptacles as follows:

7.8.10.2(14)(a) Normal and Conditional power – WHITE

7.8.10.2(14)(b) Vital and Delayed Vital power – RED

7.8.10.2(14)(c) UPS power – GREY

7.8.10.2(15) Identify all power receptacles with a source panel and circuit number. Arrange colour of labelling in accordance with Authority colour coding standards as follows:

7.8.10.2(15)(a) Vital power - RED with WHITE text

7.8.10.2(15)(b) Delayed vital power - BLUE with WHITE text

7.8.10.2(15)(c) Conditional power - YELLOW with BLACK text

7.8.10.2(15)(d) UPS - GREY with BLACK text

7.8.10.2(15)(e) Normal power - BLACK with WHITE

7.8.10.2(16) Utilize thermoplastic nylon cover plates for receptacles and switches. When accessible to Patients provide tamperproof fasteners, minimum two per cover plate, and install cover in a bed of tamperproof sealant. Grouped receptacles and switches will have a single cover plate for the whole group.

7.8.10.2(17) Design each room such that receptacles are distributed throughout the room as required to support functionality and convenient use of

equipment by Users and in accordance with Good Industry Practice and as required by other provisions of the Agreement. Provide sufficient quantities of receptacles:

7.8.10.2(17)(a) to meet or exceed the requirements of these documents and CSA Z32

7.8.10.2(17)(b) to support all of the systems and equipment to be installed or used, including any additional power outlets required by other provisions of this Agreement; and as required by Good Industry Practice to provide convenience, flexibility of use and operational support.

7.8.10.2(18) Allow a maximum connection of six general use receptacles to one 15 amp circuit.

7.8.10.2(19) Utilize NEMA 5-20R 15/20Amp style duplex receptacles for printers / and provide 20A rated dedicated circuits for each printer / copier unless special receptacle type configuration is required to suit the selected equipment.

7.8.10.2(20) Utilize NEMA 5-20R 15/20Amp style receptacles for housekeeping spaced a maximum of 15 metres apart staggered along alternate sides of the corridor. Provide 20A rated dedicated conditional circuits for each area, to a maximum of 6 receptacles per circuit.

7.8.10.2(21) Provide a housekeeping receptacle within each enclosed Patient care area.

7.8.10.2(22) In Offices:

7.8.10.2(22)(a) Provide a minimum of one duplex receptacle on each wall and a minimum of one duplex receptacle spaced every 3 metres of open wall space.

7.8.10.2(22)(b) Provide one Vital and one Conditional duplex receptacle at all office workstation locations. In single occupancy enclosed offices design for the location of possible workstations on at least two walls by providing a separate set of Vital and Conditional receptacles at each location.

7.8.10.2(22)(c) Provide a minimum of one Vital and one Conditional 15Amp circuits per four open office workstations.

7.8.10.2(22)(d) Provide a minimum of one Vital and one Conditional 15Amp circuits per two single person enclosed offices.

7.8.10.2(23) At each Administration workstation and computer workstation will have a minimum of one Vital and one Conditional duplex receptacles.

7.8.10.2(24) In each Exam, Exam/Treatment room, and Consultation/Therapy Room:

7.8.10.2(24)(a) Provide two Vital and one conditional duplex receptacles located at the exam table and/or desk.

7.8.10.2(24)(b) Provide a minimum of one duplex receptacle on each wall and a minimum of one duplex receptacle spaced every 3 metres of open wall space.

7.8.10.2(25) In each Clean Utility Room:

7.8.10.2(25)(a) Provide a minimum of six duplex receptacles, 50% of which will be fed from vital power and the remainder connected to conditional power.

7.8.10.2(26) In each Care Team Base (Open and Enclosed Area):

7.8.10.2(26)(a) Provide one Vital and one Conditional receptacle for each computer workstation location.

7.8.10.2(26)(b) Provide general purpose receptacles above work counters spaced at 1m on centre. 50% of these receptacles will be fed from vital power and the remainder connected to conditional power.

7.8.10.2(26)(c) Provide receptacles on all open walls with a maximum spacing of 3m.

7.8.10.2(26)(d) Provide dedicated power outlets for permanently located equipment.

7.8.10.2(27) In each Patient Bedroom provide duplex receptacles as follows:

7.8.10.2(27)(a) Four at the bed wall for general use - connect two of the receptacles to vital power and two to conditional power.

7.8.10.2(27)(b) One at the bed wall for dedicated electric bed use – connect to conditional power.

7.8.10.2(27)(c) One for the TV

7.8.10.2(27)(d) One for the Patient lift system (if lift system installed in room)

7.8.10.2(27)(e) One openly accessible for general use.

7.8.10.2(27)(f) One for the desk area.

7.8.10.2(27)(g) One receptacle for housekeeping

7.8.10.2(28) Provide a minimum of four duplex receptacles in each medication room in addition to permanently located equipment. Connect 50% of these receptacles to vital power and the remainder to conditional power.

7.8.10.2(29) In each Large Group Therapy Room:

7.8.10.2(29)(a) Provide receptacles on all walls with a maximum spacing of 3m.

7.8.10.2(29)(b) Provide power for all A/V system equipment as described in section 7.9 Communications (Division 27).

7.8.10.2(30) Provide convenience 15A 120V outlets above counter at all charging stations, including in the following rooms:

7.8.10.2(30)(a) Central Storage Room

7.8.10.2(30)(b) ECT Suite - Acute recovery

7.8.10.2(30)(c) ECT Suite – Post-Recovery

7.8.10.2(30)(d) Inpatient Reception

7.8.10.2(30)(e) Medication Room

7.8.10.2(31) In each conference or meeting room

7.8.10.2(31)(a) Provide a minimum of one duplex receptacle spaced every 2 metres of wall space and one duplex receptacle spaced a maximum every metre above work counters.

7.8.10.2(31)(b) At all locations with overhead projectors provide 15Amp 120 volt receptacle located at ceiling and provide one 27 mm conduit and pullstring to floor and/or wall outlet for the video signal to the projector as further described in section 7.9 Communications (Division 27).

7.8.10.2(31)(c) Provide power for all floorboxes in multimedia rooms as described in section 7.9 Communications (Division 27).

7.8.10.2(32) In the main electrical substations and UPS Room:

7.8.10.2(32)(a) Provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 6m and one at each interior column. Connect 25% of receptacles to vital power and the remainder to conditional power.

7.8.10.2(33) In the Campus Communication Hub:

7.8.10.2(33)(a) Provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 6m and one at each interior column. Connect 50% of receptacles to vital power and the remainder to conditional power. Each receptacle to be on a dedicated circuit.

7.8.10.2(34) In the Entrance Facility Room, Tech Room and the Telecommunications Riser Rooms

7.8.10.2(34)(a) Provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 3m. Connect 50% of receptacles to vital power and the remainder to conditional power. Each receptacle to be on a dedicated circuit.

7.8.10.2(35) In the Energy Centre:

7.8.10.2(35)(a) Provide general purpose 15/20A T-slot receptacles along the perimeter wall of each mechanical and electrical room at a maximum spacing of one every 6m and one at each interior column. Connect 25% of receptacles to vital power and the remainder to conditional power.

7.8.10.2(36) In the Energy Centre Control Room:

7.8.10.2(36)(a) Provide vital receptacles for all permanently located equipment.

7.8.10.2(36)(b) Provide one Vital and one Conditional receptacle for each computer workstation location.

7.8.10.2(36)(c) Provide general purpose receptacles above work counters spaced at 1m on centre. 50% of these receptacles will be fed from vital power and the remainder connected to conditional power.

7.8.10.2(36)(d) Provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 3m. Connect 50% of receptacles to vital power and the remainder to conditional power.

7.8.10.2(37) In the Energy Centre Staff Room / Kitchenette:

7.8.10.2(37)(a) Provide 15/20A T-slot split GFCI receptacles above kitchen counters spaced at 1m on centre connected to conditional power.

7.8.10.2(37)(b) Provide general purpose duplex receptacles along the perimeter wall at a maximum spacing of one every 3m. Connect to conditional power.

7.8.10.2(38) Provide receptacles on a dedicated circuit for all large electrical load equipment such as microwaves, coffee makers, refrigerators, stoves, etc.

7.8.10.2(39) Provide one duplex receptacle for every 35 square metres, or portion thereof, of service, housekeeping and storage space. A minimum of one duplex receptacle will be provided per room.

7.8.10.2(40) In addition to receptacle quantities listed elsewhere, provide receptacles for fixed and moveable equipment as defined in the Equipment List. Provide all necessary electrical equipment devices as required to provide an installation in accordance with manufacturers installation recommendations and make all connections for owner supplied equipment.

7.8.11 Raceways

7.8.11.1 Basic Requirements

7.8.11.1(1) Provide raceways for all wiring and cabling to support, protect and organize all wiring and cabling systems. Raceway systems will not be accessible to Patients.

7.8.11.1(2) Design raceways to provide ease of access and install with capacity for expansion and change, consistent with the requirements of the equipment and systems that they serve.

7.8.11.1(3) Install all raceways in a neat and secure manner in such a way that they are protected from damage, are not in conflict with mechanical or architectural components and allow for future changes and additions.

7.8.11.1(4) Design and install raceways without sharp edges or tight bends so that cables will be pulled in or laid in and removed without damage to the cables.

7.8.11.1(5) Construct separate raceways to isolate systems of different voltages and prevent magnetic interference to low voltage system conductors.

7.8.11.1(6) Utilize separate or barriered raceways to isolate 120V branch circuit device wiring and low voltage system device wiring.

7.8.11.1(7) Refer to Section 7.9 for detailed requirements for communication pathways.

7.8.11.2 Performance Criteria

7.8.11.2(1) Except as noted otherwise, install power wiring in EMT with steel couplings and connectors.

7.8.11.2(2) Banding for MICC cables will be as recommended by manufacturer.

7.8.11.2(3) Provide all duct banks with a minimum quantity of 50% spare conduits of the largest conduit size.

7.8.11.2(4) Install all conduits in finished areas within finished walls and above finished ceilings.

7.8.11.2(5) EMT is to be surface mounted in mechanical and electrical equipment room unfinished spaces. Conceal conduit in finished ceiling spaces and finished partition walls. In mechanical and electrical equipment rooms where conduit is installed below 2 metres and other locations where conduits are exposed to possible mechanical damage provide supplementary mechanical protection to exposed EMT or use rigid galvanized steel conduit. Wiring in mechanical and electrical rooms to be installed in EMT with the exception of final connections, less than 3m in length, to light fixtures which may utilize armoured cable (BX).

7.8.11.2(6) Do not encase EMT in concrete. Utilize rigid PVC conduit where conduit encased in concrete is necessary to achieve a concealed installation in finished spaces such as exposed concrete stairwells, conference room floor boxes, etc. Such conduit runs will:

7.8.11.2(6)(a) Be as short as possible;

7.8.11.2(6)(b) Emerge from the concrete in the closest adjacent space above suspended ceilings; and

7.8.11.2(6)(c) Be reviewed by the Authority as being necessary to achieve a concealed installation in finished spaces.

7.8.11.2(7) Minimum EMT conduit size is 21 mm (3/4”), except that minimum EMT conduit size for each communication or data outlet is per Division 27 Section 7.9.

7.8.11.2(8) Use flexible conduit for all final connections to vibrating equipment, such as transformers and motors. Flexible PVC conduit (ENT) is not permitted.

7.8.11.2(9) Minimum flexible conduit size is 21 mm (3/4”) and maximum length of any flexible conduit run is 1.5 metres.

7.8.11.2(10) Armoured cable (BX) may be used for final connections from concealed junction boxes to lighting fixtures on suspended ceilings in non-clinical areas. Armoured cable ISO-BX may be used for final connections from concealed junction boxes to lighting fixtures on suspended ceilings in clinical areas. The maximum length of any armoured cable from the junction box to the lighting fixture is 3 metres.

7.8.11.2(11) Use PVC coated rigid galvanized steel conduit for the underground portion of services to lighting and power outlets located outside of a building. Use PVC for exposed conduits subject to washdown.

7.8.11.2(12) Install individual bonding conductor in each conduit and/or raceway.

7.8.11.2(13) Raceways will typically be concealed, however, surface raceways may be installed where required and approved by the Authority. Typical areas will include laboratory spaces, workbenches, Care Team Bases, and other areas where frequent changes in power and telecommunication outlets are likely.

7.8.11.2(14) Armoured cable (BX) may be provided for modular pre-fabrication of non-clinical electrical systems. Modular wiring will consist of pre-cut flexible wiring which will terminate at an easily located and accessible junction box above the ceiling. The junction box will be located in an adjacent room within 3m (horizontally) of the prefabricated unit. Excess lengths of armoured cable will be neatly coiled up in the ceiling space to accommodate future changes. All wiring installed in walls will be vertical from device to ceiling space.

7.8.11.2(15) Armoured cable (BX) may be provided for receptacles and light switches for non-clinical areas. Armoured cable AC90 ISO-BX may be provided for receptacles and light switches for clinical areas. All installation of armoured cabling will be concealed in ceiling spaces and partition walls and will originate from an easily located and accessible junction box mounted above the ceiling of the room it serves. This junction box will only serve one room, and will utilise conduit to home run its circuits back to a panelboard. Horizontal runs of armoured cabling within the ceiling space will not exceed 3m. Armoured cable may be daisy-chained within a single wall, but will not extend around a corner or horizontally beyond 10 metres of its vertical drop. There will be no excess armoured cabling in the ceiling space and all wiring will be neatly strapped to the underside of slab or onto dedicated wire management supports. Do not support armoured cabling from mechanical ducts, pipes or equipment, or suspended ceiling systems.

7.8.11.2(16) Design all power outlet back boxes such that they are minimum 4" square welded steel type, equivalent to Iberville 5200 series.

7.8.11.2(17) Bond and ground all conduits, cable trays, racks and other infrastructure as per CEC and TIA 607B to the associated building ground.

7.8.11.2(18) Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands in accordance with Fraser Health Authority Electrical Colour Band standard. Provide all power and communication systems with unique colours in accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands (using either spray paint or coloured duct tape) at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway). Colour-code all junction boxes using spray paint on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations.

7.8.11.2(19) Install approved fire stopping to maintain all fire separations and as required by the Authority Having Jurisdiction.

7.8.12 Grounding and Bonding

7.8.12.1 Basic Requirements

7.8.12.1(1) Provide grounding and bonding for all electrical equipment and systems for the safety of people and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or

systems. Install grounding and bonding as required by all applicable codes and Division 27 requirements.

7.8.12.1(2) Provide supplementary grounding per CSA Z32 in areas identified by the Authority as Patient care areas and for all Patient dwelling and clinical treatment areas in the Facility. Provide supplemental insulated bonding conductors with all feeders and branch circuits supplying security systems loads.

7.8.12.2 Performance Criteria

7.8.12.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems.

7.8.12.2(2) Provide high-resistance system grounding on the secondary of 12-0.6kV transformers including conductors and bussing.

7.8.12.2(3) Provide a minimum #12 copper bonding conductor in each and every conduit or raceway. Provide a #6 copper bonding conductor on each communications tray and ensure each section of the tray is securely bonded.

7.8.12.2(4) Bond all exposed non-current carrying components of communication, radio or television equipment in Patient care areas to ground using a properly sized equipment bonding conductor. Uniquely identify each bonding conductor at each end.

7.8.12.2(5) Provide a ground bus in each electrical room connected to the central grounding system.

7.8.12.2(6) Provide a lightning protection system for the Facility buildings as defined by CAN/CSA B72. Risk value will not be considered a determinant in lightning protection need except for remote small structures or on-site equipment having a risk value of 3 and under.

7.8.12.2(7) Bond DAS antenna located on roof level to lightning protection grounding system.

7.8.12.2(8) Where installed in conduit, lightning protection conductors will be installed in PVC conduit.

7.8.13 Seismic Requirements for Electrical Systems

7.8.13.1 Basic Requirements

7.8.13.1(1) Provide seismic restraint for all electrical equipment and components of electrical systems. Design the electrical systems and its associated equipment to comply with the BCBC for a post-disaster Facility.

7.8.13.1(2) Provide seismic restraint systems and methods that facilitate ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and building components.

7.8.13.1(3) Provide seismic restraint systems and methods that coordinate with the Facility's architecture and finishes. Wherever practicable, conceal components of seismic restraints from public view. Where concealment is not practicable, provide systems that complement the Facility's architecture and finishes.

7.8.13.1(4) Electrical equipment to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as identified in the BC Building Code for the geographic location of installation.

7.8.13.2 Performance Criteria

7.8.13.2(1) The following equipment will be designed, certified and installed in accordance with the International Building Code (IBC) chapters 16 and 17 and tested in accordance with the shake table testing standard ICC-ES AC-156:

7.8.13.2(1)(a) diesel generators;

7.8.13.2(1)(b) automatic transfer switches;

7.8.13.2(1)(c) UPS systems;

7.8.13.2(1)(d) Switchgear

7.8.13.2(1)(e) Distribution panels, 600V and 208V;

7.8.13.2(1)(f) 12.47kV-600V step-down transformers; and

7.8.13.2(1)(g) distribution transformers 112.5kVA and larger.

7.8.13.2(2) Provide seismic support for all electrical equipment and components of electrical systems that have the potential to cause injury or damage during or following a seismic event.

7.8.13.2(3) Use seismic restraint systems that are designed by a professional engineer, registered in British Columbia, or, where an identified pre-

designed standard restraint device or system exists for a particular item, that equipment may be used provided that written confirmation of its acceptability for the installation is provided by a professional engineer registered in British Columbia. Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification of the main electrical distribution equipment for "seismic withstand capability" and, to maintain the certification, anchor such equipment according to the manufacturer's instructions.

7.8.14 Lighting

7.8.14.1 Basic Requirements

7.8.14.1(1) Lighting systems will accommodate the needs of hospital staff, maintenance staff Patients and visitors, and will support the visual tasks being performed and the desired appearance of the space. The lighting installed will meet the requirements of the Appendix 1A [Clinical Specifications].

7.8.14.1(2) Provide complete lighting solutions which align with the requirements and recommendations of IESNA RP-29-06. Illuminance levels and design criteria will be consistent with IESNA RP-29-06 tables 3A and 3B or CSA Z317.5-98 whichever is higher.

7.8.14.1(3) Lighting design in Communications Rooms (eg: CCH, EF, TRs), and multimedia rooms to also comply with requirements in Division 27.

7.8.14.1(4) Provide luminaires which are easily maintainable and accessible. In patient areas utilize luminaires that include the ability to replace ballast / drivers and lamps / LED's from below without a need to break the ceiling seam around the fixture or provide remote drivers on the wall in a secure, locked recessed cabinet. Drivers mounted on top of the luminaire may be used in non-patient areas where T-bar ceilings allow access to the drivers.

7.8.14.1(5) Provide luminaires that require minimal cleaning and permit practical and easy access and disassembly by authorized staff. In locations where it is necessary (for example high atrium) to locate luminaires in locations not routinely accessible without fall restraint / staging, utilize long life LED luminaires.

7.8.14.1(6) All luminaires will be free of light leaks. Luminaires in secure and common Patient areas will be of form to provide a friendly, inviting,

welcoming, non-institutional ambiance feel while providing vandal and ligature resistant performance.

7.8.14.1(7) Provide appropriate luminaires to support the Authority's infection control policies and procedures including minimising accumulation of dust and debris. Locate luminaires such that they can be easily cleaned. In Patient areas, including spaces with a SRC of C, D, E, F or G, do not provide wall mounted lighting that would create a dust shelf above. In critical patient care areas provide NSF-2 listed luminaires.

7.8.14.1(8) Selection and location of all luminaires will be closely coordinated with the video surveillance system to avoid "wash-out" of video surveillance video images and to ensure proper illumination levels are maintained to permit video capture from the video surveillance system.

7.8.14.1(9) As architectural features, design lighting in main lobbies, waiting areas and the main entrance with high quality products aesthetically pleasing to the public and staff.

7.8.14.2 Performance Criteria

7.8.14.2(1) Specify luminaire construction based on the SRC of the areas, as defined in Appendix 1A [Clinical Specifications], into which the luminaires are being installed:

7.8.14.2(1)(a) SRC-E, SRC-F, SRC-G, and SRC-J - High abuse security grade including ligature resistant, tamper-proof, vandal resistant.

7.8.14.2(1)(b) SRC-B, SRC-C, and SRC-H – Specification grade.

7.8.14.2(1)(c) SRC-A and SRC-D – Vandal resistant. Luminaires in public lobby and large "multi-purpose room ceiling mounted a minimum of 3600mm A.F.F. may be specification grade.

7.8.14.2(2) Luminaires in Patient areas mounted 3000 A.F.F. or lower to be vandal resistant and tamperproof with lenses securely fixed in the frame and covers firmly secured with tamper-resistant screws. As per 2.8.1.13 and 2.8.8 a sample of each luminaire to be provided to the Authority for review.

7.8.14.2(3) Use LED lighting technology for all project luminaires, where applicable. Where LED is not available, utilize high efficiency fluorescent lighting for interior illumination. Use high efficiency electronic fluorescent linear T8

and T5 lamps when LED is not available. Do not use incandescent or compact fluorescent lighting unless otherwise indicated in this Schedule.

7.8.14.2(4) Utilize premium grade quality luminaires with emphasis on energy efficiency (69 lumens/watt minimum) and high colour rendition (85 colour rendering index minimum for fluorescent fixtures). In Patient areas provide luminaires with an R9 value above 50, except for exam lights for which the R9 value will be above 80. Where achieving the energy efficiency specified in this Section is not feasible due to functional constraints imposed by the task being performed by the luminaire, the luminaire will be exempt from the energy efficiency requirement. Examples of luminaires that are exempt from the energy efficiency requirement include:

7.8.14.2(4)(a) Medical procedure luminaires;

7.8.14.2(5) Lamps will have a colour temperature of 3000K unless indicated otherwise for functions of certain areas.

7.8.14.2(6) Master-slave wiring of multiple luminaires from a single driver or ballast is not permitted.

7.8.14.2(7) No area will have luminaires circuited from one power source only. Circuit the luminaires in all interior and exterior areas from both normal and emergency power so that if one power source is not available emergency light levels are met.

7.8.14.2(8) Do not use exterior low pressure sodium, high pressure sodium, and mercury vapor lamps. Do not use incandescent lamps except for exterior HID (high intensity discharge) applications with quartz restrike lamps,

7.8.14.2(9) HID sources are not permitted for interior applications.

7.8.14.2(10) When use of fluorescent luminaires is necessary, utilize program start electronic ballasts wired in parallel for fluorescent lamps with a THD of 10% and no more than 8% for third harmonic. Power factor will be .98 or greater and efficiency will be 90% or higher. Ballasts will be supplied by an established vendor with minimum 10 years history of serving the healthcare sector in North America, and manufactured in a Facility certified to ISO9002.

7.8.14.2(11) LED drivers to meet the following requirements:

7.8.14.2(11)(a) Operable from 50/60 Hz input source of 120V through 277V or 347V through 480V with sustained variations of ± 10% (voltage) with no damage to the driver.

7.8.14.2(11)(b) Input power factor greater than 0.90 from 20% to 100% rated load.

7.8.14.2(11)(c) Input current Total Harmonic Distortion (THD) less than 20% from 20% to 100% rated load.

7.8.14.2(11)(d) Comply with NEMA 410 for in-rush current limits.

7.8.14.2(11)(e) Output current regulated to ± 5% across published load range.

7.8.14.2(11)(f) Output ripple current at maximum output:

(f).1 less than 15% measured peak-average/average,

(f).2 less than 5% low frequency content (< 120 Hz.).

7.8.14.2(11)(g) Integral means of limiting surges to the LED's, based on IEEE/ANSI C62.41.2 surge characteristics:

(g).1 for interior applications: common mode and differential mode surge protection of 2.5kV (100kHz, 30 Ohm ring wave),

(g).2 for exterior applications: common mode and differential mode surge protection of 3kV (1.2/50µs, 2 Ohm combination wave).

7.8.14.2(11)(h) Able to tolerate sustained open circuit and short circuit output conditions without failure, without need for external fuses or trip devices. Auto resetting.

7.8.14.2(11)(i) No visible flicker when tested with flicker wheel.

7.8.14.2(11)(j) For dimming systems: no visible flicker, when tested with flicker wheel, across the full dimming range.

7.8.14.2(11)(k) Minimum operating temperature:

(k).1 -20˚C (-4˚F) for interior applications,

(k).2 -40˚C (-40˚F) for exterior applications.

7.8.14.2(11)(l) Metallic enclosure for optimal thermal performance.

7.8.14.2(11)(m) Integral thermal foldback to reduce driver power if case temperature exceeds rated maximum temperature.

7.8.14.2(11)(n) Compatible with the dimming system.

7.8.14.2(11)(o) Class A sound rating.

7.8.14.2(11)(p) Rated for UL Damp and Dry locations.

7.8.14.2(11)(q) For downlights: compact enclosure with integral studs allowing the driver to be mounted on the outside of the luminaire or on a junction box, without the need of an additional enclosure.

7.8.14.2(11)(r) For linear luminaires: slim profile with height ≤ 25 mm (1 inch) and width ≤ 30 mm (1.2 inch).

7.8.14.2(11)(s) Integral colour-coded connectors.

7.8.14.2(11)(t) Free of any Polychlorinated Biphenyls (PCBs).

7.8.14.2(11)(u) Labelled compliant with the latest edition of the following standards:

(u).1 CSA-C22.2 No. 223, Power Supplies with Extra-Low Voltage Class 2 Outputs,

(u).2 CSA C22.2 No 250-13, Light Emitting Diode (LED) Equipment for use in Lighting Applications.

7.8.14.2(11)(v) Comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, for Non-Consumer equipment.

7.8.14.2(11)(w) RoHS compliant.

7.8.14.2(11)(x) Warranty: 5 years

7.8.14.2(12) Light Emitting Diodes to meet the following requirements:

7.8.14.2(12)(a) Not used.

7.8.14.2(12)(b) Correlated Colour Temperature tolerances to remain within a 3-step MacAdam ellipse and to maintain a CRI of ≥80. In Patient areas provide luminaires with CRI≥85 in accordance with CSA Z8000 and an R9 > 50. For exam lights provide luminaires with R9>80.

7.8.14.2(12)(c) Comply with IESNA LM-79 testing procedures.

7.8.14.2(12)(d) Maximum temperature at the base of the “LED cap” mounted to the substrate to be controlled to ensure full lamp life.

7.8.14.2(12)(e) Minimum lumen maintenance of L_{70} @ 50,000 hours. Comply with IESNA LM-80 and LM-21 testing procedures.

7.8.14.2(12)(f) LED’s of the same type to be from the same manufacturing batch.

7.8.14.2(12)(g) Capable of continuous dimming, flicker and noise free, from 10-100% lumen output.

7.8.14.2(12)(h) Provide certified test results for each type of LED used on the project.

7.8.14.2(12)(i) Warranty: 5 years

7.8.14.2(13) Provide standalone battery-operated emergency LED lighting in the security room, CACF, Energy Centre Control Room, Generator Rooms, Electrical Substations, Switchgear Rooms, and the CCH.

7.8.14.2(14) Utilize low glare recessed luminaires, direct/indirect or architectural troffers, specifically designed to eliminate direct glare in treatment rooms, offices, reception areas, Care Team Bases and areas where computer terminals or similar screens are used.

7.8.14.2(15) Design lighting in corridors to limit glare to Patients being transported on stretcher (e.g. direct slot lighting along the sides of corridor, wall washing, or indirect lighting).

7.8.14.2(16) Place a luminaire outside all corridor accessible single occupant Patient Washrooms, controlled by a washroom ceiling mounted occupancy sensor (an inherent 30 second “time off” period is acceptable), to alert staff that the washroom is occupied – connect to Vital power.

7.8.14.2(17) Provide a LED observation light above the patient bed in each Patient Bedroom to enable Clinical staff to monitor Patients during the night without entering the Patient Bedroom. The observation light will be manually controlled by Clinical staff from the corridor. The observation light function will provide sufficient illumination for viewing Patient activities while not disturbing their circadian sleep cycle. Light colour to be red. Observation light may be integrated into the overhead reading light or provided as a separate luminaire.

7.8.14.2(18) Provide separate lighting control for each of the following areas within each Patient bedroom:

7.8.14.2(18)(a) Entry (locate control at entry);

7.8.14.2(18)(b) Patient Reading Light (locate control at bed head side);

7.8.14.2(18)(c) Patient Area (locate lighting control at bed head side);

7.8.14.2(18)(d) Desk Area (locate control at desk area); and

7.8.14.2(18)(e) Observation light (locate light switch in corridor adjacent to Patient Bedroom door).

7.8.14.2(18)(f) Position switches above the bed to allow Patient to access light switches.

7.8.14.2(19) Provide an amber LED night light at 450 mm above floor along the walkway between the Patient bed and washroom to prevent tripping hazards. Night light to direct light to the floor (ex. Louver) and located to not disturb Patient sleep. Provide switch at Patient bed head.

7.8.14.2(20) Provide an amber LED night light at 450 mm above floor within the Ensuite. Night light in Ensuite does not need to be controlled by switch but shall be controlled by photocell such that when lights are turned on in Ensuite the night light turns off.

7.8.14.2(21) Design lighting in technology conference rooms and video conferencing facilities to maximize viewing of monitors and screens and provide suitable illumination of people being viewed (i.e. vertical illumination).

7.8.14.2(22) Provide video specific dedicated lighting for video conferencing to facilitate visual quality of video transmission in accordance with IESNA Design Guideline DG-17.

7.8.14.2(23) Provide task lighting with illumination levels as required by CSA Z317.5. Provide dedicated task lighting designed for the types of functions conducted in rooms and areas where specialized analytical or diagnostic work is carried out. Provide task lighting to illuminate room counter and work areas in exam rooms, medication rooms, offices and Care Team Bases. Provide task lighting in food preparation area counters including in the Life Skills Assessment Room.

7.8.14.2(24) All exterior lighting to be LED. Outdoor spaces will have luminaires to assure full cut off photometric to prevent light leakage into the building while eliminating shadows. All outdoor spaces within the property to

have a minimum average general illumination of 10 lux. All entrances to be lit above 10 lux for wayfinding. City of New Westminster streets to be lit as per City requirements.

7.8.14.2(25) Provide low level lighting, bollards, wall mounted and post top lighting where needed to provide safe, well-lit walkways, parking areas and roads.

7.8.14.2(26) All exterior lighting will have a colour temperature as indicated in Section 5.3.1.1(6).

7.8.14.2(27) Utilize vandal resistant and dark sky compliant exterior luminaires. Comply with LEED requirements for light trespass and light pollution.

7.8.14.2(28) Utilize high-abuse decorative fixtures for Patient accessible exterior roof areas. Select and locate fixtures to provide uniform illumination levels on all surface areas avoiding shadows.

7.8.14.2(29) Provide LED green pictogram exit signs powered by the Vital power system. Utilize edge lit type exit signs in the public lobby and large multi-purpose room. Utilize vandal resistant high abuse exit signs where required in patient areas with a Safety and Risk Category classification of SRC-E, SRC-F, SRC-G, and SRC-J.

7.8.14.2(30) Provide built in LED valance lighting as required for task orientated and staff areas such as: medication room, ante room, nourishment area, lounge, dictation, and nurse station. All upper cabinets above a workstation, work surface, sink or countertop will be provided with valance lighting underneath.

7.8.14.2(31) Install exam lights, providing 750 lux task lighting levels, to meet the requirements of the Appendix 1A [Clinical Specifications], including in the following locations:

7.8.14.2(31)(a) Exam/Treatment Rooms

7.8.14.2(31)(b) ECT Treatment Rooms

7.8.14.2(31)(c) ECT Recovery Rooms

7.8.14.2(31)(d) TMS Room

7.8.14.2(31)(e) Clinical Exam/Observation Rooms

7.8.14.2(31)(f) Consult/Exam Rooms

7.8.14.2(31)(g) Exam/Procedure Rooms

7.8.14.2(31)(h) Testing Rooms

7.8.15 Lighting Control System

7.8.15.1 Basic Requirements:

7.8.15.1(1) Provide a networked digital addressable lighting control system throughout the facility for lighting control.

7.8.15.1(2) Lighting control system t will provide flexibility to adjust lighting to suit functions and activities and permit simple, integrated control of lighting. Controls will be easily operated and located in each area to suit the function of the space. Each room and area will have separate lighting control.

7.8.15.1(3) Lighting controls will comprise a significant part of the energy management of the Facility reducing energy consumption as well as permitting simple and integrated control of lighting both locally and remotely;

7.8.15.1(4) Lighting controls are to meet or exceed ASHRAE 90.1 requirements.

7.8.15.1(5) Utilize a combination of natural light, luminaires, and daylight harvesting controls to maximize energy savings.

7.8.15.1(6) Provide daylight sensors and luminaires to maximize daylight use throughout the Facility. Install and design in accordance with general manufacturers recommendations. Optimize daylight sensor response and control operation during commissioning.

7.8.15.1(7) Connect the lighting control system to the BMS and allow for FMO staff to override programmed settings, occupancy sensor, daylight sensor, or manual control events;

7.8.15.1(8) Protect lighting controls from unauthorized operation when required to be located in areas accessible to the public.

7.8.15.1(9) In open areas and common areas, zone and subdivide lighting to permit energy management and appropriate control and variation of light levels.

7.8.15.1(10) Consult with the Authority when programming the lighting operation (controllability, zones, and timing) of the Facility.

7.8.15.2 Performance requirements:

7.8.15.2(1) Lighting control system:

7.8.15.2(1)(a) Will be extra-low voltage type

7.8.15.2(1)(b) Will be networked to each luminaire and control device (eg., wall switches, occupancy sensors, photo sensors, etc.)

7.8.15.2(1)(c) Will have an individual address for each luminaire and control device

7.8.15.2(1)(d) Will have local on/off control and dimming capability of the lighting in each room or space

7.8.15.2(1)(e) Will allow Owner-programmable control of a single luminaire, or a group of luminaires, from any single control device or multiple control devices in the facility.

7.8.15.2(1)(f) Will allow on/off control and adjustable light levels of luminaires, individually or as programmable groups, from a central location in the Facility.

7.8.15.2(1)(g) Will have an interactive, web-based graphical user interface (GUI) showing floor plans and lighting layouts which will:

(g).1 allow programming, including assignment of luminaires into groups for control

(g).2 allow programmable setting of maximum light level of each luminaire

(g).3 indicate status of each luminaire and control device

(g).4 provide lighting energy and demand reporting for each luminaire and zone

7.8.15.2(1)(h) will allow Daylight Harvesting and Time Clock Scheduling

7.8.15.2(1)(i) will have a BACnet/IP interface with the Building Management System for bi-directional communication and, in response to inputs from the BMS, be able to:

(i).1 load-shed groups of luminaires

(i).2 initiate ‘emergency mode’ which adjusts luminaires to full light output

7.8.15.2(2) Ensure that the Facility, including all buildings and on-site lighted areas, will have a lighting control system divided into buildings and logical

zones and be subdivided to permit energy management and allow staff control of light levels for all interior and exterior lighting;

7.8.15.2(3) Lighting systems will maximize the use of daylight and lighting control devices to maintain lighting levels and use the least amount of energy to provide the required illumination and in conformance with ASHRAE 90.1 energy use requirements.

7.8.15.2(4) Provide all required communications units between the BMS control interface and the lighting controllers;

7.8.15.2(5) Provide ability for all lighting program scheduling to be done through the BMS. Identify on/off status of lighting control zones operator screen.

7.8.15.2(6) Identify on/off status of lighting control zones operator screen;

7.8.15.2(7) Provide override at Care Team Base for all associated Patient accessible exterior lighting zones and interior lighting zones;

7.8.15.2(8) Provide local controls for each Patient wing at the associated staff workstation and security control areas. The master controls will be divided into logical zones to allow staff the flexibility to control lighting levels within the Patient areas, including two illumination levels at outdoor spaces;

7.8.15.2(9) Provide time program control of Patient care unit lighting to provide automatic night time shut-off. Provide manual override control in the Care Team Bases;

7.8.15.2(10) Utilize the lighting control system with time scheduled programming for corridor lighting levels. Light levels in corridors to maintain minimum 50 lux measured on the floors at all times, including night time scheduled reduced level. Provide local dimming control for Patient corridors from Care Team Bases and reception desks as applicable. Provide occupancy sensors in corridors to increase lighting levels when Patient presence is detected at night time to alert staff to activity in the corridor.

7.8.15.2(11) Design all lighting in public and administration areas to be capable of being switched from a central location.

7.8.15.2(12) All rooms will have local switching, unless specified otherwise within this Section;

7.8.15.2(13) Except for security and exit lighting, circuit breakers will not be used to switch lighting circuits;

7.8.15.2(14) Provide door switch lighting control for enclosed closet lighting.

7.8.15.2(15) Provide occupancy sensor lighting control for luminaires in open alcoves that are separate from the primary corridor lighting.

7.8.15.2(16) Provide dimmable 100% -10% lighting in rooms that require adjustable illumination levels.

7.8.15.2(17) Provide a programmable scene lighting controller in rooms requiring simple control of multiple functional lighting zones.

7.8.15.2(18) In Patient waiting areas reduce lighting levels by 50% within 20 minutes of all occupants leaving the space.

7.8.15.2(19) All open areas will be provided with independent switching controls with a minimum of one switch per 90m2;

7.8.15.2(20) Meeting rooms 16.7m2 in size or greater will have separately switched dimmable low-level presentation luminance;

7.8.15.2(21) With the exception of the Secure Room, all Patient Bedroom luminaires will be controlled from local heavy duty momentary contact switches within the room;

7.8.15.2(22) Secure room luminaires will be controlled by the applicable staff from within the ante room using switches located adjacent to the latch side of the door into the seclusion room.

7.8.15.2(23) Provide un-switched 24hr lighting within all stairwells and emergency exit corridors. Luminaires shall have bi-level switching with occupancy sensor control to maximize energy savings. In the event of emergency power or sensor failure, lights shall default to 100% on.

7.8.15.2(24) All exterior luminaires will be switched from the building lighting control system via BMS programmed astronomical time signals or photocell inputs to produce four channels of control as follows:

7.8.15.2(24)(a) Channel 1 - Dusk to Dawn;

7.8.15.2(24)(b) Channel 2 - Dusk to Preset;

7.8.15.2(24)(c) Channel 3 - Preset to Preset; and

7.8.15.2(24)(d) Channel 4 - Preset to Dawn;

7.8.15.2(25) The exterior lighting system will be divided into logical zones. Include the following zones as the minimum:

7.8.15.2(25)(a) Road Lighting (per roadway);

7.8.15.2(25)(b) Admitting and Discharge Vehicular Controlled vestibule;

7.8.15.2(25)(c) Outdoor spaces Night Illumination and Enhanced Security Illumination (separate);

7.8.15.2(25)(d) Pathway/Walkway lighting;

7.8.15.2(25)(e) Building entrance, including exterior stairs and ramps; and

7.8.15.2(25)(f) "ALL ON" single point control

7.8.15.2(26) Lighting control will provide flexibility required to adjust lighting to minimal levels during predetermined night time hours to achieve Energy savings while maintaining required uniformity to provide and support video surveillance system functionality.

7.8.15.2(27) Integrate controls in technology conference rooms, videoconference rooms and meeting rooms with equipment controls and control stations in the room so as to permit the conference manager to vary the lighting as required for different activities. Provide dimming lighting control. Detailed requirements for lighting and controls in Multimedia rooms are further described in section 7.9 Communications (Division 27).

7.8.15.2(28) Provide manually operated lighting controls, which will be completely cleaned and disinfected without requiring any disassembly, and which will not deteriorate or be otherwise adversely affected by frequent cleaning and disinfection.

7.8.15.2(29) Install specifically rated lighting controls for the application/condition in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration.

7.8.15.2(30) Provide control of parking garage lighting in accordance with ASHRAE 90.1-2013. Parking garage lighting control to meet include:

7.8.15.2(30)(a) Automatically reduce the lighting output of each luminaire by a minimum of 30% when there is no activity detected within a lighting zone for 20 minutes. Lighting zones are to be maximum 334m^2. Provide occupancy sensors zoned such that lights are turned fully on ahead of traffic and people. Do not provide each fixture with individual occupancy sensor control. Lighting in parking garage to only be reduced at each fixture; do not shut lighting off.

7.8.15.2(30)(b) Lighting for covered vehicle entrances and exits with no parking to be separately controlled to automatically reduce the lighting output of each luminaire by at least 50% from sunset to sunrise.

7.8.15.2(30)(c) The power to each luminaire within 1.9m^2 of any perimeter wall structure that has a net opening-to-wall ratio of at least 40% and no exterior obstructions within 1.9m^2 are to be automatically reduced in response to daylight.

7.8.15.2(30)(d) All parking garage lighting to return to full lighting level output upon activation of any panic alarm station within the parking garage, upon activation of 2nd stage fire alarm or while a loss of power is experienced by one of the power sources.

7.8.15.2(31) Provide scheduled shutoff for the outpatient area. Provide adjustable programming through the BMS initially configured for one hour before daily scheduled clinic opening and one hour after clinic closing. Provide manual override control, limited to 2 hours per activation during scheduled shut-off time. Lighting is not required to be on scheduled shutoff in spaces where Patient care is rendered or lighting in spaces where automatic shutoff would endanger the safety or security of the room or building occupants.

7.8.15.2(32) Provide lighting control devices in each space as per the following table:

	Lighting Control Devices to be used in each space type.							
RCH Room	Local Light Switching	Scene Controller	Dimming	Local Multiple switch leg lighting level control	Occupancy Sensor	Vacancy Sensor	Daylight Sensor (*)	Time of Day Scheduling
Allied Health	●		●			●	●	
Large Multipurpose Room	●		●		●		●	●
Care Team Base	●		●					●
Café	●			●			●	●
Clean Supply					●			
Comfort	●		●			●	●	
Consultation/Therapy room	●		●					●
Communications Rooms	●				●			
Corridors - patient	at CTB						●	●
Corridors	●				●		●	

Dining Room/Lounge		●	●		●		●	●
ECT Treatment	●		●					
ECT Suite Acute Recovery	●		●				●	
ECT Suite Waiting	●		●		●			●
Exam / Treatment	●		●				●	●
Exercise / Wellness	●		●			●	●	
Group Therapy	●		●			●	●	
Intake Room	●		●			●	●	
Kitchenette	●		●				●	●
Laundry Facility	●			●		●	●	
Life Skills Assessment	●		●			●	●	
Lobby (Main, Elevator)							●	
Lobby (Large Multipurpose Room)	●					●	●	
Lounges	●		●			●	●	
Medication Room	●					●		
Services Spaces (Mech/Elec/Telecom)	●							
Inpatient areas	●		●				●	
Patient Bedroom Bariatric Contact Isolation Room	●		●				●	
Patient Bedroom Bariatric Contact Isolation Room Ante Room	●				●			
Multi-purpose / Meeting / Conference	●		●			●	●	
Workstations (Clinical)	●			●		●		
Learner's Workstations	●			●		●		
Office enclosed and ≤23.2m2	●		●			●		
Parking				●	●		●	
Projection and Control Room	●							
Reception / Registration	●		●			●		
Secure Room	●		●				●	
Secure Room –Ante Room	●				●			
Security Office	●		●			●		
Soiled Utility					●			
Staff Lounge	●		●			●	●	
Staff Lockers	●			●		●		
Tub Room	●			●				●
Video Conference	●		●			●	●	
Video Conference Operator	●		●			●	●	
Waiting / Reception / Registration	●		●		●		●	●
Staff Washroom and Patient Washroom	●				●			

Ensuite	•							

Note: (*) Daylight sensor only required if room receives sufficient natural light.

7.8.15.3 Daylight Harvesting

7.8.15.3(1) Basic Requirements

7.8.15.3(1)(a) Maximize the use of daylight to maintain lighting levels while reducing Energy consumption with a combination of natural light, luminaires and controls.

7.8.15.3(2) Performance Requirements:

7.8.15.3(2)(a) Provide local photocell sensors to optimize energy use and provide a stable illumination level utilizing natural and artificial light; and

7.8.15.3(2)(b) Provide continuous day light harvesting controls utilizing dimmable light fixtures in rooms that receive natural light, including the spaces listed in 7.8.13.2(32).

7.8.15.3(2)(c) Where day lighting control is installed in Patient accessible areas provide for manual and time/mode controlled switches disabling the day lighting control.

7.8.15.3(2)(d) Where day lighting control is installed in corridors and common spaces open to the corridor the controls are to be configured such that luminaires revert to 100% output while a loss of power is experienced by one of the power sources serving corridor lighting.

7.8.15.4 Occupancy Sensors

7.8.15.4(1) Basic Requirements

7.8.15.4(1)(a) Use dual technology (passive infrared and ultrasonic) occupancy sensors (auto-on/auto-off) to automatically turn off lighting in areas that are unoccupied to reduce Energy consumption. Vacancy sensor (manual-on/auto-off) functionality will be a programming option and is preferred for energy efficiency.

7.8.15.4(2) Performance requirements

7.8.15.4(2)(a) Occupancy sensors will be capable of detecting presence, in the floor area to be controlled

7.8.15.4(2)(b) Provide zoned occupancy sensors in Patient Corridors in Units and Dining Room/Lounge. The occupancy sensors will be vandal-proof ceiling mounted or fixture-integrated. The occupancy sensors will be enabled and disabled by low voltage controls switch located in the Care Team Base. The zoned occupancy sensors will switch on or brighten lights in the related zone when they are dimmed.

7.8.15.4(2)(c) Provide dual technology occupancy sensors in the spaces listed in 7.8.13.2(32).

7.8.15.4(2)(d) In Clean Supply and Soiled Utility rooms and provide occupancy sensor instead of a vacancy sensor with manual on. Lighting required to be automatically on for staff safety requirement of awareness that Patient in the room.

7.8.16 Mechanical Equipment Connections

7.8.16.1 Basic Requirements

7.8.16.1(1) Provide electrical power control and monitoring connections to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe, reliable and serviceable mechanical equipment and systems.

7.8.16.2 Performance Criteria

7.8.16.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment so as to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.8.16.2(2) Where Variable Frequency Drives are utilized on 600V equipment they should be suitable for application on a 600V high resistance grounded system.

7.8.16.2(3) Design connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration to accommodate the vibration.

7.8.16.2(4) Design connections to mechanical equipment to easily permit removal and replacement of the equipment.

7.8.16.2(5) Size motor control centres, main feeders to motor control centres, and mechanical distribution centres to accommodate the current mechanical equipment with an additional 50% spare capacity.

7.8.16.2(6) Utilize motor control centres when four 3-phase motors that require a starter are located within 50 m of each other.

7.8.17 Clock System

7.8.17.1 Basic Requirements

7.8.17.1(1) Provide a synchronized wireless clock system to assure accurate consistent time is available at key control and clinical spaces in the Facility. Connect to the Authority's network time server for synchronization of all clocks throughout the Campus.

7.8.17.1(2) The system will provide automatic correction for daylight savings time and self-correct if power fails.

7.8.17.1(3) Supply master time controllers and all clocks by a recognized industry leader with all components by the same manufacturer.

7.8.17.2 Performance Criteria

7.8.17.2(1) Provide 120V powered synchronized clocks that receive correction signals from the master clock. Clock to have polycarbonate lens.

7.8.17.2(2) Provide a deep recessed receptacle to accommodate the clock power connection. Cord length to be suitable for this application. Provide 15A, 120V Vital circuit complete with handle-locking device on the circuit breaker to all clock locations. Circuit to be dedicated to clocks.

7.8.17.2(3) The finish and appearance of the clocks are to complement the architectural finishes and be flush mount type within rooms.

7.8.17.2(4) All clocks located in Patient accessible areas to have a clear high impact polycarbonate guard complete with tamperproof fastenings and centre pin rejection screws.

7.8.17.2(5) Locate analogue clocks in rooms and areas to meet the clinical functions, including:

7.8.17.2(5)(a) Lobbies (main, elevator, and Large Multipurpose Room);

7.8.17.2(5)(b) Conference rooms, Multi-purpose rooms, meeting rooms, Staff Lounges, family rooms, reception desks, staff workstation rooms;

7.8.17.2(5)(c) Care Team Base, Treatment Rooms, Consultation/Therapy room, Patient Therapy Rooms, Medication Rooms, waiting areas, Life Skills Assessment;

7.8.17.2(5)(d) Staff Locker Rooms;

7.8.17.2(5)(e) Large Multipurpose Room; and

7.8.17.2(5)(f) Dining Room/Lounge.

7.8.17.2(6) Provide clocks that indicate AM/PM and date for areas where it is not obvious if it is day or night, including:

7.8.17.2(6)(a) Older Adult Psychiatric Unit and Ante rooms.

7.8.17.2(7) Provide local satellite transmitter such that the system is capable of providing sufficient coverage throughout the entire facility.

7.8.17.2(8) Install main transmitter and satellite transmitters located for correct system operation. Connect equipment to UPS power, complete with handle lock on device on the circuit breaker.

7.8.18 Ancillary Electrical Works in HCC and CT

7.8.18.1 HCC

7.8.18.1(1) Provide an 800A feeder from the new Vital ATS and connect to the existing main breaker of the vital bus of the HCC main 600V switchboard.

7.8.18.1(2) Provide an 800A feeder from the new Delayed-Vital ATS and connect to the existing main breaker of the Delayed-Vital bus of the HCC main 600V switchboard.

7.8.18.1(3) Provide an 800A feeder from a 1600A frame power circuit breaker at bus ‘B’ of the new main 600V switchgear and connect to the existing main breaker of the conditional bus of the HCC main 600V switchboard.

7.8.18.1(4) Provide an 800A feeder from a 1600A frame power circuit breaker at bus ‘B’ of the new main 600V switchgear and connect to the existing main breaker of existing panel P1H6D (the breaker currently fed from 750kVA

Transformer #3). Disconnect and remove Transformer #3 including existing cabling.

7.8.18.1(5) Provide new 600V distribution to new mechanical equipment being provided in the HCC to phase out mechanical equipment in the existing Energy Centre. Coordinate with mechanical and provide the electrical services required for completion of the steam to hot water conversion scope.

7.8.18.1(6) Include the existing HCC main 600V switchboard in Engineering studies for voltage drop, short-circuit, protective device coordination and arc-flash.

7.8.18.1(7) Transitioning power supplies at all aforementioned existing equipment is required in the least disruptive way to the Existing Hospital's operations. The transitioning procedure will be multi-phased, performed during premium overtime hours in a sequence that minimizes the time and extent of loads affected by the interruptions, and shall be coordinated with and approved by the Hospital well in advance.

7.8.18.1(8) Miscellaneous modification of existing building lighting, power and systems as required to achieve the scope of work described in the RFP.

7.8.18.1(9) Existing 600V Vital, Delayed Vital and Conditional electrical feeds and existing 12.47kV power feed to Transformer #3 to be disconnected, removed, and made safe back to source in existing Power Plant.

7.8.18.2 CT

7.8.18.2(1) Provide an 800A feeder from the load terminals of the new Vital ATS and connect to the existing main breaker of the vital bus of the CT main 600V switchboard.

7.8.18.2(2) Provide an 800A feeder from the load terminals of the new Delayed-Vital ATS and connect to the existing main breaker of the Delayed-Vital bus of the CT main 600V switchboard.

7.8.18.2(3) Provide an 800A feeder from a 1600A frame power circuit breaker at bus ‘B’ of the new main 600V switchgear and connect to the existing main breaker of the conditional bus of the CT main 600V switchboard.

7.8.18.2(4) Coordinate with mechanical and provide the electrical services required for completion of the steam to hot water conversion scope.

7.8.18.2(5) Include the existing CT main 600V switchboard in Engineering studies for voltage drop, short-circuit, protective device coordination and arc-flash.

7.8.18.2(6) Transitioning power supplies at all aforementioned existing equipment is required in the least disruptive way to the Existing Hospital's operations. The transitioning procedure will be multi-phased, performed during premium overtime hours in a sequence that minimizes the time and extent of loads affected by the interruptions, and shall be coordinated with and approved by the Hospital well in advance.

7.8.18.2(7) Miscellaneous modification of existing building lighting, power and systems as required to achieve the scope of work described in the RFP.

7.8.18.2(8) Existing 600V Vital, Delayed Vital and Conditional electrical feeds to be disconnected, removed, and made safe back to source in existing Power Plant.

7.9 Communications (Division 27)

7.9.1 Design and Implementation Principles and Guidelines

7.9.1.1 The Authority is committed to delivering a safe, secure, therapeutic and welcoming environment to meet the needs of its Patients, families, community and providers.

7.9.1.2 Information Technology (IT) and communications infrastructure as defined in this section of the document is a key enabler and essential service in the delivery of Patient care and general facility operations.

7.9.1.3 The Facility’s IT and communications infrastructure will be designed and implemented in a manner consistent and appropriate for an Advanced Digital Hospital-where innovative technology is seamlessly integrated with modern rehabilitative models of care to drive efficiencies in service delivery.

7.9.1.4 The Authority will provide leadership and direction as it relates to the design and implementation of all IT and communications infrastructure defined within this section of the document.

7.9.1.5 The Design-Builder will consult with the Authority and meet all of the Authority’s policies and standards for all connections to the Authority’s data, voice, audio, video and wireless networks.

7.9.1.6 The Construction Period responsibilities of the Authority and The Design-Builder Division 27 are outlined in Appendix 1I(I) [IMIT Roles and Responsibility Matrix].

7.9.1.7 All design and installation work must be reviewed and agreed to by the Authority.

7.9.1.8 The Authority will be consulted in the areas where building design and construction impacts any aspect of the IT and communication infrastructure defined within this section of the document.

7.9.1.9 The Design-Builder will provide all necessary project management, qualified technical expertise, infrastructure design, installation coordination, labour, materials, equipment, services and other items required to fulfill its scope of work as defined in this section. The Design-Builder's technical team will be available to the Authority throughout the design and construction phases of the project.

7.9.1.10 The Design-Builder will design, engineer, supply, install, test and document all IT and communications infrastructure defined in this section in a manner that meets or exceeds the latest industry standards (IEEE, TIA, BICSI standards) and the specific Authority standards identified in this document and Appendix 1(lll) [HSSBC Communications Infrastructure Standards and Specifications] of this document.

7.9.1.11 In the event of a conflict between applicable industry standards, Authority standards or this Schedule, the more stringent standard or requirement will apply.

7.9.1.12 These standards are not to be used by the Design-Builder as a final specification or bid document, but as a starting point in a process of collaborative design between the Authority and the Design-Builder.

7.9.1.13 The Design-Builder will establish an IMIT Coordination Committee with the Authority. The IMIT Coordination Committee will meet regularly (not less that once per month) to review all aspects of the design and deployment of the IT and communications infrastructure in the Facility as defined within this Statement of Requirements and its associated appendices.

7.9.1.14 The Design-Builder will appoint and make available to the Authority an IMIT Coordination Lead within 30 days of the Effective Date to chair the IMIT Coordination Committee. The IMIT Coordination Lead will coordinate meeting dates, establish agendas, record minutes and maintain an action register throughout all phases of the project. Furthermore, the IMIT Coordination Lead will be experienced in the deployment of Information Technology (IT) and communications infrastructure through design, construction, equipment fit out and commissioning and integration with other systems.

7.9.1.15 The Design-Builder will include sufficient lead time to develop and obtain agreement of designs and will ensure that every aspect of the deployment of the IT and communications infrastructure (including those tasks performed by the

Authority) are identified and factored into the construction schedule in an efficient, collaborative and seamless manner.

7.9.1.16 The Design-Builder will maintain and update the project schedule and inform the Authority of any schedule changes through weekly meetings or other mechanisms as deemed appropriate.

7.9.1.17 The Design-Builder will use the latest proven and reliable materials and equipment and the most current versions of any control or operating software provided by at the time of construction.

7.9.1.18 The Design-Builder will assist the Authority during the design process to define locations for Authority Supplied End-Use Equipment and ensure that adequate space, infrastructure, power, and wired network data outlets are provided for the Authority Supplied End-Use Equipment. Refer to Appendix 1l(ll) [Equipment Lists IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details. End-use equipment provided by the Authority includes but is not limited to:

7.9.1.18(1) computer, desktop and thin client;

7.9.1.18(2) computer, laptop;

7.9.1.18(3) tablet PCs;

7.9.1.18(4) printer laser, multifunction;

7.9.1.18(5) photocopiers;

7.9.1.18(6) facsimile machines, general: facsimile, multifunction;

7.9.1.18(7) VoIP and analogue phone sets:

7.9.1.18(8) healthcare card readers;

7.9.1.18(9) dictation microphones;

7.9.1.18(10) scanner, barcode;

7.9.1.18(11) printers, label;

7.9.1.18(12) flat panel televisions;

7.9.1.18(13) handheld computer devices;

7.9.1.18(14) glucometers;

7.9.1.18(15) physiological monitors;

7.9.1.18(16) automatic drug dispensing units;

7.9.1.18(17) multifunction communication devices; and

7.9.1.18(18) Virtual Care (Telehealth) clinical devices and videoconferencing equipment.

7.9.1.19 The Design-Builder will make sure the Authority is not bound to any undesired proprietary solution or technology and will ensure that the Facility's IT and communication infrastructure is not encumbered with outmoded materials, equipment, systems and processes.

7.9.1.20 The Design-Builder will not, without the Authority's prior agreement, install or use any software that resides on, accesses or otherwise interacts with the Authority's network.

7.9.1.21 All servers provided by the Design-Builder must meet Authority standards at time of purchase.

7.9.2 Performance Principles and Guidelines

7.9.2.1 The IT and communications infrastructure designed and installed by the Design-Builder will:

7.9.2.1(1) Disseminate and transfer all forms of information to the Authority, its Patients and associates as required.

7.9.2.1(2) Enable fast and reliable wired and wireless IT and communication services for all end-users, systems and applications.

7.9.2.1(3) Accommodate all transmission media types required to, data, voice, audio, video, CATV, public address, nurse call and wireless communications.

7.9.2.1(4) Have high availability and security that meets or exceeds the industry and Authority's standards for use in and support of mental health hospital applications.

7.9.2.1(5) Be easy to operate and maintain, scalable, proven and reliable, capable of supporting future expansion and enhancements and provide adaptability to changing business needs in order to ensure the Facility is one of the most modern and technologically advanced of its kind.

7.9.2.1(6) Support advancement towards an integrated, smarter Facility that continuously contributes to operational efficiencies through standardization, improved workflow and access to information;

7.9.2.1(7) Function in a safe manner and will not unduly impact Patient care and the operation of the Facility.

7.9.2.1(8) Be robust and resilient enabling the network to remain operational during and after disasters or in the event of a major network event such as a core network equipment failure or fiber cut.

7.9.2.1(9) Have the capacity to accommodate separate physical networks in accordance with Good Industry Practice, equipment vendor specifications or where operational requirements dictate.

7.9.3 Site Utilities / Access Provider

7.9.3.1 The Authority's will coordinate with its designated access providers to provide telecommunications services to the Facility. The Telecommunication Services will include:

7.9.3.1(1) cable TV;

7.9.3.1(2) internet access and data WAN services;

7.9.3.1(3) Telephone service; and

7.9.3.1(4) Distributed Antenna System (DAS).

7.9.3.2 If the Design-Builder requires telecommunication services over above what is being obtained by the Authority either in terms of additional circuits, additional capacity, different service offerings or alternate demarcation points to support the solutions it is providing in the Facility then the Design-Builder will be responsible for all associated installation costs and coordination with the Authority's designated access providers.

7.9.3.3 Access providers will bring their cabling into the Facility through the Campus Perimeter Pathway System. The Campus Perimeter Pathway System is an underground network of structures consisting of ducts and manholes that runs around the perimeter of the site and ties into the Facility and each existing building on the RCH Campus. The purpose of the Campus Perimeter Pathway System is to support an inter-building fiber ring as well as copper cabling infrastructure for the distribution of analog voice services to the RCH Campus. The Campus Perimeter Pathway System will also connect to access provider and third party structures in order to facilitate the provision of telecommunication and

Wide Area Network (WAN) services to the site. Refer to Appendix 1B(III) [Campus Perimeter Pathway System Technical Specifications] for further details.

7.9.3.4 Access providers will demarcate their cabling and install their equipment in the Entrance Facility Room. Refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for the requirements to construction and fit-out the Entrance Facility Room.

7.9.3.5 The Design-Builder's requirement to provide fiber and copper cables to extend access providers services between the Entrance Facility Room and the Campus Communication Hub (CCH) are defined in Appendix 1B(II) [Campus Communications Hub Technical Specifications].

7.9.4 Common Works

7.9.4.1 Telecommunications Grounding and Bonding Infrastructure

7.9.4.1(1) The Telecommunications Grounding Backbone system contains grounding bus bars, grounding conductors, bonding conductors, and connecting devices (including but not limited to pressure connectors, lugs, clamps, or exothermic welds). These components provide a low impedance path to ground for stray voltages or spurious signals present on telecommunications media and equipment.

7.9.4.1(2) The Design-Builder is required to provide a Telecommunication Grounding and Bonding Infrastructure that adheres to ANSI/TIA J-STD-607-B Commercial Building Grounding and Bonding Requirements for Telecommunications. Refer to Appendix 1l(lll) [HSSBC Communications Infrastructure Standards and Specifications] for minimum requirements.

7.9.4.2 Communications Pathways

7.9.4.2(1) The communications pathway system will consist of a combination of cable tray, conduit, sleeves, pull and junction boxes and miscellaneous accessories required to protect cabling and maintain cable manufacturer's recommended bend radius. Include manufactured dropouts, cable spools, radius 90-degree bends, etc.

7.9.4.2(2) The communications pathway system will support, protect and organize all low voltage communications systems wiring referenced herein,

7.9.4.2(3) including but not limited to building automation, security, CCTV, public address, paging, clock and time systems, CATV, intercoms, nurse call, clinical systems, AV and videoconferencing systems, the Authority's

voice and data wired and wireless networks and the distributed antenna system (DAS).

7.9.4.2(4) All low voltage communications system wiring will be run in conduit, and cable tray even in fully accessible ceiling areas. Non-continuous support systems such as J-hooks are not permitted. Equipment cords run above accessible ceilings for the express purpose of connecting to wireless access points or DAS antennas can be attached to cable trays or other fixtures above the ceiling using non-continuous support systems to allow flexibility for positioning.

7.9.4.2(5) The Design-Builder will coordinate:

7.9.4.2(5)(a) The communications pathway requirements of the individual low voltage systems as established by the vendors and the designers of such systems.

7.9.4.2(5)(b) The design and installation of the communications pathway system with mechanical, electrical, plumbing, and pneumatic tube systems

7.9.4.2(6) The Design-Builder will adhere to the standards and specifications identified in Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] when designing and installing the communication pathway system.

7.9.4.2(7) The Design-Builder will design and install the communications pathway system to:

7.9.4.2(7)(a) protect and organize low voltage cabling systems;

7.9.4.2(7)(b) provide ease of access;

7.9.4.2(7)(c) minimize or eliminate occupant disruption when pathways are accessed and;

7.9.4.2(7)(d) provide capacity for expansion and change.

7.9.4.2(8) The Design-Builder will ensure the communications pathway system is:

7.9.4.2(8)(a) Isolated from sources of Electromagnetic Interference (EMI) as well as high magnetic fields, radiation and high temperatures.

7.9.4.2(8)(b) Installed parallel or at right angles to building lines in order to keep cable run length at an absolute minimum.

7.9.4.2(8)(c) Installed without tight bends, burrs, sharp edges or projections.

7.9.4.2(8)(d) Installed with sweeping bends as per TIA cabling standards.

7.9.4.2(8)(e) Not accessible to Patients and the general public.

7.9.4.2(8)(f) Not routed through Electrical or Mechanical Rooms except for the express purpose of servicing these rooms.

7.9.4.2(8)(g) Not in conflict with architectural, mechanical and electrical components.

7.9.4.2(9) The Design-Builder will:

7.9.4.2(9)(a) Fire stop communication pathways and cable penetrations of any kind resulting from the installation of the cabling system using an approved fire stop systems. This applies to all types of full height walls for the purpose of either restoring the fire or acoustical rating of the wall or for infection control. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for a list of approved fire stop systems.

7.9.4.2(9)(b) Bond and ground all conduits, cable trays, racks and other infrastructure as per Section 7.9.4.1.

7.9.4.2(9)(c) Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme will be determined by the Authority at a later date. Provide all power and communication systems with unique colours in accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands (using either spray paint or coloured duct tape) at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway). Colour-code all junction boxes using spray paint on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations.

7.9.4.2(9)(d) Maintain the following clearances when installing the communications pathway system:

(d).1 1220 mm from any motor or transformer;

(d).2 150 mm from fluorescent light fixtures, or other EMI sources

(d).3 305 mm from conduit and cables used for electrical distribution less than 1kV

(d).4 1000 mm from conduit and cables used for electrical distribution greater than 1kV

(d).5 305 mm to a flue, parallel hot water, steam line or other heat producing source or 75 mm from such lines when crossing perpendicular to the runs

(d).6 Where equipment produces particularly high levels of electric or magnetic fields, provide greater clearances as required based on the source.

7.9.4.2(9)(e) Ensure that communications pathways crossing through expansion joints are built to compensate for building movement.

7.9.4.2(10) Cable Tray

7.9.4.2(10)(a) Provide cable trays, fittings, brackets and hangers for the low voltage communications systems wiring.

7.9.4.2(10)(b) Basket cable tray is to be provided in hallways and in Communications Rooms where it will be installed on the perimeter walls and extending over equipment racks. Basket tray will also be used as vertical risers to provide cable strain relief. Refer to Section 7.9.4.2(11)(a) regarding the utilization of sleeves when cable trays pass through any solid walls and floors.

7.9.4.2(10)(c) Perimeter basket tray inside Communications Rooms will be offset at about 250 mm from the wall to the near side of the tray.

7.9.4.2(10)(d) Totally enclosed cable tray will be used inside parking levels or other spaces exposed to the public.

7.9.4.2(10)(e) Refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for cable tray requirements in the Entrance Facility Room.

7.9.4.2(10)(f) In addition to the clearances noted in Section 7.9.4.2(9)(d), ensure cable trays are installed with a minimum of 150 mm above, 150 mm in front, and 75mm below of clearance from piping, conduits, ductwork, etc.

7.9.4.2(10)(g) Provide manufactured dropouts where cables exit and enter all horizontal basket cable trays. Tray manufacturer's cable dropout fittings that clips over the side of the cable tray without the need to cut into the cable tray is the product of choice. The Design-Builder shall design and install the cable tray in a manner that enables the dropout to empty directly and fully into vertical cable management channels and GigaBIX cable management modules.

7.9.4.2(10)(h) Provide miscellaneous accessories to maintain cable manufacturer's recommended bend radius and protect the cable from being damaged. Include waterfalls, cable spools, radius 90-degree bends, etc.

7.9.4.2(10)(i) Cable Tray Size:

(i).1 Depth: Cable tray minimum depth will be 100 mm.

(i).2 Width: Cable tray minimum width will be 610 mm.

(i).3 Fill Ratio: The fill ratio for cable tray is to be 50% maximum at substantial completion of the project. The remaining 50% is reserved for future growth capacity.

7.9.4.2(11) Conduit and Sleeves

7.9.4.2(11)(a) Sleeves:

(a).1 Where cable trays are required to pass through any solid walls and floors regardless of their location. Provide the Hilti CP-653-4" speed sleeves. Quantity of speed sleeves installed must be capable of accommodating the entire capacity of the cable tray.

(a).2 Use the Hilti ganging wall plate when installing 2 or more Hilti Speed sleeves.

(a).3 For riser sleeves, use a combination of Hilti CP 680 cast-in-place fire stop devices c/w CP-653-4" speed sleeves inserted into them.

7.9.4.2(11)(b) Conduits:

(b).1 Install all conduits in finished areas within finished walls and above finished ceilings except in mechanical and electrical rooms and the parking levels. Surface raceways may be installed where required and approved by the Authority.

(b).2 Conduits will be EMT or rigid steel or PVC where permissible.

(b).3 Do not encase EMT in concrete, unless such installation is permitted by code and is reviewed by the Authority as being necessary to achieve a concealed installation in finished spaces such as exposed concrete stairwells.

(b).4 Each drop conduit to a Communications outlet shall be connected to the nearest cable tray with a minimum 27 mm (1") conduit. Conduit shall be attached to the edge of the tray with a conduit bracket designed for this purpose. If this is not possible, conduit shall be stubbed within 150 mm above the tray and terminate in a bonding type bushing.

(b).5 Provide sweeping 90º bends for conduits where conduits are above cable trays and cables are running from the conduits to cable trays to create a water fall effect to reduce the strain on cables.

(b).6 Where conduit size is not specified, the conduit will be sized to not exceed a 28% fill ratio with no more than two 90º bends after all the cables are installed at the time when a new facility becomes operational. Where there are zero bends in the communications pathway, the fill ratio can be increased to 40%.

(b).7 Sections between pull points shall not exceed 30m. In conduit runs that total more than 30m, insert pull boxes so that no segment between pull points exceeds the 30m limit.

(b).8 All conduits with an internal diameter of 50 mm or less shall have sweeping bends with inside radius being no less than six (6) times the internal diameter of the conduit. For conduit 50mm or larger, the bend radius shall be no less

than ten (10) times the internal conduit diameter. Fittings such as LB type joints are not acceptable.

7.9.4.2(11)(c) When a parkade level or mechanical electrical level (in the Energy Centre) is serviced from a Telecommunications Room located on another floor level, the Design-Builder will provide for every 929m^2 of floor space a minimum of 3 x 103mm EMT conduits running from the TR to a 1.2M x 1.2M x 3M pull box located near the center of the serving area.

7.9.4.2(11)(d) The Design-Builder is to design and install a backbone riser system that provides physically route diverse pathways (minimum 20-meter riser separation) between the CCH and each Telecommunications Room in the Facility. The routing of the pathways should be such that a loss of single Telecommunications Room will not impact the connection between the CCH and any other Telecommunications Room in the Facility.

7.9.4.2(11)(e) A Mule tape will be left in all backbone conduits after installation of the cables. Mule tape will be Greenlee 4435 or approved equal for backbone conduits.

7.9.4.2(11)(f) Provide a minimum of 4 x 103mm Riser sleeves or conduits. Add one additional 103mm riser sleeve or conduit for every additional Communications Room serviced from a riser stack. For example: Where there are six Communications rooms in a riser stack, (one on each level where level 1 is the location of the main Equipment Room and the beginning of the riser and level 6 is the end; provide the following communications riser:

(f).1 Level 1 - provide 9 x 103 mm riser sleeves or conduits.

(f).2 Level 2 - provide 8 x 103 mm riser sleeves or conduits.

(f).3 Level 3 - provide 7 x 103 mm riser sleeves or conduits.

(f).4 Level 4 - provide 6 x 103 mm riser sleeves or conduits.

(f).5 Level 5 - provide 5 x 103 mm riser sleeves or conduits.

(f).6 Level 6 - provide 4 x 103 mm riser sleeves or conduits.

7.9.4.2(12) Surface Raceways, Modular Furniture and Custom Millwork

7.9.4.2(12)(a) Pathways will typically be concealed, however, if approved by the Authority, surface raceways may be installed in unique circumstances.

7.9.4.2(12)(b) Modular furniture and custom millwork will be equipped with communications pathways, TIA, compliant furniture cut-outs and cable management to safely secure, manage and hide power and horizontal data cabling and work area patch cords.

7.9.4.2(13) Service Entrance Facilities – The Facility

7.9.4.2(13)(a) The Design-Builder is to provide physically route service entrance facilities into the Facility. The entrance points will be distant from each other and enter the Facility from two different streets or opposite sides of the Facility. Minimum separation between entrance facilities will be 20m. This minimum separation will be maintained inside the Facility to the designated terminus of the service entrance facilities in the Entrance Facility Room and the CCH.

7.9.4.2(13)(b) The service entrance facilities will consist of ducts that enter into the Facility as well as EMT pathways that will connect back to the Entrance Facility Room and the CCH.

7.9.4.2(13)(c) The Design-Builder must connect the service entrance ducts to two different manholes on the Campus Perimeter Pathway System maintaining the minimum 20m separation as noted above.

7.9.4.2(13)(d) The Design-Builder will provide a minimum of three (3) Type DB2 PVC orange 103 mm ducts per service entrance. Service entrance ducts will:

(d).1 Not have more than two 90-degree sweeping bends.

(d).2 Be concrete encased. Coordinate the duct bank with the structural design of the building to support the duct bank at the wall without

reducing structural or the watertight integrity of the building wall.

(d).3 Be properly drained in accordance with building and electrical codes.

(d).4 Be reamed and bushed and have a smooth bell-shaped finish.

(d).5 Be equipped with watertight expandable duct plugs that seal the duct against water, gas, litter and vermin. Watertight expandable duct plugs shall be installed at both ends of every Service Entrance Facility duct.

7.9.4.2(13)(e) Place a mule tape in all ducts. Mule tape will be Greenlee 4435 or approved equal.

7.9.4.2(13)(f) In all instances, the minimum separation from other utilities that must be maintained are as follows:

(f).1 Separation from a duct bank and other underground structures running parallel shall be a minimum of 300mm.

(f).2 Crossing at 90 degrees cannot be less than 150mm, and when dealing with gas pipelines, the minimum crossing separation is also 300mm.

(f).3 Maintain minimum 50 mm (2”) separation from power ducts encased in concrete or 300 mm (12”) in well tamped earth.

7.9.4.2(13)(g) Refer to Appendix 1B(III) [Campus Perimeter Pathway System Technical Specifications] for further requirements.

7.9.4.2(13)(h) The Design-Builder will install a minimum of four (4) 103 mm EMT conduits per service entrance. The conduits will be installed from pull boxes located at each service entry point to the Entrance Facility Room (4 x 103mm conduits) and the CCH (4 x 103mm conduits). Provide individual cable support at the top of the riser (inside the pull box).

7.9.4.2(13)(i) Pull box size will be 1219 mm x 1219 mm x 610 mm (48” x 48” x 24”) in size, lockable and equipped with hinged lids.

7.9.4.2(14) Service Entrance Facilities – Healthcare Centre and Columbia Tower

7.9.4.2(14)(a) The Design-Builder is to provide physically route service entrance facilities into both the Healthcare Centre (HCC) and the Columbia Tower.

7.9.4.2(14)(b) The entrance points will be distant from each other and enter from two different streets or opposite sides of the building. Minimum separation between entrance facilities will be 20m.

7.9.4.2(14)(c) The Design-Builder must connect the service entrance ducts to two different manholes on the Campus Perimeter Pathway System maintaining the minimum 20m separation as noted above.

7.9.4.2(14)(d) The Design-Builder will provide a minimum of three (3) Type DB2 PVC orange 103 mm ducts per service entrance. Service entrance ducts will:

(d).1 Not have more than two 90-degree sweeping bends.

(d).2 Be concrete encased. Coordinate the duct bank with the structural design of the building to support the duct bank at the wall without reducing structural or the watertight integrity of the building wall.

(d).3 Be properly drained in accordance with building and electrical codes.

(d).4 Be reamed and bushed and have a smooth bell-shaped finish.

(d).5 Be equipped with watertight expandable duct plugs that seal the duct against water, gas, litter and vermin. Watertight expandable duct plugs shall be installed at both ends of every Service Entrance Facility duct.

7.9.4.2(14)(e) Place a mule tape in all ducts. Mule tape will be Greenlee 4435 or approved equal.

7.9.4.2(14)(f) In all instances, the minimum separation from other utilities that must be maintained are as follows:

(f).1 Separation from a duct bank and other underground structures running parallel shall be a minimum of 300mm.

(f).2 Crossing at 90 degrees cannot be less than 150mm, and when dealing with gas pipelines,

the minimum crossing separation is also 300mm.

(f).3 Maintain minimum 50 mm (2") separation from power ducts encased in concrete or 300 mm (12") in well tamped earth.

7.9.4.2(14)(g) Refer to Appendix 1B(III) [Campus Perimeter Pathway System Technical Specifications] for further requirements.

7.9.4.2(14)(h) In the HCC, the Design-Builder shall extend the service entrance facilities through the interior of the HCC between the entrance points into the building and the Communications Rooms designated by the Authority.

(h).1 Four (4) 103 mm EMT conduits shall be installed per service entrance.

(h).2 Pull boxes shall be installed at each service entry point. Pull box size shall be 1219 mm x 1219 mm x 610 mm (48" x 48" x 24") in size, lockable and equipped with hinged lids.

(h).3 20m separation shall be provided between each service entrance facility along the entire pathway route through the interior of the building.

7.9.4.2(14)(i) In the Columbia Tower, the Design-Builder shall terminate the outside plant portion of each service entrance facility in a dedicated pullbox located within the interior of the building. Pullboxes shall be located in an area within the interior of the building that will allow each service entrance facility to be extended easily to Communications Rooms in the future. Pull box size shall be 1219 mm x 1219 mm x 610 mm (48" x 48" x 24") in size, lockable and equipped with hinged lids.

7.9.4.3 Communications Rooms

7.9.4.3(1) "Communication Rooms" includes the following room types: Entrance Facility Room, Equipment Room, and Telecommunication Room.

7.9.4.3(1)(a) Entrance Facility (EF) Room – The EF Room consists of pathways, spaces, cables, connecting hardware, protection devices and other passive and active equipment that support the access provider. The EF Room will accommodate cellular service provider's base transceiver stations or Node B equipment for LTE and

HSPA services, as well as fiber connectivity to enable backhauling of cellular traffic to the cellular service providers' core networking equipment. The EF Room will be located adjacent to Campus Communication Hub and sized to accommodate fifteen (15) 584 mm (23") wide racks dedicated for cellular equipment. The Design-Builder's requirements relative to the design, construction and fit-out of the EF Room is detailed in Appendix 1B(II) [Campus Communications Hub Technical Specifications].

7.9.4.3(1)(b) Equipment Room (ER) – Space will be allocated in the CCH to support the function of an Equipment Room for the Facility. Those functions include the housing of telecommunications equipment, connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection devices. The Design-Builder's requirements relative to the design, construction and fit-out of the CCH is detailed in Appendix 1B(II) [Campus Communications Hub Technical Specifications].

7.9.4.3(1)(c) Telecommunications Rooms (TRs) – TRs provide a common access point for pathways and backbone and horizontal cabling systems. The CCH will also function as a TR for the floor it resides on. The functions of a TR are to:

(c).1 House the terminations of horizontal and backbone cables to connecting hardware.

(c).2 Provide a controlled environment to house telecommunications equipment, connecting hardware and splice closures

7.9.4.3(2) Tech Room

7.9.4.3(2)(a) Although not a Communications Room, the Tech Room is a critical IT space that will be situated adjacent to the CCH. This space will accommodate:

(a).1 Work space for IT (HSSBC) techs that would be supporting the site and the CCH.

(a).2 Test bench for testing, configuring, upgrading, fixing and staging network hardware.

(a).3 Storage space for critical network hardware spares, project materials and consumables.

7.9.4.3(2)(b) The Tech Room will contain a work bench for four technicians, chairs, lockable shelving (situated above the work bench), storage shelves and a wire mesh partition with sliding doors equipped with card readers that will divide the work area from the storage.

7.9.4.3(2)(c) The Design-Builder will provide and install:

(c).1 All millwork, casework and associated accessories required to support the function of the Tech Room.

(c).2 Industrial bulk storage racks that come with shelves that are adjustable and can support a minimum of 975 kg (2149 lbs). Build storage shelving units to allow standard sized pallets to be inserted below the storages shelves with a pallet jack. In addition, there shall be a minimum of 812 mm (32 inches) clear pathway to walk along the front of the shelving unit when pallets are inserted.

7.9.4.3(3) Telecommunications Rooms

7.9.4.3(3)(a) The Design-Builder will design, construct and fit out the TRs in accordance with Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications).

7.9.4.3(3)(b) The Design will design the TRs with expansion and maintenance as the foremost thought, taking into consideration building size, the variety of systems that operate within Healthcare Facilities, working space and drop density.

(b).1 A 50% growth factor will be factored into determining the size of a TR. Room sizing will take into consideration the wall mounting area required for each system.

(b).2 Triangle, L, curved or any other odd shaped rooms are not acceptable for use as a TR.

(b).3 Avoid placing TRs in locations that are restricted by building components that limit expansion such as elevators, core, outside walls or other fixed building walls.

(b).4 In all areas of the Facility with the exception of the parking levels, the minimum sizing specifications for a TR shall be 3.66m x 4.88m.

(b).5 The minimum sizing specifications for a TR on the parking levels of the Facility shall be 3.10m x 3.66m

(b).6 The maximum floor area that a Telecommunications Room can serve is 2000m^2.

(b).7 Subject to compliance with the maximum horizontal cable permanent link length as specified in Section 7.9.4.3(3)(e), the maximum quantity of Data Drops per Telecommunications Room is 1,200. The maximum number of Category 6A - horizontal copper patch panels will not exceed what is required to terminate 240 Data Drops per equipment rack.

7.9.4.3(3)(c) The systems that are housed within a TR include, but are not limited to, building automation (network equipment), security, CCTV, Public Address, clock and time systems, CATV, intercoms, nurse call, clinical systems, AV and videoconferencing systems, the Authority's voice and data wired and wireless networks and the distributed antenna system (DAS). Fire alarm and building automation panels and cabling are not permitted in TRs.

7.9.4.3(3)(d) The Design-Builder where necessary will enlarge the size of the TRs above the minimum dimension specified to accommodate the aggregate equipment rack and wall space requirements of the all systems housed within a given TR while still maintaining a 50% growth factor.

7.9.4.3(3)(e) The Design-Builder shall locate TRs to minimize the distances for cable runs. The location of a Communications Room shall be based on the 80m (262') maximum permanent link length of cable required to reach the extremities of a building's interior space, for current and future outlets.

7.9.4.3(3)(f) The Design-Builder will locate TRs away from services and conditions that may be obvious or hidden within the fabric of the building that will endanger or adversely

affect telecommunications equipment and cabling. This includes, but is not limited to:

(f).1 Gas lines and pneumatic tubing will never be installed directly above, in or through a TR. This includes inside adjoining walls.

(f).2 Electrical feeders, branch circuits or devices such as transformers, large motors, generators, etc. that generate electromagnetic interference (EMI) will not be allowed to reside in or transit through TRs. This includes adjoining walls and floor slabs.

(f).3 Mechanical ducting, water/sewer/steam/drain pipes, sprinkler risers and radiant heating will not reside in or transit through TRs. This includes adjoining walls and floor slabs.

(f).4 Mechanical systems and associated ducting for supply and return air that are used to cool and control the environment within TR must not be housed within the TR as this will inhibit the placement of overhead cable tray and lighting and constrain the optimal layout of the space.

7.9.4.3(3)(g) TRs nor any other type of Communications Room are to be used as catch-all spaces in which to add utility chases, equipment or panels.

7.9.4.3(3)(h) The Design-Builder will locate to serve the floor they are on. This statement applies to all levels of the Facility with the exception of the underground parking levels and Energy Centre.

(h).1 The Authority will permit TRs located on a parking level to serve other levels of the underground parking as long as the requirements stipulated in Sections 7.9.4..2(11)(c), 7.9.4.3.(3)(b) and 7.9.5.2 are met.

(h).2 The Authority will permit TRs located within the Energy Center to serve other levels of the Energy Center as long as the requirements stipulated in Sections 7.9.4.2(11)(c), 7.9.4.3.(3)(b) and 7.9.5.2 and are met.

7.9.4.3(3)(i) The Design-Builder will ensure all horizontal and backbone communication cabling for a given floor or area terminates at a Telecommunications Room.

7.9.4.3(3)(j) The Design-Builder will design and construct TRs in accordance with following requirements:

(j).1 Walls will be to underside of slab.

(j).2 All walls will be lined with rigidly installed 20 mm (3/4"), AAA G1S plywood painted with two coats of light coloured fire resistant paint applied to all sides. Sanding between coats is mandatory. The plywood panels will extend from floor level to a height of 2438 mm. Expose certified stamped mark.

(j).3 There will be no suspended ceiling.

(j).4 Floor coverings will be linoleum composite (i.e. Marmoleum) and light in colour to enhance the brightness of the room. Vinyl tiles or sheeting are not acceptable.

(j).5 Floor loading (static and dynamic) capacity in the space will be sufficient to bear both the distributed and concentrated load of the installed equipment. A structural engineer will be consulted during the design to specify the floor loading limit. The minimum floor load capacity will be 60 kPA (125 lbs/square foot) in TRs.

(j).6 The door opening will be 1066 mm wide and 2440 mm high and will swing 180^{o} out to gain valuable floor and wall spaces inside the room for equipment and cable installs, and to provide working space for pulling entrance and riser cables. If the door must swing into the room, the size of the room will be increased by the width of the door to compensate for lost space. All doors are to be provided with door sweeps. Where the TR is directly accessible from the Facility's exterior or from parkade levels, door hinges are to be recessed or hidden with a full length astragal installed.

7.9.4.3(3)(k) The Design-Builder will provide dedicated scalable, reliable and N+1 redundant cooling capacity in all TRs to permit all equipment racks to be fully populated with a total load of 8KW of power per equipment rack. Refer to

Section 7.5 Heating, Ventilating and Air Conditioning (Division 23) for further details.

(k).1 HVAC systems serving Communications Rooms will maintain a temperature between 18-24 degree Celsius (dry bulb temperature) with a relative humidity between 40% and 55%. Anything outside these ranges will generate an alarm that will be visible on the Facility's building management system.

(k).2 Design the HVAC system to maintain these requirements 24/7, 365 days per year and be connected to the Emergency Generator Power system.

(k).3 Provide separate, in room controls for the heating, ventilation and air conditioning systems servicing all Communications Rooms.

(k).4 The air pressure inside a Communications Room shall be positive to force the air out of the room to mitigate dust accumulation. Provide a minimum of 1 complete air change per hour.

(k).5 Detailed heat loads will be calculated at time of design.

7.9.4.3(3)(l) The Design-Builder will provide heat and smoke detection and a dry pre-action sprinkler system in all TRs.

(l).1 Sprinkler heads will be mechanically protected in all cases.

(l).2 In order to avoid the placement of sprinkler heads above equipment racks, additional sprinkler heads will be added to provide the required coverage in the room.

(l).3 If there are no alternatives other than to place a sprinkler head above an equipment rack, then it is the responsibility of the Design-Builder to identify all instances of this situation to Authority for review and approval. Upon receipt of the Authority's approval, the Design-Builder will provide a drip tray under the sprinkler head in all situations where a sprinkler head is permitted over an equipment rack.

(l).4 Refer to Division 21 for further details.

7.9.4.3(3)(m) The Design-Builder will provide 8KW of power from a Network Dedicated Centralized UPS to each equipment rack in the Facility's TRs. Provide an additional 8KW of redundant power from the generator protected (vital) distribution to each equipment rack in the Facility's Communications Rooms. Install two (2) L21-30R twist lock receptacles; one from the Network Dedicated Centralized UPS' distribution and one from the generator protected (vital) distribution. Refer to Division 26 for further details.

7.9.4.3(3)(n) The Design-Builder will provide general-purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 3m. Connect 50% of receptacles to vital power and the remainder to conditional power. Each receptacle to be on a dedicated circuit. All receptacles will be set flush-mounted and centred at 300 mm AFF. Refer to Division 26 for further details.

7.9.4.3(3)(o) The lighting provided by the Design-Builder in each TR will meet the following requirements [Refer to Division 26 for further details]:

(o).1 Lighting fixtures will be mounted at a minimum of 2.8m AFF.

(o).2 The minimum light levels will be 500 lux in the horizontal plane and 200 lux in the vertical plane @ 1 m above the finished floor.

(o).3 Lighting inside the TRs will be on the Facility's emergency generator system.

(o).4 Provide an occupancy sensor to control the lights in each TR.

7.9.4.3(3)(p) The Design-Builder will:

(p).1 Provide a card access system for all Equip TR doors. Only the main entry door will be equipped with a network access control card reader. Supplementary doors will be for exit only. Manual punch code locks are not permitted.

(p).2 Provide CCTV camera(s) inside all TRs. CCTV cameras will be used to identify people entering the room and general activity within the room. CCTV camera footage to be recorded on the

Facility's security systems and stored for a minimum of thirty (30) days.

(p).3 Provide an intrusion alarm when the TR is directly accessible from the building's exterior or from parkade areas. Alarm will consist of door contacts on all doors, dual tech motion detectors and keypad. Control panel is to be located in a secure space. Intrusion system is not to be integrated with access control to arm or disarm the alarm.

7.9.4.3(3)(q) Prior to installing network equipment and switches, the Design-Builder will have the TRs professionally cleaned at the sub-micron level by a company that is specialized in cleaning critical environments. The cleaning will remove all construction related dust and debris from all surfaces including equipment racks and all components installed within them.

(q).1 Prior to receiving any network equipment from the Authority to install, the Design-Builder shall conduct air quality testing and provide the Authority with a report and analysis of particle counts before and after the cleaning of the TRs.

(q).2 The Design-Builder will provide clean room sticky mats, booties, curtains and plastic strip doors and air scrubbers as required to keep the TRs clean until target substantial completion of the Facility is achieved.

7.9.4.3(4) Equipment Racks

7.9.4.3(4)(a) The Design-Builder will provide Zone 4 certified equipment racks required to house the termination of the backbone and horizontal cabling subsystems, and all the telecommunication and low voltage system's equipment installed within a TR. Equipment racks will be independently tested and certified to meet or exceed established Seismic Zone 4 NEBS Telcordia GR-63-CORE standards and specifications.

7.9.4.3(4)(b) Quantity and type of equipment racks provided by the Design-Builder will be based on the type of telecommunications equipment and the use of the TR to house other low voltage systems. The minimum number

of equipment racks for a TR with a minimum size of 3.66m x 4.88m will be four (4). The minimum number of equipment racks for a TR with a minimum size of 3.10m x 3.66m will be two (2). For further details, refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.4.3(4)(c) The Design-Builder will ensure:

(c).1 The maximum number of horizontal Data Drops per equipment rack will be 240 at the time when the Facility becomes operational.

(c).2 The location of the equipment racks will provide physical and environmental protection for the telecommunications and low voltage systems equipment. This protection may be achieved either by choice of appropriate location or by specific design and should address temperature, humidity, vibration, exposure to ultraviolet radiation, ingress of dust, fluids or other contaminants, physical damage (accidental or malicious), security, electromagnetic interference and the presence of other hazards and impediments

(c).3 The location of the equipment racks will allow for adequate access and be provided with illumination and temperature conditions suitable to allow installation and maintenance of the Structured Cabling System and associated telecommunications and systems equipment.

(c).4 Access clearance of 1m in the front, side and behind the rear of the racks is provided. Where several rows of racks are located side by side, the row spacing shall be a minimum of 1m. A minimum clearance of 50 mm shall be maintained between one side of the rack vertical manager and the wall. All clearances are to be measured from the face of any equipment mounted to the wall and from the front of the vertical cable managers.

(c).5 The location of equipment racks are located such that subsequent measurements, repair, expansion or extension of the installed cabling can be undertaken in safety.

(c).6 All installations of equipment racks are reviewed by a structural engineer for certification as being seismically restrained in accordance with the requirements for a post disaster facility.

(c).7 Equipment racks are grounded as per manufacturer recommendations and as required in Section 7.9.4.1.

(c).8 Within equipment racks that all cables are supported to provide strain relief and prevent kinking so that mechanical damage is avoided during later access to the patch panels and telecommunications and low voltage equipment.

7.9.4.3(4)(d) Within equipment racks, the Design-Builder will ensure all cabling (backbone, horizontal and power distribution) will be managed using appropriate materials and properly sized vertical and horizontal cable management.

(d).1 Where two or more racks are mounted side by side, the racks shall have a double sided 12” wide vertical manager installed in between and ganged with metal bolts and washers. Provide double sided 6” wide vertical managers at either end of the line-up. All vertical managers are to be equipped with three (3) slack management spool kits.

(d).2 Provide horizontal wire management as required to accommodate Category 6A cabling and patch cords. Provide a minimum of one 2RMU horizontal wire management with fingers, rear access and cover plate at the top of each equipment rack.

7.9.4.3(4)(e) Provide each equipment rack with redundant ePDUs (Power Distribution Units) connected to L21-30R circuits, one fed from e Network Dedicated Centralized UPS’ distribution and one from the generator protected (vital) distribution. The ePDU specified for the TRs is an Eaton EMI331-10 (Part Name EMI3PD15JFJ78A1).

(e).1 Input: NEMA L21-30P, three (3) metre cord (w/molded male cord ends).

(e).2 Output: (24) C13, (3) C19 and (6) NEMA 5-20R

(e).3 LCD metered with Ethernet Connection and Environmental Probe.

7.9.5 Structured Cabling

7.9.5.1 General

7.9.5.1(1) The aim of this section is to provide the Design-Builder with sufficient information for the successful delivery of a complete end to end Structured Cabling infrastructure that is universal and supports the networks, systems and end use equipment required in the Facility.

7.9.5.1(2) This information is an overview and is not intended to provide an in-depth consideration of all cabling or working practices.

7.9.5.1(3) The importance of a Structured Cabling infrastructure is similar to that of other fundamental building utilities such as heating, water and electricity. As with other utilities, interruptions to service can have a serious impact. Because of this, and the additional fact that the useful life of a cabling infrastructure should last several decades, it is essential that the design and installation be done with due care and attention ensuring capacity when and where required as well as protection against obsolescence and physical risks.

7.9.5.1(4) To meet the ever changing IT demands, standardizing on a product set that is recognized in the industry for its high degree of reliability, quality and performance is vital. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for further details on what vendors and manufacturers are approved for use on this project.

7.9.5.1(5) All materials and equipment used must be Canadian Standards Association (CSA) or Underwriters Laboratories (UL) approved (as appropriate) and installed in accordance with manufacturer's specifications and recommendations.

7.9.5.1(6) The relevant standard, specification, manufacturer's instructions or code of practice must be consulted at all times. This includes HSSBC Communications Infrastructure Standards and Specifications referenced in Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.5.1(7) All aspects of the design, specification, performance, planning, installation, testing and documentation of the Structured Cabling infrastructure will meet or exceed HSSBC Communications Infrastructure Standards and Specifications referenced in Appendix I1(III) [HSSBC Communications Infrastructure Standards and Specifications]. The HSSBC Communication Infrastructure Standards and Specifications

align to industry standards and are concerned with specification, performance, quality assurance, documentation and administration of Structured Cabling System to be installed on this project. The standards set out the responsibilities of RCDD Communications Consultant, cabling installers and the Authority and is intended to be used to guide the development of the Telecommunication (T) Drawings and Division 27 Specifications that the Design-Builder will issue to a qualified communications contractor.

7.9.5.1(8) The Design-Builder will cause:

7.9.5.1(8)(a) the cabling infrastructure to be designed by an RCDD (A DCDC designation is also preferred given the scope of work associated with the CCH.);

7.9.5.1(8)(b) the RCDD to work with the Authority to complete all aspects of the design specified herein.

7.9.5.1(9) Design

7.9.5.1(9)(a) The Design-Builder will provide during the proposal stage:

(a).1 Conceptual drawings of proposed telecommunications outlet locations.

(a).2 Plan view drawing of all Communications Rooms illustrating the layout of all communications components and equipment and referencing information supplied by other engineering disciplines and consultants such as electrical distribution (panels and receptacles) and lighting fixtures, pathways (sleeves, conduits, entrance ducts, cable tray), grounding, mechanical ducting and equipment, fire detection and suppression systems, security equipment, etc.

(a).3 Elevation drawings of all walls of each Communications Room, clearly showing the layout of all termination hardware, grounding & bonding components, horizontal pathway penetrations, and wall mounted equipment.

(a).4 Detailed elevation drawings of equipment layout in each floor or wall mounted equipment rack in Communications Rooms.

7.9.5.1(9)(b) Telecommunications drawings will be identified as “T” series (Telecommunications) drawings in the approved construction drawings, separated from “E” (Electrical) drawings. Refer to Section 2.8.12 for further details.

7.9.5.1(10) All structured cabling installations must be performed by one of the Authority’s prequalified cable contractors.

7.9.5.1(11) Maintain the manufacturer’s warranties on all IT and communications infrastructure and ensure that the warranties are transferable to the Authority at the completion of the project. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for warranty requirements.

7.9.5.2 Horizontal Cabling Subsystem

7.9.5.2(1) The Design-Builder will design, supply, install, test and certify a horizontal Category 6A structured cabling subsystem for the Facility. The supplied Category 6A cable will be the highest performing cable offered by the designated manufacturer at the time of material procurement and must be approved by the Authority before the cable is ordered.

7.9.5.2(1)(a) The installed system shall utilize a Category 6A cable no larger than 0.275” while supporting IEEE proposed Type 4 PoE performance (100W) over the full channel length.

7.9.5.2(1)(b) The installed system shall utilize a cable design supportive of heat dissipation such that no more than 9.5C of temperature rise occurs inside a 100 cable bundle as PSE power reaches 90W over 100 meters.

7.9.5.2(2) The design of this subsystem will accommodate future equipment needs, diverse and increasing user applications, ongoing maintenance, relocation, sustainability, flexibility and service changes.

7.9.5.2(3) The configuration of this sub system will be a star structure with separate dedicated cables run in a continuous fashion from the servicing local Communications Room to the work area telecommunications outlets on the same floor. The system includes horizontal cables, telecommunications outlets and connectors in the work area, mechanical terminations, patch panels and patch cords or jumpers located in Communications Room.

7.9.5.2(4) The maximum permanent link length of any horizontal cable will not exceed 80m (262') within the entire physical area served by a Communications Room. For horizontal distances, cable will be measured at right angles to the building. Risers or vertical distances will also be used to add to the length of the cable.

7.9.5.2(5) Where there is more than one Communications Room on the same floor, communications serving zone boundary lines will be established so that horizontal cables will not cross the lines to another zone to be served by another Communications Room.

7.9.5.2(6) The Design-Builder will, in consultation with and as directed by the Authority, assign each room and space in the Facility a work area Data Drop density ("High", "Medium" or "Low") in accordance with the ANSI/TIA-1179 Healthcare Facility Telecommunications Cabling Standard Table 1 (refer to Section 1.1 for the definition of a “Data Drop”). The Design-Builder will provide a quantity of Data Drops as defined below:

7.9.5.2(6)(a) Low Density Work Area – 2 to 6 Data Drops in each area;

7.9.5.2(6)(b) Medium Density Work Area - 6 to 14 Data Drops in each area;

7.9.5.2(6)(c) High Density Work Area - provide > 14 Data Drops in each area.

7.9.5.2(7) Notwithstanding the Data Drop density assigned in the ANSI/TIA-1179 Healthcare Facility Telecommunications Cabling Standard, the Design-builder will categorize patient rooms as a Low Density Work Area.

7.9.5.2(8) The Design-Builder will provide additional Data Drops in excess of the minimum quantity required by Section 7.9.5.2(6) as required:

7.9.5.2(8)(a) to support Appendix 1A [Clinical Specifications] and all of the networks, systems and equipment to be installed or used in the Facility;

7.9.5.2(8)(b) to comply with any other provisions of this Agreement that require Data Drops;

7.9.5.2(8)(c) by Good Industry Practice to provide convenience, flexibility or use and operational support throughout the Facility; and

7.9.5.2(8)(d) to ensure there is one unused Data Drop for each telecommunications outlet with the exception of wall mounted telephones and wireless access points, which do not require an unused Data Drop.

7.9.5.2(9) The Design-Builder will provide an additional 50 Data Drops with an average permanent link length of 70m to be terminated, installed and tested in locations as directed by the Authority.

7.9.5.2(10) All horizontal cables will be terminated on Category 6A patch panels termination hardware located in a Communications Rooms.

7.9.5.2(11) A minimum cable slack allowance of 0.3m will be provided for all horizontal cables crossing an expansion joint location.

7.9.5.2(12) For horizontal cables running outside the Facility to service CCTV cameras, wireless access points or other devices, surge protectors shall be installed in Communications Rooms for every horizontal run entering the Facility.

7.9.5.3 Backbone Cabling Subsystem

7.9.5.3(1) The Design-Builder will provide a backbone cabling subsystem that supports interconnections between the CCH and Telecommunications Rooms in the Facility and consists of backbone copper and fiber cables, intermediate and main cross-connects, mechanical and fusion terminations and patch cords and cross connect jumpers.

7.9.5.3(2) Copper Backbone

7.9.5.3(2)(a) The Design-Builder will design, supply, install, test and certify a multi-conductor twisted pair Category 3 backbone cabling system (including all patch panels, termination blocks, patch cords and cross connect wire) that will connect the CCH to each Telecommunications Room in the Facility. This includes connections to all Communications Rooms in the Energy Centre. Refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for the installation requirements of the copper backbone between EF Room and the CCH.

7.9.5.3(2)(b) The configuration of this system will be a hierarchical star typology with separate dedicated cables from the CCH to each Telecommunications Room.

7.9.5.3(2)(c) The pair count of each multi-conductor twisted pair Category 3 riser installed between the CCH and each Telecommunications Room will be a minimum of 50 pairs.

7.9.5.3(2)(d) A minimum cable slack allowance of 0.3m will be provided for all copper backbone cables crossing an expansion joint location.

7.9.5.3(3) Intra-Building Fiber Backbone

7.9.5.3(3)(a) The Design-Builder will design, supply, install, test and certify an intra-building fiber backbone cabling system (including all patch panels (and related components and patch cords) that will connect the CCH to each Telecommunications Room in the Facility. This includes connections to all Communications Rooms in the Energy Centre.

7.9.5.3(3)(b) The intra-building fiber backbone cabling system will consist of the latest accepted standard of multimode and single mode optical cables, connectors and patch cables offered by the designated manufacturer at the time of material procurement. The Design-Builder will be responsible to engage the Authority for instruction on the latest accepted standard of multimode and single mode optical cables, connectors and patch cables to use in the Facility prior to the ordering the materials.

7.9.5.3(3)(c) The configuration of this intra-building fiber backbone system will be a hierarchical star typology and will consist of primary and redundant multimode and single mode optical cables installed between the CCH and each Telecommunications Room.

7.9.5.3(3)(d) Primary and redundant multimode and single mode fiber will be installed in physically route diverse pathways between the CCH and each Telecommunications Room. The routing of the pathways will be such that a loss of single Telecommunications Room will not impact the connection between the CCH and any other Telecommunication Room in the Facility.

7.9.5.3(3)(e) Minimum strand count for each primary and redundant multimode and single mode fiber cable running between

the CCH and each Telecommunications Room will be twenty-four (24). Final fiber count to be installed by the Design-Builder will be approved by the Authority prior to the completion of the project's design phase.

7.9.5.3(3)(f) Fiber cable must be protected along its entire length either by employing interlocking armoured cable or inner duct.

(f).1 All fiber jackets including inner and outer jackets as well as inner duct are to be colour coded so the type of fiber can easily be identified. The accepted colour code standards are yellow for single mode and Erika Violet or Violet for OM4 multimode. In the event that a newer standard of optical cable is selected for installation as per Section 7.9.5.3(3)(b), the Authority will provide direction to the Design-Builder as to the correct colour code.

(f).2 Armoured cable will be grounded in accordance with Section 7.9.4.1.

7.9.5.3(3)(g) The Design-Builder will provide 8m (25') of slack on both ends of each fiber cable installed.

(g).1 Wire management rings will be provided in each Communications Room to manage fiber cable slack.

(g).2 Install an angle bracket or cantruss structure to support each wire management ring in the Communications Room.

7.9.5.3(3)(h) A minimum cable slack allowance of 0.3m will be provided for all fiber backbone cables crossing an expansion joint location

7.9.5.3(3)(i) All intra-building backbone fibers are to be terminated using LC Connectors unless otherwise noted.

7.9.5.4 Telecommunication Outlets

7.9.5.4(1) In this Schedule and the Appendices to this Schedule, the terms "telecommunication outlet", "data outlet", "work station outlet, "wireless communication outlet" and "communications outlet" are used interchangeably. Notwithstanding any standard referenced in this Schedule, all such outlets included in the Facility will:

7.9.5.4(1)(a) include a minimum of two Data Drops, with each “Data Drop” comprising a complete Category 6A structured cabling connection between the RJ45 outlet jack and the port on the patch panel in a Communications Rooms;

7.9.5.4(1)(b) comply with all requirements set out in Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications];

7.9.5.4(1)(c) be located based on the intended use;

7.9.5.4(1)(d) be connected to the nearest cable tray with conduit and will have a minimum conduit size as defined in Section 7.9.4.2(11);

7.9.5.4(1)(e) maintain the proper bend radius of telecommunication cable media installed;

7.9.5.4(1)(f) include a 4 port single gang cover plate with RJ45 jacks as required to terminate the supplied cabling, plus blank filler plates on unused outlets; and

7.9.5.4(1)(g) use Category 6A-termination technique. No differentiation will be made between data and voice cables.

7.9.5.4(2) The Design-Builder will provide jack number information (on the Authority’s cable information Excel spreadsheet -refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.5.4(3) The Design-Builder will design each room in the Facility such that Data Drops and telecommunications outlets are distributed throughout the room as required to support clinical functionality and convenient use of equipment by Facility Users and in accordance with Good Industry Practice.

7.9.5.4(4) The Design-Builder will co-locate, at each telecommunications outlet location, an appropriate number of power outlets.

7.9.5.4(5) Provide all ceiling spaces with telecommunication outlets for wireless network access points, information display systems, CCTV and other ceiling mounted digital devices.

7.9.5.4(6) Provide floor telecommunications outlets and floor power to connect floor mounted self-registration systems, electronic wayfinding systems, audio visual, video conferencing and Virtual Care (Telehealth) systems

Patient education kiosks, Patient telephone system devices and other systems and devices as required by the Authority.

7.9.5.5 Patch Cords, Cross Connect Wire and Harness Cables

7.9.5.5(1) The Design-Builder will provide and, where required, install Category 6A, multimode and single mode patch cords as well as any copper cross connect wire jumpers and harness cables of the correct length for all end-use and telecommunications equipment in sufficient quantity to make each device and system in the Facility fully operational.

7.9.5.5(2) The Design-Builder will provide additional spare Category 6A patch cords in excess of the quantity required by Section 7.9.5.5(1). The formula used to determine the quantity will be 2 x (6.5% x the total number of network switch ports in the Facility on opening day). The variety of lengths of the spare patch cords will be provided to the Design-Builder by the Authority.

7.9.5.5(3) Category 6A patch cords will be 28 AWG stranded with an outer diameter less than or equal to 4.72 mm (0.186 inches).

7.9.5.5(4) The Design-Builder will additional spare multimode and single mode patch cords in excess of the quantity required by Section 7.9.5.5(1). The amount will be equal to twelve spare multimode and twelve spare single mode patch cords for each fiber patch panel installed in the Facility. The variety of lengths of the spare patch cords will be provided to the Design-Builder by the Authority.

7.9.5.5(5) In addition to the cables required for the Authority's IT and communications networks, the Design-Builder will provide any additional cables necessary to support all of the other networks and systems to be installed or used in the Facility as described in this document.

7.9.6 Wireless Network Infrastructure (WIFI)

7.9.6.1 General Requirements

7.9.6.1(1) The Wireless (WIFI) Network is a mission critical infrastructure and is considered to be a basic utility and as such must be designed and installed to:

7.9.6.1(1)(a) Provide superior coverage, capacity and reliability, with a cabling infrastructure capable of supporting wireless services.

7.9.6.1(1)(b) Blend aesthetically with the environment while not impacting wireless performance.

7.9.6.1(1)(c) Protect wireless access points and antennas from theft, vandalism, tampering, accidental damage and unauthorized moves and disconnects.

7.9.6.1(1)(d) Protect access points from adverse environmental conditions and exposure to impact, spills and liquids.

7.9.6.1(1)(e) Permit convenient and authorized access to access points and cabling to simplify moves, adds and changes brought about by alterations in the physical environment, and increased utilization over time.

7.9.6.1(2) In a wireless environment, network reliability is a function both of the level of user congestion (traffic loads) and service availability (interferences and coverage). In an effort to provide an acceptable level of reliability to its end users, the Authority will not permit other wireless networks to operate that cause interference and disruption to its wireless (WIFI) network. If the Design-Builder installs a wireless system that interferes with the Authority's wireless network, the Design-Builder will have to turn off and completely remove the interfering system and associated infrastructure that it installed and replace it with an alternative solution at any point up until the end of the Warranty period.

7.9.6.1(3) The Authority is responsible for:

7.9.6.1(3)(a) The design of the Facility's wireless (WIFI) network and the procurement, configuration and commissioning of all wireless and wired network hardware including access points, antennas, switches and controllers.

7.9.6.1(3)(b) The procurement, configuration and commissioning of all hardware and software related to wireless network management systems and tools.

7.9.6.1(3)(c) Providing centralized authentication and security appliances or latest equivalent to support the wireless network within the Facility.

7.9.6.1(3)(d) The procurement of all standard vendor supplied access point mounting brackets, lighting arrestors and accessories required to install wireless hardware.

7.9.6.1(3)(e) Conducting all predictive, active and passive wireless RF surveys necessary to determine access point placement and to validate and calibrate the wireless network to ensure all required technical parameters (coverage, SNR, etc.) are met.

7.9.6.1(3)(f) Identifying to the Design-Builder the mounting locations for all wireless hardware. To assist in the correct installation of wireless hardware, the Authority will provide Design-Builder with drawings, written instructions and/or pictures detailing mounting locations. Where possible, the Authority will also identify access point and antenna locations on site.

7.9.6.1(3)(g) Labelling and supplying the Design-Builder with wireless access points, antennas, mounting brackets and other standardized hardware based upon a mutually agreed to schedule.

7.9.6.1(4) The Design-Builder is responsible for:

7.9.6.1(4)(a) Furnishing the Authority with all documentation required to accurately complete a software based predictive wireless survey. This includes, but is not restricted to floor plans, reflective ceiling plans, elevation and section drawings, furniture and equipment layouts and information on building materials and finishes. The Design-Builder is required to keep the Authority appraised of all changes to this documentation throughout the course of constructing the Facility.

7.9.6.1(4)(b) Designing the Facility including equipment locations (e.g., microwave ovens) in a manner that does not introduce interference beyond the noise floor and impact signal strength requirements (SNR) of the wireless network. The resulting RF environment in the Facility must be consistent with the strictest specifications of the wireless end-use equipment.

7.9.6.1(4)(c) Providing adequate space and power outlets for wireless device charging stations inside each department, taking in to account that charging units with multiple devices may cause signal concentrations that impact wireless performance and capacity. Sufficient spread of units must be maintained for both charging and storage areas

so as not to impact operational performance of the WIFI network.

7.9.6.1(4)(d) Providing the Authority or its representatives with access to the site during construction to conduct wireless RF surveys and testing.

7.9.6.1(5) All materials and equipment used by the Design-Builder must be Canadian Standards Association (CSA) or Underwriters Laboratories (UL) approved and installed in accordance with manufacturer's specifications and recommendations.

7.9.6.2 Wireless Cabling Grid

7.9.6.2(1) The Design-Builder will design, supply, install, test and certify a horizontal Category 6A cabling grid throughout the Facility's ceiling spaces to connect wireless access points in conformance to the standards set forth in Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.6.2(1)(a) The grid is defined as a collection of uniform cells where each cell is a square.

7.9.6.2(1)(b) The size of the square is 10.0m x 10.0m to ensure seamless wireless coverage for both the 2.4 GHz and 5.0 GHz frequency ranges. The Authority permits the Design-Builder to adjust the grid to 15.0m x 15.0m on the parking levels only.

7.9.6.2(1)(c) Wireless communications outlets with two Category 6A Data Drops are to be located at the centre of each square cell. Where only a portion of a square cell resides within the interior of the Facility (such as at the Facility's perimeter), a wireless communication outlet with two Category 6A Data Drops shall still be provided in the interior of the Facility for that cell. Specific installation method of the communication outlet, pathways and cabling will vary depending on the type of ceiling and location.

7.9.6.2(2) The Design-Builder will supply, install, test and certify all components of the wireless cabling grid. All components will be Category 6A. This includes all horizontal cables, jacks, connectors, patch panels, patch cords, surface jack assemblies and faceplates.

7.9.6.2(3) The Design-Builder will supply four Category 6A patch cords per wireless communication outlet (two for the access point and two for connection to the switch in the designated Communications Room).

7.9.6.2(4) Regardless of the location and mounting method of a wireless access point, the maximum permissible permanent link length between a wireless communication outlet and a Communications Room is 80 metres.

7.9.6.2(5) At the Communications Room, the horizontal Category 6A cables which comprise the wireless cabling grid in a given wiring zone will be distributed evenly across patch panels to enable patching to different network switches.

7.9.6.2(6) Wireless communication outlets must always be easily accessible.

7.9.6.2(7) To ensure 100% contiguous and ubiquitous wireless coverage, the wireless cabling grid will cover all areas within the Facility including utility spaces (mechanical, electrical, elevator machine, telecommunication rooms), stairwells, parking levels, service links and tunnels.

7.9.6.2(8) Additional wireless communications outlets over and above what is provided by the 10m x 10m grid will be installed in large multimedia spaces in accordance with TIA 4966.

7.9.6.2(8)(a) The Design-Builder is to allow for one wireless communications outlet equipped with two Category 6A Data Drops for every twenty-five (25) seats in large multimedia rooms as defined in Section 7.9.9.1

7.9.6.2(8)(b) The location of the wireless communications outlets in large multimedia spaces will be determined in consultation with the Authority.

7.9.6.2(9) Wireless communication outlets, supporting infrastructure and pathways are to be provided to enable wireless coverage inside all elevator cabs. The Design-Builder needs to ensure access points can be installed in all elevator landings, (lobbies), and if permissible by code, in elevator shafts and cabs.

7.9.6.2(10) Wireless communication outlets are also to be provided outside the Facility to enable installation of access points to provide exterior wireless coverage to the property line and to ensure seamless integration and transfer to the Authority's wireless networks in adjacent areas of the Existing Hospital.

7.9.6.2(10)(a) Coverage areas are to include, but are not limited to Secure and Staff Outdoor Spaces, roofs, walkways and lanes.

7.9.6.2(10)(b) The location and quantity of exterior wireless communication outlets are to be determined in consultation with the Authority

7.9.6.2(10)(c) If the cabling length between the nearest Telecommunication Room and the exterior wireless communication outlet exceeds 80m, the Design-Builder will install fiber and provide power to the access point location identified by the Authority.

7.9.6.3 Wireless Network Hardware, Components and Enclosures

7.9.6.3(1) The Design-Builder will install all access points, antennas and associated accessories and hardware as prescribed by the Authority's wireless design. The estimated number of access points required for the Facility is one hundred and ninety (190). Refer to Section 7.9.7, Data Communications for requirements around the installation of network switches and other wired network components.

7.9.6.3(2) Wireless network hardware provided to the Design-Builder for the interior of the Facility will not be installed until the Facility is enclosed, weather tight, temperature and humidity conditions are approximately the same as final conditions expected, wireless cabling grid is installed and tested, most construction activities are complete and surfaces have been swept and treated for dust control. The Design-Builder will not be allowed to install wireless and wired network hardware until the Authority has inspected the interior conditions of the Facility and provided written approval to proceed with the installation.

7.9.6.3(3) Prior to receipt of wireless network hardware and components for installation, the Design-Builder is required to provide the Authority with as-built documentation of the wireless cabling grid identifying the cable IDs associated with each wireless communication outlet.

7.9.6.3(4) Upon receipt of wireless and wired network hardware and components, the Design-Builder will be financially responsible for any damage or disappearance of Authority provided material due to improper handling and storage, negligence, fire, theft and environmental conditions during construction.

7.9.6.3(5) The Design-Builder is required to move and/or add wireless network hardware as prescribed by the Authority after completion of pre and post occupancy wireless surveys. In addition to labour and equipment, the Design-Builder is required to cover all costs associated with moving access points such as replacement of ceiling tiles and the installation of sleeves through walls. The Design-Builder will allow for a quantity of twenty (20) moves and or adds in the Facility.

7.9.6.3(6) The Design-Builder will install two patch cords between each access point and its designated wireless outlet as specified in the Authority's design. If required due to the ceiling type, the Design-Builder will install conduit to run the patch cords between the wireless communication outlet and the access point. In the Communications Room, the Design-Builder must also install two patch cords to connect the access point to the switch ports designated by the Authority. For material specifications and installation requirements, refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.6.3(7) All access points and wireless components will be seismically supported by the Design-Builder in accordance with equipment manufacture's guidelines.

7.9.6.3(8) If the mounting of wireless hardware requires the procurement of coloured vanity skins or covers, specialized mounts and brackets or the fabrication of custom solutions, the Design-Builder will be expected to bear all associated design, fabrication, procurement and installation costs. Furthermore, if alterations in the design, fabrication and installation of components provided by others are needed to install any aspect of the wireless infrastructure then the Design-Builder will be expected to bear the full cost of all such alteration.

7.9.6.3(9) The Design-Builder will be required to install lightening arrestors and associated grounding on all outdoor access point locations where specified by the Authority. The Design-Builder will also be required to supply and install surge protectors in Communication Rooms for each horizontal Category 6A cable run entering the Facility. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for further details.

7.9.6.3(10) For the safety of Patients and staff, the Design-Builder will be required to supply, install and label ceiling (hard cap and tile) enclosures to house wireless hardware in areas of the Facility specified by the Authority. These enclosures will hide wireless hardware from view and prevent unauthorized access to the access point and the connecting cabling.

The enclosures provided must allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour. Prior to purchase of the enclosures, the Design-Builder will submit shop drawings to the Authority for approval and, if required, provide samples to Authority for RF testing purposes and to check for interoperability with wireless hardware.

7.9.6.3(11) To protect wireless hardware from the environment, theft or vandalism, the Design-Builder will be required to supply, install and label indoor/outdoor NEMA rated access point enclosures in certain areas within and outside the Facility as specified by the Authority. The enclosures must be able to protect wireless hardware from wet and dirty environments, UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, lockable and work with all variations of Authority provided wireless hardware. Prior to purchase of the enclosures, the Design-Builder will submit shop drawings to the Authority for approval and, if required, provide samples to Authority for RF testing purposes and to check for interoperability with wireless hardware.

7.9.7 Data Communications

7.9.7.1 The Authority will:

7.9.7.1(1) Provide the Design-Builder with all required telecommunications equipment, including network switches and SFP modules to provide data connectivity to all systems and end-use devices in the Facility.

7.9.7.1(2) Provide and manage all firewalls, security and IDS/IPS systems for connections to the Facility's data network.

7.9.7.1(3) Complete all physical and logical network design and telecommunications equipment programming, configuration, activation and testing; and be responsible for all network management licensing.

7.9.7.1(4) Provide interface to the Authority's wireless network and VoIP telephone System.

7.9.7.1(5) Work with designated access providers to deliver the telecommunications services necessary to connect the Facility to the Authority's corporate network and to the Internet.

7.9.7.1(6) Extend the fiber and copper inter-building cabling necessary to physically connect the Facility's data network to Existing Hospital' existing Local Area Network (LAN).

7.9.7.1(7) Provide all physical and logical connections and integration between the Facility's data network and the Existing Hospital Local Area Network (LAN).

7.9.7.2 In accordance with instructions and documentation provided by the Authority, the Design-Builder will:

7.9.7.2(1) Mount all network switches in the local Telecommunication Rooms in the Facility. This includes the provision and installation of all mounting hardware (screws and cage nuts) as well as the connection of network switches to the ePDUs installed in equipment racks.

7.9.7.2(2) Supply and install the materials and labour to physically connect all Authority supplied network equipment and switches to the Facility's intra-building fiber backbone infrastructure. For material specifications and installation requirements, refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications]. Refer to Section 7.9.5.5 for patching requirements.

7.9.7.2(3) Supply and install all patch cords required to connect network switches to all systems and end-use devices requiring connectivity to the Facility's data network. For material specifications and installation requirements, refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications]. Refer to Section 7.9.5.5 for patching requirements.

7.9.7.3 Network equipment and switches provided to the Design-Builder for the interior of the Facility will not be installed until the Facility is enclosed, weather tight, temperature and humidity conditions are approximately the same as final conditions expected, fiber backbone is installed and tested, most construction activities are complete and surfaces have been swept and treated for dust control. The Design-Builder will not be allowed to install wireless and wired network hardware until the Authority has inspected the interior conditions of the Facility and provided written approval to proceed with the installation.

7.9.7.3(1) Prior to receipt of network equipment and switches, the Design-Builder is required to provide the Authority with as-built documentation and the test results for the intra-building fiber backbone system.

7.9.7.3(2) Upon receipt of network equipment and switches, the Design-Builder will be financially responsible for any damage or disappearance of Authority provided material due to improper handling and storage, negligence, fire, theft and environmental conditions during construction.

7.9.8 Voice Communications

7.9.8.1 Dial tone for VoIP, analog and fax lines will be provided to the Facility through the new main RCH telephone system located in the Campus Communication Hub (CCH).

7.9.8.2 The voice network and infrastructure in the Facility will be equipped to provide VoIP, analog, fax and public access services.

7.9.8.3 Pay-telephones and courtesy phones will be located in the Building's entrance lobby and other areas as specified by the Authority.

7.9.8.4 A small number of dedicated taxi phones will be required in lobby area.

7.9.8.5 A computer will not share a Data Drop with a telephone device

7.9.8.6 The Authority will be responsible for:

7.9.8.6(1) Working with designated access providers to provide the telecommunication services necessary to connect RCH's main telephone system and the new Facility to the Public Switched Telephone Network (PSTN).

7.9.8.6(2) Extending the fiber and copper inter-building cabling necessary to connect the new main telephone system in CCH to the existing legacy phone system in Healthcare Centre

7.9.8.6(3) Integration between the new main telephone system in CCH and the existing legacy phone system in Healthcare Centre.

7.9.8.6(4) Providing, installing, configuring, programming and activating all telecom active hardware and telephone handsets and associated licenses and conference stations. The provision, installation, programming and activation of payphones (equipped with TTY) and taxi phones will be coordinated by the Authority with 3rd Party providers.

7.9.8.6(5) Providing voice mail and related features from RCH's main telephone system in the CCH.

7.9.8.7 The Design-Builder will:

7.9.8.7(1) Design, supply, install, test and certify a multi-conductor twisted pair Category 3 backbone cabling system that will connect the CCH to all Telecommunication Rooms. Refer Structured Cabling Section 7.9.5.3(2) for further details.

7.9.8.7(2) Design, supply, install, test and certify a Category 6A horizontal cabling system required to connect all phone and fax lines that comprise the

Authority's VOIP and analogue phone system, Patient telephone system and public telephone system. Refer Structured Cabling Section 7.9.5.2 for further details.

7.9.8.7(3) Provide the materials and labour required to cross-connect and patch all analogue, fax VoIP and public access lines in the new Facility. For material specifications and installation requirements, refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

7.9.8.7(4) Ensure the Facility is designed to accommodate easy access, installation maintenance, and upgrading of telephone services. This includes ensuring that design and construction of the Facility and any related custom millwork and infrastructure supports the installation of wall mounted phones and public access devices such as payphones.

7.9.9 AV and Videoconference Multimedia Rooms

7.9.9.1 Types of Multimedia Rooms:

7.9.9.1(1) In general, there are six (6) types of Multimedia Rooms:

7.9.9.1(1)(a) Type 1 rooms for Audio and Video (AV) presentations. Typically used for internal meetings and teleconferences. Presenters must be able to easily display audio and video content from a laptop or mobile device on to a permanently installed AV system including one HD digital display monitor with dual channel (stereo) speakers.

7.9.9.1(1)(b) Type 2 rooms designed and built for AV presentations plus Videoconferencing (VC). These rooms are used for AV and VC meetings and presentations, utilizing two permanently installed AV / VCHD digital display monitors, associated codecs, VC camera(s), systems controls and amplified sound systems. Seating and tables will be used in different configurations for AV and VC meetings. It is anticipated from the Indicative Design that there will be seven (7) Type 2 rooms.

7.9.9.1(1)(c) Type 3 rooms designed and built for AV plus VC are primarily used for clinical educational purposes. These rooms are teaching spaces that are used for VC and non-VC meetings, clinical skills sessions, and AV presentations, utilizing permanently installed AV / VC HD digital display monitors, VC camera systems, controls

and amplified sound systems. Refer to Appendix 1J(ll) [Clinical Education and Applied Research Space Infrastructure Specifications] for specific AV, Technical and Design requirements for the various Type 3 Rooms.

7.9.9.1(1)(d) Type 4 one hundred and twenty (120) seat multipurpose room. This room will be used for a variety of purposes. It is designed and built predominately as a large videoconferencing room, also a space for large group meetings, and large group AV presentations. The Type 4 room has a local control and projection/equipment room adjacent and will be fully videoconference equipped and enabled for connecting with other VC endpoints and external facilities. Built-in AV equipment, VC systems, systems controls, HD projection screens and sound systems are utilised. In addition to the multimedia design guidelines in this section, the Design-Builder will design and construct the Type 4 room in accordance with the more detailed requirements provided in Appendix 1J(l) [RCH MHSU Large Multipurpose Room Specifications]. There is only one (1) Type 4 room.

7.9.9.1(1)(e) Type 5a and Type 5b Multimedia rooms are used for Virtual Care (Telehealth). Virtual Care includes point-to-point videoconferencing utilizing two (2) monitors and one camera. Type 5a and Type 5b rooms are to be, wired and finished to fully enable the current and future installation, interconnection and operation of multimedia and other Virtual Care (Telehealth) equipment. Furthermore, in Type 5b rooms the Design-Builder will also install and interconnect the multimedia equipment It is anticipated from the Indicative Design that there will be forty-five (45) Type 5a rooms and ten (10) Type 5b rooms.

7.9.9.1(1)(f) Type 6 Multimedia rooms are used by the Authority for internally televised Patient interviews for the purposes of training and education via a Clinical Education and Observation Camera System. A portion of the Type 6 rooms will also be used for Virtual Care (Telehealth) and thus must also be fitted out to meet the requirements of Type 5a and Type 5b rooms. Furthermore, in Type 6 rooms the Design-Builder will also supply and install the Clinical Education and Observation Camera System. It is

anticipated from the Indicative Design that there will be twenty (20) Type 6 rooms. Refer to Section 7.9.10 for the Audio Video and technical requirements for Type 6 rooms.

7.9.9.2 Scope

7.9.9.2(1) The Authority is responsible for:

7.9.9.2(1)(a) Identifying multimedia room locations and types that are to be constructed to the multimedia standards.

7.9.9.2(1)(b) Identifying the typical number of seats (4, 8, 20, 120 etc.) required for multimedia purposes in each multimedia room. The number of seats in multi-media rooms only refers to that number of seats required for typical use as a multimedia room, not the maximum occupancy of the space. In cases where a multimedia room is used for non-multimedia purposes such as when tables are removed and additional chairs are brought in the actual occupancy figures and heat loads will be greater.

7.9.9.2(1)(c) Identifying those Type 5a, Type 5b and Type 6 rooms in the Facility that require multimedia, communications or construction infrastructure in order to provide functionality for Virtual Care (Telehealth) as well as for teaching and observation.

7.9.9.2(1)(d) Describing the Authority's standard requirements for construction and finishes for multimedia rooms. These standards will describe requirements for lighting, systems controls, wall finishes, window treatments, electrical and data distribution, and acoustics.

7.9.9.2(1)(e) Describing the types of equipment and connectivity required for the various types of multimedia rooms.

7.9.9.2(1)(f) Providing documentation at the time of the Design-Builder's procurement, of the Authority's current equipment standards and compliant makes and models of AV and VC equipment.

7.9.9.2(1)(g) Describing mounting requirements and other functional and aesthetic considerations for installing screens,

cameras, projectors, microphones, control devices and other related AV and VC equipment.

7.9.9.2(1)(h) Upon successful completion of the installation by the Design-Builder the Authority will configure videoconferencing codecs in multimedia rooms.

7.9.9.2(1)(i) Securing software licenses for videoconferencing systems, except for codec licenses which are the responsibility of the Design-Builder.

7.9.9.2(1)(j) Providing tables and seating for all multimedia rooms except for the Type 4 multimedia room.

7.9.9.2(1)(k) Providing and installing desk phones, wall phones, speaker phones, or conference phones deployed in multimedia rooms.

7.9.9.2(1)(l) Providing and installing a computer, keyboard and mouse in those multimedia rooms that require such a computer.

7.9.9.2(1)(m) Providing Virtual Care (Telehealth) clinical carts and desktop or laptop multimedia communications software in rooms used for Virtual Care.

7.9.9.2(1)(n) Reviewing the proposed layout drawings submitted by the Design-Builder for each multimedia room.

7.9.9.2(1)(o) Observing the testing and commissioning and integration of the multimedia systems to verify compliance, and to then participate further with performance verifications including testing connections with other FHA videoconferencing facilities and endpoints.

7.9.9.2(1)(p) Upon successful verification the Authority will program the codecs.

7.9.9.2(2) The Design-Builder is responsible for:

7.9.9.2(2)(a) Providing suitable Audio Visual professionals, who have experience and expertise in the design and installation of audio/video and videoconferencing systems and who are certified and accredited by the multimedia equipment manufacturers to a level that satisfies the Authority.

7.9.9.2(2)(b) Designing and constructing multimedia rooms incorporating the construction requirements, dimensions, layouts, materials and finishes that the Authority has described.

7.9.9.2(2)(c) Designing and installing any millwork, podiums or lecterns required to house or support AV or VC equipment in multimedia rooms.

7.9.9.2(2)(d) The procurement of all multimedia equipment and related cabinets or racks and hardware components necessary in order to provide complete AV and VC systems for Type 1, Type 2, and Type 4 multimedia rooms and the installation of that equipment. In Type 3 rooms, the Authority will supply and install its own AV and VC equipment.

7.9.9.2(2)(e) The installation and inter connection of multimedia equipment in Type 5b rooms that is procured by the Authority and supplied to the Design-Builder for that purpose.

7.9.9.2(2)(f) The procurement, installation and commissioning of all educational camera system equipment, controls and infrastructure required for Type 6 rooms as per Section 7.9.10.

7.9.9.2(2)(g) Providing centralized controllers and in room control panels (such as Crestron, or equivalent) and ensuring their customized display graphics match the FHA standards and templates for such controls. Stand alone in-room controls for building and AV systems shall not be deployed in multimedia rooms.

7.9.9.2(2)(h) Providing remote interface controls software (such as x panel, or equivalent) and the associated programming and integration of this networked software with other control systems for all multimedia rooms.

7.9.9.2(2)(i) Ensuring that the equipment supplied and installed conforms to or exceeds the Authority's latest types and standards for multimedia equipment at the time of the installation.

7.9.9.2(2)(j) The supply and installation of all wiring, connection cables, patch cables, connectors, terminals, mounting brackets, fasteners, hardware and accessories required for installing, interconnecting and operating the AV and VC equipment in multimedia rooms.

7.9.9.2(2)(k) Producing dimensioned drawings of each individual multimedia room, not just each room type, in the Facility for the Authority's review and approval. Each drawing set will include a floor plan identifying furniture layouts, Reflected Ceiling Plan, two cross-sections, a front elevation of the display wall. In addition, for the Large Multipurpose Room the rear elevation and the plan drawings of the Projection and Control Room. Drawings are to illustrate; the layout of all multimedia components and equipment, low voltage and electrical distribution including wall and floor boxes and wall/ceiling receptacles, lighting fixtures and controls, cable pathways (sleeves, conduits, raceways), vertical and horizontal sightlines, connection panels for auxiliary equipment and other requirements as described in Section 2.8.7 – Telecommunications Construction Documents.

7.9.9.2(2)(l) Providing adequate spaces and power outlets for all components.

7.9.9.2(2)(m) Providing floor boxes of a type acceptable to the Authority.

7.9.9.2(2)(n) Providing stackable seating and tables with folding/collapsible legs that can be locked into position of a type suitable for housing AV and power cables as part of an integrated AV solution in the Type 4 multimedia room. The seats and tables shall be easy to transport and store efficiently in the adjoining "Staging/Preparation Room" when the Type 4 room is converted for non-multimedia events as further described in Appendix 1J(l) [RCH MHSU Large Multipurpose Room Specifications].

7.9.9.2(2)(o) Shop drawings of mounting materials and method of installation for each component being installed in multimedia rooms.

7.9.9.2(2)(p) Prior to ordering equipment the Design-Builder will provide the following:

(p).1 A sample of all proposed multimedia equipment mounts.

(p).2 A sample and demonstration to confirm that screen image quality and legibility, at a distance equivalent to the furthest viewer's seat for each screen size, is acceptable to the Authority.

(p).3 A mock-up of the presenter's podium/lectern.

(p).4 A sample of proposed multimedia room floor boxes and connection panels

(p).5 A successful demonstration, in a room of similar size, of the videoconferencing microphone system proposed for the Type 4 room.

7.9.9.2(2)(q) The complete installation, interconnection, testing and commissioning by qualified AV contractors of all hardware, components and materials that form the AV and VC systems. This will include proper adjustment and fine tuning of audio levels and signal processing settings and other adjustments necessary to maximize the intelligibility of audio capture and playback and maximize the quality of video capture and display.

7.9.9.2(2)(r) Providing the Authority or its representatives with access to the multimedia rooms so that they may conduct inspections during construction, observe the testing and commissioning, and to ultimately participate in the verifications of multimedia equipment and systems.

7.9.9.2(2)(s) Providing control systems interfaces to, and integration with, the Fire Alarm system and BMS for lighting, HVAC and audio overrides in all multimedia rooms in emergency situations.

7.9.9.2(2)(t) Furnishing the Authority with as-built documentation of multimedia rooms and all O+M manuals for the AV and Videoconferencing and controls equipment and systems that the Design-Builder supplies or installs.

7.9.9.2(2)(u) Providing service training to the Authority's technical staff including wiring routes and interconnections, means of access to junction boxes, mounts and similar multimedia

infrastructure and related replacement procedures for all components.

7.9.9.2(2)(v) Delivering a working copy of the code changes related to customized GUI template programming for the Crestron or similar systems control panels

7.9.9.2(2)(w) Providing licenses for all videoconferencing codecs supplied by the Design-Builder.

7.9.9.3 Design Guidelines for Multimedia Rooms

7.9.9.3(1) The Design-Builder will coordinate with the Authority to ensure multimedia rooms are designed to support the technology and services required.

7.9.9.3(2) Multimedia rooms will not be located in areas in the Facility at risk from water entry due to plumbing or drainage failures or adjacent to sources of high humidity.

7.9.9.3(3) The design of multimedia rooms will facilitate flexibility of the spaces through the provision of appropriately located connection boxes in floors, walls and ceilings that distribute data, audio, video, controls and communications signals, and electrical power throughout the room.

7.9.9.3(4) Lids and covers of floor boxes will be flush with the finished floor, and not impede the flow of people or materials through the room.

7.9.9.3(5) The design of multimedia rooms will allow furniture to be relocated to facilitate various operational configurations. The design of the finished floor in the Type 4 room must incorporate a permanent pattern marking precisely where the tables are to be placed to enable proper alignment with screens and camera and efficient connections to floor boxes when configured for videoconferencing sessions and AV presentations.

7.9.9.3(6) Walls will be suitably reinforced in locations where monitors, televisions, screens, cameras and speakers are to be mounted, and ceilings will be suitably reinforced in those locations from which such items are to be hung or suspended.

7.9.9.3(7) All cables will be hidden and run in conduit in walls, ceilings and floors. Surface mounted raceways are not permitted.

7.9.9.3(8) Spare or empty conduits require pull cords.

7.9.9.3(9) Cables will be terminated with appropriate connectors in high quality plates that are suitable for the décor and finishes of the room.

7.9.9.3(10) Doors will be located out of view of videoconferencing cameras. Doors are to be solid, light-tight, lockable and secure. Access via a swipe or proximity card system that is capable of providing an audit trail of activities. Door secure status is to be monitored with door position switches connected to the Facility's security system.

7.9.9.3(11) Videoconferencing rooms require a wall mounted clock.

7.9.9.3(12) Whiteboards in VC rooms will be located in a position that can be seen by the camera. Whiteboards in all multimedia rooms will be non-reflective.

7.9.9.4 Acoustics and Noise Abatement

7.9.9.4(1) Rated acoustic walls for multimedia rooms will be constructed so as to minimize unwanted acoustic transfer. Interior double stud "party" walls with two layers of gypsum wallboard are to use offset studs with all intervening cavities filled with fibreglass or similar insulation.

7.9.9.4(2) Provide wall and floor assemblies with Sound Transmission Class (STC) ratings of 55 for walls and 50 for ceilings.

7.9.9.4(3) Design partition walls and ceiling construction to provide approximately the same degree of sound control through each assembly. When a partition is used for sound isolation extend the sound control construction from slab to slab.

7.9.9.4(4) Direct contact between the wall lining board and floor finish is to be avoided, to reduce vibration transfer. Wall plasterboard is to be stopped 5 mm above the floor and then be filled with acoustic sealant.

7.9.9.4(5) Air paths through walls are not permitted. Vents and grilles will not be installed in rated acoustic walls and device boxes are not to be installed "back-to-back" but are to be separated by one stud space.

7.9.9.4(6) Joints in successive layers of drywall are to be staggered.

7.9.9.4(7) Any gaps are to be sealed with acoustic sealant.

7.9.9.4(8) Ceilings in multimedia rooms will not be constructed of hard, acoustically reflective material. Acoustic ceiling tiles are required.

7.9.9.4(9) Fabric covered acoustic damping wall panels are to be installed on at least two adjacent walls in multimedia rooms having sixteen (16) or more seats to eliminate echo, reverberation and flutter. Install acoustic treatment panels starting 1M above finished floor and continue to ceiling

7.9.9.4(10) All doors will be fitted with door sweeps or seals that meet sill plates.

7.9.9.4(11) HVAC diffusers will be selected for low noise properties and must not vibrate or rattle. Dampers must not be placed within 3 metres of diffusers. Ducts in multimedia rooms must be lined with fibreglass duct liner.

7.9.9.4(12) Mechanical, electrical and other equipment that makes or emits noise will not be installed in multimedia room ceilings.

7.9.9.4(13) Design and construct the Facility so that noise from the mechanical systems does not exceed the noise levels of NC 25-35, dBA 30-35, within multimedia rooms.

7.9.9.4(14) Noise blocking measures will be undertaken to minimise ingress of noise from outside multimedia rooms. Target noise floor for multimedia rooms is NC-25 with an acceptable maximum of NC-30.

7.9.9.4(15) The interior noise levels of multimedia rooms (LA90 15 minute) due to exterior sources should not exceed noise levels of NC 25-35, dBA 30-35.

7.9.9.4(16) Utilize methods such as physical separations, insulated cavities, and other suitable noise and vibration mitigation measures in floors and ceilings to ensure noise and vibration associated with mechanical, electrical and other equipment does not negatively impact multimedia rooms.

7.9.9.4(17) Utilize vibration isolation methods and flexible, not rigid, connectors on all mechanical, electrical and other equipment adjacent to multimedia rooms to control airborne and structure borne noise and vibration.

7.9.9.5 Lighting

7.9.9.5(1) Quality. Lighting is to provide an evenly lit space with minimal glare and shadowing. LED lamp technology will be utilized where possible to reduce maintenance and energy costs.

7.9.9.5(2) Colour temperature will be 3500K suitable for video production. Achievable light levels in meeting rooms will be 80 foot candles measured 1 metre above the floor.

7.9.9.5(3) Dimming controls are to be provided for each multimedia room. All lighting circuits, fixtures and luminaires are to be dimmable. Dimming will be lineal and smooth, not stepped, from 100% down to 1%.

7.9.9.5(4) Controls to be via a Lutron/Crestron or similar wall mounted panel and in videoconferencing rooms with eight (8) or more seats also via a portable control tablet or similar device that communicates with the wall mounted unit.

7.9.9.5(5) Ceiling fixtures closest to display screens will be on a separate circuit so that they can operate independently of other lighting circuits in the room. All fixtures will be located so as to provide even coverage to desktop and faces while eliminating light spill washout on screens and camera lens glare.

7.9.9.5(6) Multimedia rooms with eight (8) or more seats require dimmable wall washers.

7.9.9.5(7) A separate key light is to be provided for a podium/lectern/presenter location in multimedia rooms with 25 or more seats

7.9.9.5(8) Lighting is to have multiple pre-set schemes to support meetings, televised interviews, AV presentations, video conferencing and Virtual Care (Telehealth) activities.

7.9.9.5(9) Lighting controls are to be integrated with the equipment controls and control panels in the rooms so that the meeting chairperson or the videoconference manager can vary the lighting to suit different activities.

7.9.9.5(10) Lighting controls in multimedia rooms will be interfaced to the building management system to enable monitoring and overrides necessitated by fire alarms or forced evacuations.

7.9.9.5(11) The Design-Builder will submit a photometric map for each individual multimedia room.

7.9.9.6 Wall Colours

7.9.9.6(1) Preferred wall colours for multimedia rooms are pale gray with a semi-flat finish. Alternate colours, deemed suitable for use in video production spaces, may be submitted for the Authority's approval. Semi-gloss finishes are permitted on door and window frames only.

7.9.9.7 Window Treatments

7.9.9.7(1) All exterior windows in multimedia rooms require blackout roller blinds that are non-reflective acoustically and visually. Blackout blinds in large (25 or more seats) meeting rooms will be motorized.

7.9.9.8 Type 3 Rooms

7.9.9.8(1) In addition to the requirements stated herein, the Design-Builder will design and construct Type 3 multimedia rooms in accordance with the requirements of Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications]. If there is a conflict between a provision of Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] and a provision of this SOR (with respect to Type 3 multimedia rooms only), the provision of Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] will govern.

7.9.9.9 Type 4 Multipurpose Room

7.9.9.9(1) The Type 4 room design will include the following;

7.9.9.9(1)(a) Seating that is stackable and suitable for a large videoconference/auditorium room incorporating features including aesthetics (materials and colours), ergonomics (comfort, ease of ingress/egress), acoustic absorption properties, durability, efficiency of transport and storage and ease of maintenance that are acceptable to the Authority.

7.9.9.9(1)(b) Tables with a smooth and solid surface for note taking both on paper and on electronic devices and of a type that is easy and efficient to remove, transport and store when required.

7.9.9.9(1)(c) Ability for 120 participants to simultaneously connect to 120v and USB 5V @1.5A power connectors housed in 30 or more distributed floor boxes. The Design-Builder is to coordinate the precise distribution of the floor boxes in conjunction with the Authority. The floor box layout is to be based on the furniture layouts developed for the room in both Videoconferencing mode and in AV presentation modes to allow easy and direct connection of cables.

7.9.9.9(1)(d) A raised modular dais or stage across the front presentation wall, high enough to provide clear sightlines from the presenter(s) to all seats in the room, and from

all seats in the room to standing or seated presenters. The stage or dais must have a removable, transportable ramp with a rise no greater than 1:12 or other removable, transportable means of providing wheelchair access..

7.9.9.9(1)(e) Working space for two presenters at a custom-built mobile lectern on the dais, with clear sightlines to cameras, screens, monitors and all audience seats.

7.9.9.9(1)(f) Enough stage area between the front wall and the front of the dais to accommodate seating and tables and electrical/data connectivity for panel discussions of four to six people.

7.9.9.9(1)(g) In Videoconferencing mode, all participants (local and distant) are to clearly see, hear, and speak to each other.

7.9.9.9(1)(h) All participants must be able to see (and hear, when applicable) other participants' presentation material.

7.9.9.9(1)(i) Presenters must be able to display content from a PC, a laptop or mobile device and other sources. Controls, communications connections and input sources for auxiliary equipment will be available at the lectern.

7.9.9.9(1)(j) A permanently installed AV presentation system.

(j).1 The AV system will have the ability to screen live television feeds, DVD and Blu-ray DVD content, audio playback, compressed and uncompressed digital video in all common forms including but not limited to Mpeg-4, Mpeg-2 H.264, H.265. AVI, MKV, MOV, as well as streaming feeds and other content from the Internet.

(j).2 The AV system will have one motorized large front projection screen for AV presentations. Locate the centre of the screen with the centre line of the seated area and the centre projection port. Screen is to be high gain, and non-perforated. Screen motors controlled via the touch panels at the lectern and the Projection and Control Room. This centre screen will be retracted during Videoconferencing sessions.

7.9.9.9(1)(k) A permanently installed dual codec Videoconferencing system.

(k).1 Two side-by-side projection screens for VC use as detailed in Appendix 1J(l) [RCH MHSU Large Multipurpose Room Specifications].

(k).2 There will be simultaneous display of electronic images including video, document camera, computer-based digital slides, and computer presentations, as well as images/sources from the remote locations.

(k).3 Four motorized high definition cameras with zoom lenses suitable for videoconference use in a large videoconference setting. Audience cameras are to automatically triangulate and pan/tilt/zoom to active audience microphones.

(k).4 For the purpose of connecting to remote sites, the room will be equipped with videoconferencing-based distance communications capability, allowing simultaneous transmission and reception of up to two video and two high-resolution graphics channels via dual videoconferencing codecs. The VC system can be controlled from the lectern touch panels, and the local Projection and Control Room, as well via a secure network interface to an external control centre.

(k).5 A custom lectern will be the primary systems control point housing a DVD player, computer interfaces, the systems controls touch screen, a document camera and other related technology and communications components and connection points.

(k).6 The presenter position requires two preview/confidence HD Digital display monitors located in front of the first row of seating and within the sightline of a presenter facing the audience. They will be mounted in a secure millwork housing. The purpose of these monitors is to provide the presenters with the ability to move freely about on the dais or stage while still seeing the selected source video and the VC participants in remote locations.

7.9.9.9(1)(l) The audio systems perform two key functions: playback of multimedia material from various local and remote

sources, and capture processing and playback of local live audio.

7.9.9.9(1)(m) This room will have one wired lectern microphone, two wireless head-worn presenter microphones, and six wireless hand-held microphones with table stands for panel discussions. Multiple microphones will be required for all participant-tables. The form and quantity of these microphones will be dependent upon the type of tables and seating that is approved by the Authority. Ceiling mics will not be used.

7.9.9.9(1)(n) The centrepiece of the audio systems will be a centralized Digital Signal Processor (DSP) and matrix mixer/router system that will allow the various microphone and AV source inputs to be sent to the appropriate signal paths with suitable signal processing. Auto mixers will be used to mix all microphones to manage feedback and signals will be simultaneously mixed and processed with automatic gain control and digital echo-cancelling. This process will be used for the videoconference and video recording/streaming feeds.

7.9.9.9(1)(o) The AV source inputs will be routed to the AV playback speakers, videoconference sends and archival feeds, as required. The DSP will also handle equalization, signal delays, compression, limiting, level adjustment and other required audio functions.

7.9.9.9(1)(p) A push-to-talk audience question and response microphone system is required throughout the audience seating area. One desktop microphone for each pair of seats if wired, One desktop microphone for each 3 seats if wireless. Audience microphones are to be non-latching. Microphones are to converge with active camera tracking. The Design-Builder is to investigate all wired and wireless microphone technologies in order to determine which microphone system will deliver the best legibility and operational functionality for 120 video conference participants in the Type 4 room.

7.9.9.9(1)(q) All audio and video equipment that the Design Builder supplies or provides will be AVB (Audio Video Bridging)

compliant and conform to IEE 802.1 Time Sensitive Networking standards.

7.9.9.9(1)(r) If the Design-Builder elects to deploy wireless multimedia devices such as microphones that require access to the Authority's WIFI network for connectivity, the Design-Builder will bear any associated costs with providing additional wireless communication outlets or augmenting the Authority's WIFI deployment to meet the requirements of these devices.

7.9.9.9(1)(s) The controls system will integrate the function of all controllable devices in the room including but not limited to screen motors, HVAC and lighting. All of the required controllable devices will be connected to central processors, allowing networked control from high resolution touch panels housed in the lectern, and in the Projection and Control Room.

7.9.9.9(1)(t) The room will be equipped with video and audio capture and streaming capabilities. Operations of the HD PTZ cameras, recording and streaming can be routed to the control system and controlled by the presenter or by the local operator via the control touch panels.

7.9.9.9(2) AV / Videoconferencing Projection and Control Room

7.9.9.9(2)(a) The Projection and Control Room is to be centred on the center-line of the Type 4 room facing the front wall.

7.9.9.9(2)(b) The Projection and Control Room will house three (3) video projectors, and all AV and Videoconferencing processing and control equipment, racks and other related multimedia equipment, including AV and VC control racks for other multimedia rooms.

7.9.9.9(2)(c) One openable viewing window with unobstructed views and three projection ports with unobstructed views to the screens are required between the Projection and Control Room and the Type 4 room. All of them are to be double glazed. The projection ports must be seamless and have an anti-reflective coating. Port glass must not be installed parallel to the projector lens but must instead be tilted by at least 5-degrees to reduce audio reflections and so that visual reflections are cast onto the floor of the projection

booth, not back into the projection lens or onto the ceiling.

7.9.9.9(2)(d) The Projection and Control Room will have space for two operator positions to allow an operator to monitor and support the multimedia sessions, as well as an operator to control the video capture and streaming equipment and other technical duties.

7.9.9.9(2)(e) Additional convenience connections for auxiliary multimedia equipment are to be provided at both the podium/lectern and to the local Projection and Control Room for use by presenters.

(e).1 Data and video input connection types are to include HDMI, USB, RCA composite video, Component video, Category 6A RJ45 (x2).

(e).2 Audio Input connections are to include two RCA stereo pairs (female).

(e).3 Provide network connectivity in the Projection and Control Room for reception and ingest of CATV or IPTV television signals or feeds.

7.9.9.9(2)(f) The ability to record and stream live events inbound and outbound;

7.9.9.9(2)(g) As the Projection and Control Room will also contain the equipment racks, active equipment and related videoconferencing control equipment for other multimedia rooms the Design-Builder will ensure that the power supply and cooling capacities of the Projection and Control Room are appropriately sized for the equipment and the operators.

7.9.9.10 Virtual Care (Telehealth) Additional Requirements

7.9.9.10(1) Source connection wall panels in all Type 5 rooms. Mobile Virtual Care (Telehealth) carts that the Authority may deploy are to be able to connect to the flat panel display screens in Type 5 multimedia rooms from a “source connection” wall mounted patch panel supplied and installed by the Design-Builder. The Design-Builder is to confirm with the Authority each wall location of the source connection patch panels.

7.9.9.10(2) Designated wall or floor boxes. Power (x2) and Data Drops (x3) for Virtual Care (Telehealth) carts will be provided from an additional designated wall or floor box in all Type 5 rooms. This box is in addition to

those boxes already called for in 7.9.11.13(1) Confirm the location of each designated wall or floor box with the Authority.

7.9.9.10(3) In any Type 5 multimedia room that is designated as a clinical space used by Patients then the layout, construction, fit-out, equipment and cabling must follow the Authorities guidelines and requirements for clinical spaces in the Facility.

7.9.9.11 Multimedia Room Equipment

7.9.9.11(1) HD Digital Display Monitors

7.9.9.11(1)(a) HD Digital display monitors will be commercial grade with a resolution of 1080p or better, securely attached to the front wall with tilt able VESA mounts. Monitors will have narrow, non-reflective bezels. Suitable screen size is determined by the ratio of the screen height (SH) to the distance of the most distant viewer (MDV) not exceeding a factor of 6.7 All screens must have the ability for networked control, including remote power on/off. Provide two (2) network drops at each screen location.

7.9.9.11(1)(b) Type 1 Meeting rooms require one flat screen monitor for AV presentations, wall mounted. Screen size (measured diagonally) will be determined by SH/MDV ratio. Stereo speakers can be integral or external wall mounted. Input connections will include RCA audio (x2), 1/8” stereo sub-min (x1), HDMI, RJ45. Provide two (2) network drops at each screen location.

7.9.9.11(1)(c) Type 2, Meeting rooms for AV presentation and video conferencing require 2 flat screen monitors. Screen size (measured diagonally) will be determined by SH/MDV ratio. Stereo speakers will be wall mounted. Input connections will include RCA audio (x2), 1/8” stereo sub-min (x1), HDMI, RJ45. Provide two (2) network drops at each screen location, 1 network drop at each codec location.

7.9.9.11(1)(d) Type 5 rooms require dedicated electrical and data wiring connections for two screen locations in each room. Provide 2 network drops at each screen location, 1 drop at each camera location, 1 drop at each codec location

7.9.9.11(1)(e) Controls for hardware in multimedia rooms must not be infra-red based. A hardwired feedback loop system that provides device status to the control panel, such as RS-232, Ethernet/LAN or similar will be used.

7.9.9.11(1)(f) Refer to Section 7.9.10 for Type 6 room equipment.

7.9.9.11(2) Video Projectors

7.9.9.11(2)(a) Video projectors will be ceiling mounted and installed in accordance with seismic requirements. Provide 2x power and 2x Category 6A Data Drops at the ceiling, above each projector

7.9.9.11(2)(b) Provide and install AV cables run from the projector to a wall mounted source connection patch panel at a suitable and convenient location to be approved by the Authority. Inputs will include HDMI, Category 6A RJ45.

7.9.9.11(3) Motorized Projection Screen

7.9.9.11(3)(a) The AV projection screen in the Type 4 room is to be motorized.

7.9.9.11(3)(b) Screen controls are to be on the GUI control panels at the lectern and in the Projection and Control Room.

7.9.9.11(3)(c) Control positions will include full speed homing to raised position, full speed homing to lower position, variable up and down speeds for additional minor adjustments for non-standard display sizes.

7.9.9.11(4) Videoconferencing Equipment

7.9.9.11(4)(a) At the time of the installation the videoconferencing equipment and connectivity will comply with latest Authority standards.

7.9.9.11(4)(b) Videoconference systems will be complete, including but not limited to monitors, cameras, codecs, microphones, automatic microphone controllers, amplifiers, speakers, video controllers, switching units, processing equipment, remote controls, and network connectivity.

7.9.9.11(4)(c) High definition codecs will send and received the audio and video signals to/from the other sites via remote VC

room systems or VC bridge. All codecs require minimum 2 camera inputs. Minimum of 4 inputs on video switchers. The Design-Builder is to procure and turn over to the Authority the appropriate Codec licenses for a functional system.

7.9.9.11(4)(d) Audio transmission quality will be Wideband 50Hz to 7Khz or higher. Telephone voice band is not acceptable.

7.9.9.11(4)(e) Video quality will support HD 720p and 1080p Encapsulation standards are to include H.264, MPEG-4, H.264 SVC and H.265 (HEVC).

7.9.9.11(4)(f) Cameras require positioning for appropriate image angles, and for complete visual coverage for all videoconferencing scenarios. Specifically, designated positions in the walls are required to accommodate the cameras.

(f).1 Cameras will be positioned such that when participants are looking at the screens, they appear to be looking in the direction of the camera.

(f).2 Cameras require appropriate protection from theft and damage.

(f).3 Adjoining spaces will be carefully analysed to detect and then prevent structural-borne vibration. High Definition cameras have a low tolerance for vibration, and the problem is compounded when using zoom lenses. Camera mount locations that have a detectable vibration will use isolation measures and dampening materials to stabilize the image.

7.9.9.11(4)(g) Ceiling mounted microphones in multimedia rooms (except the Type 4 room) in a quantity and location to provide full and even coverage. Type 3 rooms will require additional wiring for table microphones.

7.9.9.12 Equipment Installation in Multimedia Rooms

7.9.9.12(1) All materials and equipment used by the Design-Builder must be Canadian Standards Association (CSA) or Underwriters Laboratories (UL) approved and installed in accordance with manufacturer's specifications and recommendations.

7.9.9.12(2) Installation of flat screen monitors, motorized projection screens, video projectors, cameras, microphones, control devices, electronics and other dust sensitive equipment may only take place when the multimedia rooms are secure, clean and dust free.

7.9.9.12(3) Wiring, wiring infrastructure, connectors, conduits, wall floor and ceiling boxes, device boxes, connectors, brackets, mounts, fasteners and any miscellaneous material required to make the system functional is the responsibility of the Design-Builder

7.9.9.12(4) Videoconference codecs are to be properly mounted behind the flat panel screens in Type 2 and Type 5 multimedia rooms.

7.9.9.12(5) All wall and ceiling mounted components will be seismically supported by the Design-Builder in accordance with equipment manufacture's guidelines.

7.9.9.12(6) All multimedia cabling will be properly dressed and labeled at each end.

7.9.9.12(7) The Design-Builder will be required to follow anti-ligature requirements for devices mounted to a wall or ceiling in areas of the Facility specified by the Authority.

7.9.9.13 Distributed Power and Data Boxes for System Users

7.9.9.13(1) Floor Box power and data. Provide in-slab Floor boxes with flush steel tops, equally spaced beneath the meeting room tables. Lids in floor boxes located in floors with carpet or vinyl finishes will have matching flooring inserts. Each floor box to contain 2 x 120v duplex receptacles, 2 powered USB outlets and 2 x telecommunication outlet Data Drops. Provide one such floor box for every 4 end-user seats.

7.9.9.13(2) Auxiliary equipment connections in Type 1 AV rooms. From each flat screen provide wired connections to a wall mounted "source connection panel, such as Extron Cable Cubby or similar, that can be readily accessed by end-users in order to connect auxiliary equipment to the flat panel screens for Audio and Video playback.

7.9.9.13(2)(a) Data and video input connection types are to include HDMI, USB.

7.9.9.13(2)(b) Audio Input connections are to include an RCA stereo pair (female), and a hard-wired audio cable extension terminating in a 1/8" sub-mini stereo (male) connector,

7.9.9.13(3) Auxiliary equipment connections in Type 2 and 3 VC rooms. From each videoconference controller provide wired connections to a wall mounted termination panel, such as Extron Cable Cubby or similar, that can be readily accessed by end-users in order to connect auxiliary equipment to the flat panel screens for AV playback and as additional inputs to a videoconference session.

7.9.9.13(3)(a) Data and video input connection types are to include HDMI, USB.

7.9.9.13(3)(b) Audio Input connections are to include an RCA stereo pair (female)and a hard-wired audio cable extension terminating in a 1/8” sub-mini stereo (male) connector.

7.9.10 Clinical Education and Observation Camera and Audio Systems

7.9.10.1 The Design-Builder will design, supply, install and interconnect a complete, network based camera and playback A/V system that will be used for internally televising interviews for teaching and observation purposes in Type 6 multimedia rooms (refer to Section 7.9.9.1(1)(f) that are located on all clinical levels of the Facility.

7.9.10.1(1) The camera system used for teaching and observation will deliver real time viewing with extremely low to no latency or delay and synchronized audio and video streams.

7.9.10.1(2) The one-way live audio and video streams from this closed-circuit television system are private and must not be distributed or viewable on any other audio or video system, distribution network, monitors or screens other than those that are used by the Clinical Education and Observation Camera System.

7.9.10.1(3) The recording of audio or video streams from this camera system is neither required nor permitted.

7.9.10.2 Interview Room

7.9.10.2(1) The Type 6 multimedia rooms used specifically for observed Patient interviews will be equipped with two cameras, one focused on an interviewer and the other on the Patient.

7.9.10.2(2) The Design-Builder will provide five (5) Type 6 Interview Rooms for the Outpatient Unit and one (1) Type 6 Interview Room per Inpatient Unit for a total of ten (10) such rooms in the Facility. The locations are to be determined in consultation with the Authority.

7.9.10.2(3) Type 6 multimedia rooms used specifically for interviews will meet all the requirements relating to acoustics, noise abatement, lighting, interior finishes and installation practices as specified in Section7.9.9.

7.9.10.2(4) In each Interview Room, the Design-Builder will provide:

7.9.10.2(4)(a) Two (2) IP based cameras featuring

(a).1 Resolution 1080p,
(a).2 Frame Rate 30fps,
(a).3 Motorized Pan Tilt Zoom (PTZ),
(a).4 H.264 compression with Scalable Video Coding,
(a).5 standard tripod thread,
(a).6 brackets for secure wall mounting
(a).7 security slot.

7.9.10.2(4)(b) Two (2) RJ-45 network jacks terminated on a wall box plate at each camera location.

7.9.10.2(4)(c) One Duplex outlet at each camera location.

7.9.10.2(4)(d) One multi-element ceiling mounted vandal resistant stereo microphone, suitable for interview rooms and videoconferencing applications, connected to the clinical observation control system. Microphone is not to be installed adjacent to grills, louvers, ballasts or other sources of acoustic or electromagnetic noise. Microphone is to be capable of picking up all voices in the interview room at normal speaking volume. Intercom products are not acceptable for this system.

7.9.10.2(4)(e) Coordinate the mounting elevation and placement of cameras with the furniture layout and with the Authority.

7.9.10.3 Viewing Room

7.9.10.3(1) The Type 6 multimedia rooms used specifically for viewing interviews must be large enough to accommodate up to 10 people. The Viewing Room will be equipped with two wall mounted flat screen High Definition monitors, one to view the interviewer, and one to view the Patient. Occupants of the Viewing Room will be able to adjust, move and zoom the cameras situated in the Interview Room from a wall mounted control panel. The Viewing Room will also be equipped with speakers so that occupants can hear the interview.

7.9.10.3(2) The Design-Builder will provide five (5) Type 6 Viewing Rooms for the Outpatient Unit and one (1) Type 6 Viewing Room per Inpatient Unit for a total of ten (10) rooms in the Facility. In Inpatient Units, the Viewing Rooms must be located adjacent to Interview Rooms. The locations are to be determined in consultation with the Authority.

7.9.10.3(3) Type 6 multimedia rooms used specifically for viewing interviews will meet all the requirements relating to acoustics, noise abatement, lighting, interior finishes and installation practices as specified in Section 7.9.9

7.9.10.3(4) In each Viewing Room, the Design-Builder will provide:

7.9.10.3(4)(a) Two (2) 40-inch flat panel commercial grade HD Digital display monitors. Minimum 1080p resolution, 16:9 aspect ratio. Provide 2 network drops at each screen location.

7.9.10.3(4)(b) Two (2) tilt able VESA wall mounts.

7.9.10.3(4)(c) One pair of wall or ceiling mounted self-amplified stereo speakers.

7.9.10.3(4)(d) Crestron or similar wall mounted control panel and related centrally located backend equipment for controlling camera pan/tilt/zoom, three camera pre-sets, audio levels, audio muting, and selectable controls for switching between audio and video from every Interview Room.

7.9.10.3(4)(e) Coordinate the mounting elevation and placement of controls, monitors and speakers with the room layout and with the Authority.

7.9.10.3(4)(f) In addition to being a designated as a Viewing Room, the Observation Room identified on Level 01 of the Indicative Design will also be used for directly observing multiple group therapy sessions in adjacent rooms on two sides through one-way glass mirrors (also called two-way glass mirrors) suitable for use in research and interrogation rooms. To support this use case, the Design-Builder is required to provide:

(f).1 One multi-element ceiling mounted stereo microphone in each adjacent Group Therapy Room. The microphones must be suitable for interview rooms and videoconferencing

applications, connected to the system controller in the Observation Room. Microphones are not to be installed adjacent to grills, louvers, ballasts or other sources of acoustic or electromagnetic noise.

(f).2 Stereo audio distribution to three (3) wall plates in the Observation Room each with eight (8) stereo headphone 1/8" mini jacks. This will allow individuals to choose between hearing audio sources through headsets instead of the speakers when two simultaneous group therapy sessions are being observed.

(f).3 Etch the wall plates, in a manner satisfactory to the Authority, that will clearly identify the audio source.

(f).4 One plate is to be located under each window, one plate is to be located under the video screens. Coordinate the placement of the headphone jack plates with the Authority.

7.9.11 CATV / IPTV

7.9.11.1 The Authority will:

7.9.11.1(1) Coordinate with its designated access provider to bring CATV services into the Facility and to extend those services from the Entrance Facility Room to the required Telecommunications Rooms. This includes the provision of a backbone riser, active equipment and passive components.

7.9.11.1(2) Provide televisions to meet the functional requirements of the space.

7.9.11.2 The Design-Builder will:

7.9.11.2(1) Install one (1) coaxial non-flooded, non-messengered RG6 or RG11 drop and two Category 6A Data Drops to each TV location in the Facility.

7.9.11.2(1)(a) The configuration of this sub system will be a star structure with separate dedicated cables run in a continuous fashion with no splices from the CATV backboard in the servicing local Telecommunications Room to the work area telecommunications outlets on the same floor.

7.9.11.2(1)(b) The length of RG6 horizontal runs between the telecommunications outlet and the CATV backboard in the TR shall not exceed 46m (150'). Where the length of the horizontal run between the telecommunications outlet and the CATV backboard exceeds 46m (150'), RG11 shall be used. The length of horizontal runs between the telecommunications outlet and the CATV backboard using RG11 shall not exceed 75m (246').

(b).1 Adhere to ANSI/TIA-568-C.4, industry best practices and manufacturer's specifications for pulling tension, minimum bend radii and sidewall pressure when installing cable.

(b).2 When installing, ensure cable is not subjected to stress due to contact with tray/conduit support mechanisms, bonding lugs or any metal burrs within the support structure. Particular care must be taken around corners and offsets. Pulling lubrication must be used at all times to ensure a stress-free installation.

(b).3 Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Authority.

(b).4 A minimum of 200 mm (8") of excess cable will be stored at each telecommunications outlet, adhering to the minimum bend radius specified by the manufacturer. Provide an additional three (3) meters of slack cable inside the TRs neatly coiled above the plywood.

(b).5 All connectors, components, (wall and or rack mountable) patch panels, outlet boxes, face plates, inserts, modules and associated hardware will be provided and installed for each coaxial cable drop. Coax connectors shall be a one-piece F-type compression connector, nickel plated with molded-in gasket. Wall plates will have F-connector plate adaptors to match the structured cabling manufacturer.

(b).6 Cables shall be identified by a self-adhesive label. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate and at each patch panel. Cable labels will

identify site/building name, TR ID as well as the ID of the patch panel and port in the TR (where the cable is terminated) in accordance with Authority standards.

(b).7 Faceplates and jacks will be labelled in accordance with Authority standards to identify site/building name, TR ID as well as the ID of the patch panel and port in the TR (where the cable is terminated).

7.9.11.2(1)(c) RG6 coaxial cable will be equal or better than CommScope 2227K RG6 type Quad Shield. RG11 coaxial cable will be equal or better than CommScope 2287K RG11 type Quad Shield. The Flame Test (FT) rating of the cables shall be as required by the Authority Having Jurisdiction.

7.9.11.2(1)(d) Coaxial cable distribution and Category 6A Data Drops will be designed and installed in accordance with Section 7.9.5.2.

7.9.11.2(2) Provide all communications pathways required to support the CATV system in accordance with Section 7.9.4.2.

7.9.11.2(3) Provide Conditional Power to each television location in the Facility.

7.9.11.2(4) Provide 1200 mm (48”) x 2400 mm (96”) x 19 mm (3/4”) of wall space for CATV use only in the EF Room (refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for further details) and each TR in the Facility.

7.9.11.2(5) Provide two (2) 15 amp, 120volt AC duplex receptacles on a dedicated circuit for CATV equipment. Receptacles will be located on the CATV backboard at a location and height that will be determined in consultation with the Authority. The CATV system will use Conditional Power.

7.9.11.2(6) Allocate four (4) rack units of space for IPTV equipment in all TRs.

7.9.11.2(7) Integrate televisions and associated components seamlessly into the fabric of the building and provide any reinforcement required to support the televisions.

7.9.11.2(8) Provide all necessary measures to eliminate sources of glare coming from interior and exterior sources of light that will impact the ability to

view a television monitor. This includes, but is not limited to window coverings, paint colour, lighting and lighting control and the correct placement of television monitors relative to sources of light.

7.9.11.2(9) Provide anti-ligature and anti-vandalism measures such as enclosures or cabinets to house television monitors and related in components in areas designated by the Authority.

7.9.11.2(10) Install Authority provided television monitors and related components. This includes the provision of all television mounting brackets and hardware.

7.9.12 Digital Signage

7.9.12.1 The Design-Builder will design, construct and prepare walls in various locations throughout the Facility specifically in order to enable mounting and interconnection of HD Digital Signage Screens. These screens will be used for a variety of purposes and may be installed in either a “portrait” or “landscape” orientation depending on use.

7.9.12.2 The Authority will identify those areas that will require such preparation. They will include, but are not limited to;

7.9.12.2(1) Facility entrances, vestibules.

7.9.12.2(2) Parking Levels

7.9.12.2(3) Lobby Spaces including Large Multipurpose Room Lobby, Main Lobby, Elevator Lobbies.

7.9.12.2(4) The Connector Bridge, and hallways.

7.9.12.2(5) Areas where staff congregate.

7.9.12.2(6) Public waiting areas and lounges.

7.9.12.3 The Design-Builder will work with the Authority to determine ideal viewing angles on a screen by screen basis in order to precisely locate mounting and connection points at each Digital Sign location.

7.9.12.4 The Authority will determine the size of the monitor screen at each location.

7.9.12.5 The Design-Builder will construct walls in those locations with sufficient backing material to support the weight of the monitors and their accessories, including the digital media player and the mounting bracket for each screen.

7.9.12.6 At each Digital Signage Screen location provide one duplex outlet and two (2) Category 6A Data Drops at the required elevation.

7.9.12.7 In locations that the Authority requires a flush installation the walls shall be constructed with cavities and recessed power and data outlets to allow the Digital Signage Screens and accessories to be recessed into the wall.

7.9.13 Interactive Media Systems in Comfort Rooms

7.9.13.1 The authority requires the Design-Builder to provide roughed-in infrastructure necessary to support the installation of Interactive media walls in each of the Comfort Rooms. These are large, self contained touch screens of varying dimensions that are recessed into a mounting frame embedded in the wall so as to provide a flush, tamper free surface. The screens have integrated (hidden) speakers, a camera, and connections to the internet and building systems controls

7.9.13.2 The Design-Builder is to locate the screens in each comfort room, in coordination with the Authority, to enhance viewing angles, avoid doors and other impediments, provide comfortable viewing heights, and safeguard accessibility for maintenance.

7.9.13.3 The Design-Builder is to frame out the cavity with dimensioned lumber, using the mounting frame dimensions provided by the manufacturer.

7.9.13.4 Each screen location will require a 120v duplex outlet for power, 1 network Data Drop, the interface connection to lighting and climate control (such as KNX, DALI, DMX, MODBUS etc.), and 1 CATV/coax connection. All of these are to be located on suitable terminations inside the wall cavity to enable easy connection to the interactive media system.

7.9.13.5 The Interactive media walls require ventilation. Coordinate the screen's air intake and outlet locations and required air flow pathways inside the wall cavity.

7.9.13.6 In any comfort room that will not have an interactive media wall installed prior to the project completion date the Design-Builder is to install removable blocking inside the cavity, securely cover the wall cavity with a plywood insert, and paint to match the surrounding wall. The intention being that at the time of eventual installation the plywood insert can thereby be quickly and easily removed.

7.9.14 Supplemental Sound Systems

7.9.14.1 Supplemental Audio playback systems (amplified speakers) are required in multiple rooms throughout the facility. The intention is to provide a means of localized and focused playback of music and other audio content, with adjustable

volume controls so that the sound levels are appropriate within the rooms without leaking into adjacent spaces.

7.9.14.1(1) Full range quality audio playback that is free from distortion, hum and other noise is required.

7.9.14.1(2) Components used must be selected for their ability to deliver clear legibility of speech and distortion free music in order to prevent the need for over amplification.

7.9.14.2 In each Dining Room/Lounge:

7.9.14.2(1) Supply and install amplified, stereo, flush mounted ceiling speakers.

7.9.14.2(2) Ceiling grills are to match, or blend in with the ceiling's colour.

7.9.14.2(3) Provide audio wiring connected to the stereo headphone output jack on the television.

7.9.14.2(4) Audio levels are to be controlled with the television's remote control.

7.9.14.3 In each Exercise/Wellness room:

7.9.14.3(1) Supply and install amplified, stereo, flush mounted ceiling speakers.

7.9.14.3(2) Ceiling grills are to match, or blend in with the ceiling's colour.

7.9.14.3(3) Provide audio wiring connected to a wall mounted volume control (such as the Signa ST-WBT1 or equivalent) located adjacent to the light switch. The volume control will incorporate Bluetooth input from I-phone and Android phones, an auxiliary 1/8 mini jack input, and provide output from the rear to the amplified ceiling speakers.

7.9.15 Public Address

7.9.15.1 Basic Requirements

7.9.15.1(1) In accordance with the Authority's Overhead Paging Policy (refer to the Data Room for this policy), the Public Address (PA) System is to be used for only announcing specific emergent situations such as all code calls, stat calls, unexpected major equipment downtimes (ex. Meditech computer system, any telecommunications system, etc.), fixed equipment failures (fire alarms, power testing, generator testing, alarm testing, etc.) and any extraordinary emergent conditions and or situations.

7.9.15.1(2) The PA System is viewed by the Authority as its “last line of defense” in terms of communicating with Patients, staff and visitors on emergent conditions and situations and thus the PA System provided by the Design-Builder must be reliable, resilient and easy to operate and maintain with minimal mechanical contact points.

7.9.15.1(3) The PA System will be separate from and act independently of the Fire Alarm System and its emergency voice communications system.

7.9.15.1(4) Alternative communications systems other than the PA system will be used for routine communications between staff and other Facility occupants.

7.9.15.1(5) The Design-Builder will provide the infrastructure required for a PA System in the Facility.

7.9.15.1(6) The Design-Builder will physically and logically integrate the Facility’s PA System with the Existing Hospital PA System so that it becomes part of a single paging zone for the site. This includes integration with the Authority’s existing contact centre interface and to the back-up microphone situated in Emergency Registration.

7.9.15.1(7) The Design-Builder will provide complete speaker coverage throughout the Facility excluding the parking levels, Patient Bedrooms, Secure Rooms, isolation rooms and comfort rooms so that pages can be heard throughout with high intelligibility and low loss of articulation of consonants.

7.9.15.1(8) The Design-Builder will train the Authority’s Maintenance and Operational staff on how to maintain the PA System.

7.9.15.1(8)(a) A training course will be given by the Design-Builder on site during normal working hours.

7.9.15.1(8)(b) The training shall cover all of the items contained in the approved operating and maintenance manuals as well as a demonstrations of routine maintenance operations.

7.9.15.2 Performance Requirements

7.9.15.2(1) The Design-Builder will ensure the full functionality of the PA System is available via the existing contact centre interface.

7.9.15.2(2) Provide sound levels as follows throughout the Facility:

7.9.15.2(2)(a) Normal paging: 60 dB minimum.

7.9.15.2(2)(b) Paging sound levels will be at least 10 dB above ambient noise levels in all locations.

7.9.15.2(3) The Design-Builder will provide all equipment necessary for a fully operational public address system including but not limited to:

7.9.15.2(3)(a) Paging amplifiers. The Design-Builder is to provide one additional spare paging amplifier over and above the number required to operate the Facility's PA System. Paging Amplifiers will be a TOA DA-250FH Multichannel Power Amplifier or approved equal.

7.9.15.2(3)(b) Speakers

(b).1 All speakers must be multi-tap.

(b).2 Flush tamper proof ceiling speakers in finished areas.

(b).3 Enclosed ceiling speakers in unfinished areas

(b).4 Trumpet type speakers in mechanical and other high ambient noise locations.

7.9.15.2(3)(c) Power supplies and other support equipment.

7.9.15.2(4) Paging amplifiers are to be rack mounted in a centralized location within a Communications Room.

7.9.15.2(4)(a) Equipment racks are to be provided and installed for the PA System by the Design-Builder in accordance with Section7.9.4.3(4).

7.9.15.2(4)(b) The amount of rack space provided will accommodate all the equipment required for PA System plus sufficient space for 25% growth. Empty space dedicated for future growth of the PA System will be covered by blank panels.

7.9.15.2(4)(c) Equipment and equipment racks shall be grounded to the Telecommunication Ground Bus (TGB) using #6 conductor in accordance with Section 7.9.4.1.

7.9.15.2(4)(d) Equipment racks are to be provisioned with power and ePDUs in accordance with Section 7.9.4.3(3)(m) and 7.9.4.3(4)(e)

7.9.15.2(5) All PA system wiring be run in conduit, and cable tray even in fully accessible ceiling areas. Pathways are to be designed and installed in accordance with Section 7.9.4.2.

7.9.15.2(6) Size amplifiers to handle the total load plus 25% spare capacity per channel.

7.9.15.2(7) Maximum of one second delay between accessing the system and the ability to transmit a page from either a local station or remotely.

7.9.15.2(8) Wire alternate speakers to different amplifier channels such that a fault on one channel does not render paging in an area inaudible.

7.9.16 Intercommunication System

7.9.16.1 Basic Requirements

7.9.16.1(1) The Design-Builder will: provide intercom systems in the following locations:

7.9.16.1(1)(a) Locked entrance doors in the Facility where delivery personnel or the public will require access.

(a).1 Provide door stations with integral two-way audio and one-way video capabilities.

(a).2 Door stations located at locked entrance doors will link to the master intercom station at the Security Office.

(a).3 Master intercom station at the Security Office will be capable of remotely unlocking entrance doors.

(a).4 The numbers of locations are to be determined in consultation with the Authority, based on the Facility Threat and Risk Assessment.

7.9.16.1(1)(b) Ante Rooms that are attached to Secure Rooms and all Secure Rooms.

(b).1 Ante Room door stations will have integral two-way audio and one-way video capabilities and be equipped with two call buttons; one call button to the Secure Room door station and the second call button to the master intercom station at the Care Team Base.

(b).2 Secure Room door stations will be audio only and will have no buttons (voice activated hands free operation).

(b).3 Secure Room door stations will link to the door station in the Ante Room and to the master intercom station in the Care Team Base. Speakers at Care Team Base shall have volume control to reduce volume but not turn off completely.

(b).4 Intercom Systems for Secure Rooms will be provided in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act.

7.9.16.1(1)(c) Sally-Port and Secure (Sally-Port) Vestibule

(c).1 Sally-Port and Secure Vestibule door stations will have integral two-way audio and one-way video capability.

(c).2 Sally-Port and Secure Vestibule door stations will be equipped with a minimum of seven (7) direct dialing buttons. Each button will be programmed to link to a designated master intercom station in the Inpatient Units and the reception of the Outpatient Clinic and the Neurostimulation Clinic.

(c).3 Each Inpatient Unit Care Team Base and the reception of the Outpatient Clinic and the Neurostimulation Clinic will have master intercom stations.

(c).4 Master intercom stations will be capable of remotely unlocking the door at the Sally-Port.

7.9.16.1(1)(d) Secure entry doors to all Inpatient Units

(d).1 Provide door stations with integral two-way audio and one-way video capabilities.

(d).2 Each Inpatient Unit will have master intercom stations located at the Care Team Base. Calls from the door-station outside the Unit‘s entry door will link to the master intercom station located at the Unit’s Care Team Base.

(d).3 The master intercom station will have direct visual control of the Inpatient Unit entry and Elevator Lobby

(d).4 Master intercom stations will be capable of remotely unlocking the entry door to the Inpatient Unit.

7.9.16.1(2) Design and provide intercommunication system to include 25% growth after final commissioning has been completed.

7.9.16.1(3) Provide power where required and all back boxes.

7.9.16.1(4) Include end user intercom equipment replacement parts of each type for quick swap out.

7.9.16.2 Quality Requirements

7.9.16.2(1) The intercom systems will be manufactured by recognized industry leaders in the intercom business.

7.9.16.2(2) Provide an IP Intercom System equal or better than a Commend IP Intercom System. Provide all Intercom Server equipment and programming required for a turnkey solution.

7.9.16.2(3) The Design-Builder will furnish operations, programming and maintenance training with the intercom system. Operating, programming and maintenance manuals and user guides will be provided at the time of training.

7.9.16.3 Performance Criteria

7.9.16.3(1) Integrate intercom stations with the video surveillance system such that in the event an intercom station is activated the nearest CCTV camera will focus on the location of the request and display the image on the workstation associated with the master station receiving the call.

7.9.16.3(2) Video intercom door stations will be mounted in such a way that the area behind and beside the person requesting access is visible so the staff member can determine if other individuals are present.

7.9.16.3(3) Computer workstation monitors will not be used to display intercom video.

7.9.16.3(4) All door stations must be capable of being programmed to call any number of the master intercom stations on the intercom network and may be answered from any of these locations. In addition, the system must be programmable so that the call can be forwarded and redirected a number of times to ring at different master intercom station locations.

7.9.16.4 Description of Intercom Equipment

7.9.16.4(1) The door stations for the Inpatient Unit Doors and the locked Facility entrances in the Facility will be equal to or better than the Commend IP-Version wall station WS 201V I CM series and shall have:

7.9.16.4(1)(a) Digital pan/tilt and zoom with a minimum 170-degree wide-angle lens.

7.9.16.4(1)(b) Video Quality – HDTV 720P and H 264

7.9.16.4(1)(c) Supports DSP features, hands-free OpenDuplex audio capability; and switched duplex

7.9.16.4(1)(d) Voice Speech quality – 16 kHz voice speech quality

7.9.16.4(1)(e) push-to-talk/call buttons; and

7.9.16.4(1)(f) Protection classification IP65 vandal resistant and mechanical impact resistance up to IK09, tamper resistant and anti-ligature where accessed by Patients

7.9.16.4(1)(g) Each video door intercom station shall be able to provide a REX signal to the access control system for door release.

7.9.16.4(2) The door stations for the Sally-Port and Secure Vestibule will be equal to or better than the Commend IP-Version wall station WS 200 series and will be equipped with a direct dialing module with a minimum of seven (7) illuminated direct dialing buttons and labels.

7.9.16.4(2)(a) Digital pan/tilt and zoom with a minimum 170-degree wide-angle lens.

7.9.16.4(2)(b) Video Quality – HDTV 720P and H 264

7.9.16.4(2)(c) Supports DSP features, hands-free OpenDuplex audio capability; and switched duplex

7.9.16.4(2)(d) Voice Speech quality – 16 kHz voice speech quality

7.9.16.4(2)(e) Minimum of seven (7) programmable illuminated direct dialing push-to-talk/call buttons for Sally-Port and Secure Vestibule.

7.9.16.4(2)(f) Protection classification IP65 vandal resistant and mechanical impact resistance up to IK09, tamper resistant and anti-ligature where accessed by Patients.

7.9.16.4(3) Each video door intercom station shall be able to provide a REX signal to the access control system for door release.

7.9.16.4(4) The door stations in the Secure Rooms will be equal to or better than Commend IP-Sub Station ES 962A series and shall have;

7.9.16.4(4)(a) OpenDuplex with hands free communication with high volume audio capability

7.9.16.4(4)(b) Voice Speech quality – 16 kHz voice speech quality

7.9.16.4(4)(c) Protection classification IP65 and mechanical impact resistance up to IK09, tamper resistant and anti-ligature where accessed by Patients

7.9.16.4(4)(d) No call button.

7.9.16.4(5) The door stations in each of the Ante Rooms attached to a Secure Room will be equal to or better than Commend IP-Version wall station WS 202V I CM series and shall have:

7.9.16.4(5)(a) Digital pan/tilt and zoom with a minimum 170-degree wide-angle lens.

7.9.16.4(5)(b) Video Quality – HDTV 720P and H 264

7.9.16.4(5)(c) Supports DSP features, hands-free OpenDuplex audio capability; and switched duplex

7.9.16.4(5)(d) Voice Speech quality – 16 kHz voice speech quality

7.9.16.4(5)(e) Two push-to-talk/call buttons; and

7.9.16.4(5)(f) Protection classification IP65 and mechanical impact resistance up to IK09, tamper resistant and anti-ligature where accessed by Patients

7.9.16.4(6) Provide desktop master intercom stations with integral colour monitor, complete with momentary remote pushbutton(s) operation to release entry door(s) when activated by staff.

7.9.16.4(6)(a) Master intercom stations will be equal to or better than Commend IP-Version wall station WS 810P I series and shall have.

(a).1 Desk and wall mount capability;
(a).2 3.5” Colour-TFT display; minimum display resolution 320 x 240 pixels with 65,000 colours
(a).3 Display of IP video streams (MJPEG) static graphics (JPEG) or analogue CVBS video signal
(a).4 Supported analogue video systems: PAL and NTSC
(a).5 IP65 Protection classification
(a).6 Voice Speech quality – 16 kHz voice speech quality
(a).7 Supports DSP features, hands-free OpenDuplex audio capability
(a).8 Reception desks/care stations or other locations receiving the video calls shall be able to remotely unlock the door.
(a).9 Back-lit alphanumeric standard keypad
(a).10 Desk mount Kit and handset

7.9.16.4(7) Provide a Digital IP-Intercom Server that is equal to or better than Commend GE 800 Series with necessary equipment for a complete system. Server will be located inside the CCH.

7.9.17 Nurse Call Systems

7.9.17.1 Basic Requirements

7.9.17.1(1) The Nurse Call System will provide Patient assist, code blue and staff assist functions in Patient Bedrooms and other locations as specified or as required by the Authority. Staff duress functions will be provided by a separate staff duress system as specified in Section 7.10.5 Panic/Duress System.

7.9.17.1(2) Provide a full feature audio and visual nurse call system with full duplex communications.

7.9.17.1(3) Nurse call system shall be Rauland 5.

7.9.17.1(4) Design the system in coordination with the Authority.

7.9.17.1(5) Design-Builder will procure, install, integrate, test and commission the nurse call system complete with all hardware and software

necessary to meet or exceed the requirements in this Section, and will cause manufacturer to:

7.9.17.1(5)(a) Prior to selecting, designing and installing the nurse call system and as required by the Authority, review the technical capabilities of the proposed nurse call system, hardware, redundancy issues, system layout and functionality with the Authority and the Authority's clinical staff;

7.9.17.1(5)(b) Design the Nurse Call System in consultation with the Authority's clinical staff, including hardware and software functionality and system workflow; including reporting tools.

7.9.17.1(5)(c) Implement the Nurse Call System, including to install, program, test and commission the system, and coordinate all workflows with the Authority; and

7.9.17.1(5)(d) Train Authority end-user staff and supporting staff on the nurse call system in all areas where new or upgraded equipment is installed. Provide a minimum of four (4) sessions of 4-6 hours of training for clinical super-users, and a minimum of ten (10) hours of technical training for FMO staff.

7.9.17.1(6) Staff shall have the means to disable nurse call buttons on an individual basis to prevent misuse by Patients.

7.9.17.1(7) System shall have the capability to integrate with wireless staff devices, EMR, ADT and staff scheduling systems.

7.9.17.1(8) System shall include reporting/auditing features and all required software/licensing for workstations.

7.9.17.2 Quality Requirements

7.9.17.2(1) The nurse call system will utilize the latest proven technology used in facilities similar to the Facility.

7.9.17.2(2) Comply with all applicable standards, including UL1069, CSA C22.2 and CSA Z32-09.

7.9.17.3 Performance Criteria

7.9.17.3(1) Confirm all operational workflows, call flows and device locations through user group meetings prior to installing or programming the system.

7.9.17.3(2) All data points within the nurse call system will be capable of being retained for the purposes of reporting for a minimum 30 days.

7.9.17.3(3) Provide a separate physical network, as per the Manufacturers requirements, and all network equipment for the nurse call system and integrate this network, in consultation with the Authority, with other Facility networks. Nurse call system will work in stand-alone mode if the hospital LAN is down.

7.9.17.3(4) Utilize standard Category 5e (or greater based on standard in place at the time of procurement) copper cabling and connectors for nurse call cabling as required by the manufacturer.

7.9.17.3(5) All nurse call network horizontal runs to Communications Rooms will be terminated and labelled in accordance with Section 7.9.5 Structured Cabling. Connections from the Nurse Call System to the Authority network shall utilize Category 6A UTP in accordance with Structured Cabling specifications.

7.9.17.3(6) All system equipment (excluding servers) shall be from a single manufacturer and shall be the same model number from that manufacturer.

7.9.17.3(7) Nurse Call System shall be supplied by power from the uninterruptible power system (UPS) with backup from the emergency power system.

7.9.17.3(8) Provide connection to Patient Bedroom smoke detection system to annunciate on the Nurse Call Dome lights as per code.

7.9.17.3(9) The nurse call system will annunciate on the master console located at Care Team Stations on each unit. At a minimum, provide a staff console in each clinical nursing area including care team bases, care hubs, nurse stations, reception, and treatment areas..

7.9.17.3(10) Staff consoles will be colour, touch screen, user configurable, allow multiple screens, soft key enabled and hands-free full duplex capability with handset for private conversations.

7.9.17.3(11) Staff consoles will have the capability to redirect all calls to other staff consoles on a manual, automatically scheduled basis, call

escalation, or console failure. Confirm programming through user group meetings.

7.9.17.3(12) In each Patient Bedroom provide the following:

7.9.17.3(12)(a) One Patient assist button for each bed location; and

7.9.17.3(12)(b) Two bath stations with call button capability, one located at floor height (300m AFF) and one at standing height (1050mm AFF) in the Ensuite.

7.9.17.3(13) In each Patient/Public Washroom accessible by Patients, provide the following:

7.9.17.3(13)(a) One Patient button.

7.9.17.3(14) Patient stations will be individually programmable to allow multiple call classification and priority levels. Patient stations will be capable of connecting two alarm inputs. Provide the ability to disable any nurse call system input from any staff console.

7.9.17.3(15) The nurse call system will not have any cords included as part of the solution; only buttons will be acceptable. All parts of the system shall be non-ligature and tamper-resistant where accessible by Patients.

7.9.17.3(16) Provide multi-call classification dome light (minimum 4 LEDs) to annunciate calls in all rooms with nurse call devices. Locate dome lights in a manner that allow Authority staff the best possible view from the outside of the room where the nurse call device is located. Provide zone lights at all corridor intersections to direct and lead staff from anywhere within or outside the unit to the origin of the call.

7.9.17.3(17) Provide a staff assist system with buttons at locations determined in consultation with the Authority, including Tub Rooms and Secure Outdoor Spaces.

7.9.17.3(18) Provide a code blue system with code blue buttons at locations determined in consultation with the Authority including: Tub Rooms, ECT treatment & recovery areas, and strategic corridor locations to be coordinated with the Authority.

7.9.17.3(19) Provide a code blue system that achieves the following sequence of operation:

7.9.17.3(19)(a) Upon a Code Blue button activation a priority call signal will be annunciated at the staff console.

7.9.17.3(19)(b) Provide dome/zone lights at all corridor intersections elevator lobbies to direct and lead the code blue team from anywhere within or outside the unit to the origin of the code blue call.

7.9.17.3(19)(c) Upon cancellation of the code blue call at the Patient station all systems will reset and resume normal operation.

7.9.17.3(20) Provide adequate staff/duty stations for each nurse call system to ensure that tones are heard throughout each department. Provide the capability to mute at each staff/duty station.

7.9.18 Distributed Antenna System (DAS)

7.9.18.1 Overview

7.9.18.1(1) The Authority shall deploy a Hybrid-Fiber-Coax Active DAS in the Facility. A Hybrid-Fiber-Coax Active DAS is where single mode fiber connects the DAS head end to radio repeaters situated in Communications Rooms. From the radio repeaters, RF energy is distributed to passive antennas located throughout the Facility over horizontal coax cabling.

7.9.18.1(2) The Hybrid-Fiber-Coax Active DAS will be an independent system that will support cellular, paging, ECOMM, and private two-way radio services for building security and Facilities Maintenance and Operations (FMO). The cellular services will operate in the LTE and HSPA bands offered by Bell, Rogers, TELUS, and Wind Mobile. The range of frequencies supported by the DAS will extend from the UHF band (450MHz) to 2600MHz.

7.9.18.1(3) The Hybrid-Fiber-Coax Active DAS will provide ubiquitous coverage for the above bands and frequencies throughout the Facility. This includes parking levels, connecting links, interstitial levels, utility spaces, stairwells, elevators, tunnels, and interior courtyards.

7.9.18.1(4) The Hybrid-Fiber-Coax Active DAS head-end unit will be located in the Campus Communication Hub (CCH). The DAS head-end unit will interface to radio repeaters or powered remote antenna units to distribute the required frequencies and bands throughout the Facility.

Refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for further details.

7.9.18.1(5) The Entrance Facility Room will accommodate cellular service providers' base transceiver stations or Node B equipment for LTE and HSPA services, as well as fiber connectivity to enable backhauling of cellular traffic to the cellular service providers' core networking equipment. The Entrance Facility Room will be located adjacent to Campus Communication Hub and sized to accommodate 15 (fifteen) 23-inch racks dedicated for cellular equipment. Refer to Appendix 1B(II) [Campus Communications Hub Technical Specifications] for further details.

7.9.18.1(6) Paging, ECOMM, Security, and FMO services will be injected into the DAS through off-air repeaters to be located on the roof of the Facility.

7.9.18.1(7) The Authority shall be responsible for:

7.9.18.1(7)(a) DAS system design, supply and installation of active and passive equipment and commissioning.

7.9.18.1(7)(b) Cellular service provider and third party engagement and coordination.

7.9.18.1(7)(c) Provision, configuration and installation of all active and passive equipment except where otherwise noted.

7.9.18.1(7)(d) Providing patch cords, jumper cables, and cross-connect cables to interconnect wiring terminals, antennas, and DAS equipment except where noted.

7.9.18.1(8) The Design-Builder shall be responsible for:

7.9.18.1(8)(a) Furnishing the Authority with all documentation required to accurately complete the DAS system design. This includes, but is not restricted to, floor plans, reflected ceiling plans, elevation and section drawings, furniture and equipment layouts and information on building materials and finishes. The Design-Builder is required to keep the Authority appraised of all changes to this documentation throughout the course of constructing the Facility.

7.9.18.1(8)(b) Designing the Facility including equipment locations (e.g., microwave ovens) in a manner that does not

introduce interference beyond the noise floor and impact signal strength requirements (SNR) of the DAS network. The resulting RF environment in the Facility must be consistent with the strictest specifications of the wireless end-use equipment.

7.9.18.1(8)(c) Providing the Authority with access to the site during construction to conduct site surveys, installation and commissioning.

7.9.18.1(8)(d) Providing wall and equipment rack and cabinet space in the Facility's Communications Rooms to house DAS active equipment, passive components, fiber panels, coax and UTP distribution fields and dedicated power sources.

7.9.18.1(8)(e) Providing UPS and generator protected Vital power receptacles on walls or above equipment racks and cabinets for DAS equipment in Communications Rooms.

7.9.18.1(8)(f) Providing cooling in the Facility's Communications Rooms to meet the load of DAS active equipment.

7.9.18.1(8)(g) Providing pathways required for the DAS System. This includes all conduits, cable trays, sleeves, rated inner ducts, and non-continuous supports, installed in accordance with Section 7.9.4.2.

7.9.18.1(8)(h) Supplying and installing all junction boxes, outlet boxes and enclosures of suitable size required to mount and house DAS active and passive components and cabling. Enclosures must be able to protect wireless hardware from wet and dirty environments, UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, lockable and work with all variations of Authority provided DAS hardware. Prior to purchase of the enclosures, the Design-Builder shall submit shop drawings to the Authority for approval and, if required, provide samples to Authority for RF testing purposes and to check for interoperability with DAS hardware.

7.9.18.1(8)(i) Supplying and installing lay in ceiling (hard cap and tile) enclosures to house DAS active hardware and antennas in areas of the Facility specified by the Authority. These enclosures are required for the safety of Patients and

staff and will hide DAS active hardware and antennas from view and prevent unauthorized access to the equipment and the connecting cabling. The enclosures provided must allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour. Prior to purchase of the enclosures, the Design-Builder shall submit shop drawings to the Authority for approval and, if required, provide samples to Authority for RF testing purposes and to check for interoperability with DAS hardware.

7.9.18.1(8)(j) Grounding and bonding all installed indoor cables, pathways and equipment racks in accordance with Section 7.9.4.1.

7.9.18.1(8)(k) Providing all backbone and horizontal cabling required for the Facility's DAS system except where noted. All cabling installation will be labelled in accordance with the Authority's instructions and will conform to applicable standards, best practices and manufacturer specifications and instructions to ensure a high-quality installation.

7.9.18.1(8)(l) Providing cable terminations and terminals including but not limited to wiring panels/blocks, patch panels, fiber optic terminals and panels, and outlets/jacks except where noted.

7.9.18.1(8)(m) All physical cable management hardware including, but not limited to: "D-rings" on backboards, horizontal and vertical managers in equipment racks within all Communications Rooms, etc.

7.9.18.1(8)(n) Fire stopping as required.

7.9.18.1(8)(o) Providing manufacturer data sheets on all supplied and installed components and cabling as well as as-built drawings and cabling test results. All documentation shall be provided in accordance with Section 2.8.12.

7.9.18.1(8)(p) Providing construction, installation and manufacturer warranties on all materials installed.

7.9.18.1(9) The installation of the distributed antenna system and its related components detailed herein shall comply with all local building codes,

and applicable rules and regulations of the authority having jurisdiction (AHJ), HSSBC Communications Infrastructure Standards and Specifications, ANSI, TIA, BICSI latest technical manuals, CEC, CSA, EIA, IEEE, NECA, UL, and other applicable industry standards, codes, and methods.

7.9.18.1(10) Overhead cables and RF lines must be easily removed or reworked within the cable trays. Proper care must be taken to ensure that new cables added to the trays are not stressed or intertwined with other cables.

7.9.18.2 Roof Top Antennas

7.9.18.2(1) Donor antennas shall be supplied and installed by the Authority on the rooftop of the Facility for ECOMM, Security, FMO, and Paging services. The signals from these antennas are then amplified by bi-directional amplifiers (BDA's) that will be located in the CCH and combined with the cellular signals in the DAS head end.

7.9.18.2(2) The types and model numbers of the five donor antennas will be:

7.9.18.2(2)(a) Sinclair Model: SY-307 for UHF

7.9.18.2(2)(b) TASC Systems Single Pol / Panel Antenna (Model TA-830-DA) for ECOMM, Paging and Security (Simplex and Duplex)

7.9.18.2(3) A rooftop survey of the Facility shall be conducted by the Authority to confirm antenna mounting locations before installation. The locations of the antennas must be such that the donor antennas are able to receive FMO-UHF, Paging, ECOMM, and Security signals at levels sufficient for reliable communications.

7.9.18.2(4) The antennas will either be wall mounted on individual pipe masts (one per antenna) or mounted to individual penetrating or non-penetrating (gravity or ballast) mounts at locations on the rooftop of the Facility determined by the Authority.

7.9.18.2(4)(a) If the wall mount pipe mast option is selected by the Authority, the pipe masts for each antenna shall be supplied and installed by the Design-Builder. The pipe masts must be installed at least 2.5m above the roof and constructed of 38mm to 51mm galvanized steel, capable of tolerating wind speeds of up to 290km/hr and a bending moment of 33Nm.

7.9.18.2(4)(b) If a penetrating or non-penetrating mount is required, the Authority supply the mounts to the Design-Builder for installation.

7.9.18.2(4)(c) The antennas and associated hardware shall be provided and installed on the pipe masts and or mounts by the Authority.

7.9.18.2(5) A minimum horizontal separation of 1m edge-to-edge is required between all antennas.

7.9.18.2(6) Lightning and Grounding Protection provisions shall be engineered into the building design and installed by the Design-Builder for effective roof-mounted antenna mast and support structure grounding.

7.9.18.2(6)(a) The Design-Builder shall provide a copper cable for lightning protection to each antenna pipe mounting location. This ground cable will be used for the grounding the mount. Refer to Division 26 for further details.

7.9.18.2(6)(b) The Design-Builder shall incorporate into the Facility's lightning protection system connection points for bonding future antenna systems to the roof-top lightning protection system.

7.9.18.2(6)(c) The Design-Builder shall bond the antenna mount with a ground cable sized to match the primary lightning protection cable installed at the roof level.

7.9.18.2(6)(d) Conductor bonding shall be made using exothermic welding, listed irreversible high-compression fittings, or other fittings listed for use in lightning protection systems. No additional grounding will be required of roof-mounted antenna masts and support structures when bonded to the lightning protection system.

7.9.18.2(6)(e) The Authority shall be responsible for grounding of transmission line.

7.9.18.2(7) Pathway

7.9.18.2(7)(a) The Design-Builder shall supply and install a cable entry panel that will enable the coax cables for the antennas to run through the exterior wall masts into the Facility. The openings on the cable entry panel will be large enough to

accommodate eight (8) 1.25” coaxial cables. Include all boot assemblies, cushions and accessories for a turnkey solution. The Design-Builder shall consult with the Authority on the exact location of the cable entry panel prior to installation.

7.9.18.2(7)(b) The Design-Builder shall provide a pathway from the antenna locations to the cable entry panel and from the cable entry panel to the Entrance Facility Room.

7.9.18.2(7)(c) The pathway must be large enough to accommodate eight (8) 1.25” coaxial cables in a pathway. The pathway must be designed and installed in accordance with Section 7.9.4.2.

7.9.18.2(7)(d) The Authority shall supply, install, and terminate the runs of coax cable from each antenna to the BDA rack in the CCH.

7.9.18.3 Hybrid-Fiber-Coax Active DAS

7.9.18.3(1) Telecommunications Rooms

7.9.18.3(1)(a) The Design-Builder shall provision in each Telecommunications Room:

- (a).1 5.20m2 (7 ft. x 8 ft.) of dedicated wall space for radio repeaters, combiners and splitters.
- (a).2 A working area in front of the dedicated wall space to enable serviceability of the equipment. Considering the depth of the radio repeater equipment 1.25m of space in front of the wall will be required.
- (a).3 3RU of equipment rack space for fiber patching and for remote radio equipment peripheral devices. Rack mount power as well as ePDUs are to be provided in accordance with Section 7.9.4.3.
- (a).4 Full length vertical grounding bars on each equipment rack used for DAS equipment with a #6 AWG Green insulated copper bonding cable installed to the Telecommunications grounding busbar.

7.9.18.3(1)(b) For each 1219 mm (4 ft.) section of horizontal wall space used for DAS wall mounted equipment, the Design-Builder shall supply four duplex 5-20R receptacles; two on dedicated UPS circuit and two on dedicated emergency generator circuit. Receptacles are to be mounted at the top of the plywood walls beneath the perimeter cable tray.

7.9.18.3(1)(c) The heat load of the wall mounted DAS equipment is estimated at 1529 BTU/hr at full capacity. This heat load will be included as part of the overall heat loads calculated at the time of the design and will factor into the cooling capacity that is provided by the Design-Builder to each of the Facility's Telecommunications Rooms.

7.9.18.3(2) DAS Cabling – Optical Fiber

7.9.18.3(2)(a) The Design-Builder shall design, supply, install, test and certify a dedicated intra-building fiber backbone cabling system (including all patch panels and related components and patch cords) for the DAS. This intra-building fiber backbone cabling system will connect the CCH to each Telecommunications Room in the Facility.

7.9.18.3(2)(b) The intra-building fiber backbone cabling system will consist of the latest accepted standard of single mode optical cables, connectors and patch cables. The Design-Builder shall be responsible to engage the Authority for instruction on the latest accepted standard of single mode optical cables, connectors and patch cables to use in the Facility prior to the completion of the design phase of the project.

7.9.18.3(2)(c) The configuration of this intra-building fiber backbone system will be a star structure and will consist of primary and redundant single mode optical cables installed between CCH and each Telecommunications Room.

7.9.18.3(2)(d) Primary and redundant single mode fiber will be installed in physically route diverse pathways between the CCH and each Telecommunications Room in the Facility. The routing of the pathways will be such that a loss of single Telecommunications Room will not impact the

connection between the CCH and any other Telecommunications Room in the Facility.

7.9.18.3(2)(e) Fiber Specifications:

(e).1 Minimum strand count for each primary and redundant single mode fiber cable running between the CCH and each Telecommunications Room will be twelve.

(e).2 Fiber cable will be interlocking armoured type or installed in rated inner duct. Yellow will be the colour code used on all armoured single mode cable (inner/outer jacket) and for inner duct containing single mode cable without exception. Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for further details

(e).3 8m (25') of slack on both ends of each fiber cable installed for the DAS system. Wire management rings will be provided in each Communications Room to manage fiber cable slack. Wire management rings will be supported by an angle bracket or cantruss structure.

(e).4 Wavelength of Optical signal is 1310nm and 1550nm.

(e).5 Singlemode fiber cable will be 8.3/125 microns and use standard colored tight buffered construction.

(e).6 All fibers are to be terminated using SC/APC Connectors. SC/APC connectors shall not be mated with flat polish connectors, super polish connectors or ultra-polish connectors as this may damage the fibers and connectors.

(e).7 Optical fiber jumpers will be used between the end of the permanent optical fiber cable and the RF equipment.

(e).8 All fiber cables will be OTDR-tested to ensure fiber integrity and that Span Optical Loss and Back Reflection (Span Optical Return Loss) fall within specified limits.

(e).9 All fiber cables will be tested to ensure the fiber cable loss is less than 0.1 dB/100m per length of fiber and less than 0.35 dB per connector.

(e).10 Typical required optical return loss, which includes reflection and backscatter, is more than 35 to 45 dB.

7.9.18.3(3) DAS Cabling – Coaxial Cabling

7.9.18.3(3)(a) In a Hybrid-Fiber-Coax Active DAS solution, coaxial cable is used to transmit RF signals to and from the antennas in the ceilings from the remote repeaters in the Telecommunications Rooms.

7.9.18.3(3)(b) The Design-Builder shall:

(b).1 Supply 6000m of coax cable.

(b).2 Rough-in coaxial cable runs from the Telecommunications Rooms to the end point locations specified in the Authority's design.

(b).3 Allow for the re-location and or addition of a maximum of ten (10) coaxial cable runs with an average length of 70m to accommodate adjustments to the placement and or quantity of DAS antennas as prescribed by the Authority after the completion of Continuous Wave (CW) and DAS coverage testing. In addition to labour and equipment, the Design-Builder is required to cover all costs associated with re-locating and or adding coaxial cable runs such as the replacement of ceiling tiles, firestopping and installation of new raceways.

7.9.18.3(3)(c) Prior to rough-in, the Authority shall provide cut sheets to the Design-Builder that will specify the budgetary lengths for each coaxial cable run, including endpoint locations. The Design-Builder will then verify exact run lengths based on the endpoint locations provided and inform the Authority of any adjustments that need to be made to cable lengths.

7.9.18.3(3)(d) The coaxial cable supplied by the Design-Builder shall meet the following specifications:

(d).1 0.5" coax to each antenna.

(d).2 FT4-rated Coax will be equivalent to Commscope Heliax LDF4RK-50A.

(d).3 FT6-rated Coax will be equivalent to Commscope Heliax, HL4RPV-50.

(d).4 The Flame Test (FT) rating of the cables supplied and installed shall be as required by the Authority Having Jurisdiction.

7.9.18.3(3)(e) The Authority shall:

(e).1 Supply and install RF splitters and combiners to connect the remote radio equipment to the antennas.

(e).2 Terminate and test all coaxial cables so as to meet or exceed carrier PIM specifications.

7.9.18.3(3)(f)

7.10 Electronic Safety and Security (Division 28)

7.10.1 General

7.10.1.1 The Design-Builder will:

7.10.1.1(1) Utilize CPTED (Crime Prevention Through Environmental Design) principles along with workplace safety and security considerations;

7.10.1.1(2) Minimize the visibility of security devices in Patient care areas to reinforce the therapeutic nature of treatment spaces. In interior and exterior public spaces such as lobbies, reception and waiting areas, rest areas, access and egress points, security devices may be visible. Design the Facility and all outdoor areas with Facility Users' safety and security in mind;

7.10.1.1(3) Ensure a safe environment for Facility Users by proper utilization of electronic, panic/duress, video monitoring and intrusion detection systems; and

7.10.1.1(4) Work with the owner's representative (IPS Integrated Protection Services) at all stages of the design process to develop a suitable solution.

7.10.1.1(5) Design all electronic safety and security systems to comply with all applicable requirements of the communication systems set out in Section 7.9

7.10.2 Fire Alarm System

7.10.2.1 Basic Requirements

7.10.2.1(1) Design and install the fire alarm system to meet the latest applicable versions of the following standards:

7.10.2.1(1)(a) BCBC

7.10.2.1(1)(b) CAN/ULC S524, Installation of Fire Alarm Systems

7.10.2.1(1)(c) CAN/ULC S525, Audible Signal Devices

7.10.2.1(1)(d) CAN/ULC S526, Visual Signal Devices

7.10.2.1(1)(e) CAN/ULC S528, Manual Stations for Fire Alarm Systems including accessories

7.10.2.1(1)(f) CAN/ULC S529, Smoke Detectors

7.10.2.1(1)(g) CAN/ULC S536, Inspection and Testing of Fire Alarm Systems, and

7.10.2.1(1)(h) CAN/ULC S537, Verification of Fire Alarm Systems.

7.10.2.1(2) Provide a fire alarm system for the Facility, including coverage of all buildings, for fire detection and signalling of alarms, trouble, and supervisory conditions while maintaining secure conditions for all Facility Users.

7.10.2.1(3) Coordinate device types and locations to provide maximum coverage.

7.10.2.1(4) Ensure fire alarm system is of a type that failed devices will be rapidly replaced and programmed by building operations and do not require on site presence of a manufacturer's representative.

7.10.2.1(5) Provide a complete two-stage, zoned, supervised, 24 VDC microprocessor based fire detection and alarm system that includes addressable, intelligent, automatic and manual initiation devices and audio/visual alarm devices with voice evacuation capabilities. Strategically zone the system devices by area and type of device for colour graphical menuing. Ensure alarm activation will be initiated by manual pull stations, smoke / heat detection and fire sprinkler water flow devices. Provide alarm indication consisting of visual and combination visual/audible devices.

7.10.2.1(6) Design of the fire alarm system will include locating components in such a way that maintenance and testing will be performed with minimal interruption to the Patient areas and to mitigate disruption to operations. Devices are to be located such that they can be routinely accessed by

FMO staff without the need for man lifts or staging. When components are installed in an otherwise inaccessible location (such as high atrium ceilings) access will be provided by means of a fixed access system such as moving gantry or overhead catwalks.

7.10.2.1(7) The Existing Hospital includes a fire command central location located in the vicinity of the existing emergency department which is presently where the fire department responds to a fire condition for the campus. Under the Phase 2 Redevelopment the intent is to provide a new Central Alarm and Control Facility (CACF) within the new Phase 2 Main Entrance. This new CACF will provide Campus wide control for firefighting from a single location within the new main entrance with remote annunciators as required by the Fire Department at designated entrances.

7.10.2.1(8) The MHSU will be provided with a Fire Command Center on level 1 in the vicinity of the main entrance lobby. This command center will be provided with firefighting equipment required by firefighters to fight a fire within the MHSU, CCH or EC and will include a general alarm and trouble annunciation for the main Campus CACF (from the existing prior to Phase 2 expansion then from Phase 2 CACF after that redevelopment is complete).

7.10.2.2 Performance Criteria

7.10.2.2(1) Install all fire alarm wiring in conduit. Provide fire rated cable where required by the BCBC.

7.10.2.2(2) Provide addressable smoke detectors of self-correcting type to maintain consistent sensitivity. The following areas are to be provided with smoke detector coverage in addition to sprinklers for early detection:

7.10.2.2(2)(a) All areas required by code.

7.10.2.2(2)(b) All Corridors

7.10.2.2(2)(c) Electrical Rooms

7.10.2.2(2)(d) Communication Rooms

7.10.2.2(2)(e) Operating, Procedure and Major Treatment Rooms

7.10.2.2(3) Provide two-stage manual pull stations at all exit doors and entrances to exit stairs as required. In parking and areas accessible to Patients pull stations to have flush mount tamperproof tough polycarbonate cover

with horn. Horn to be powered by independent direct power connection (not battery).

7.10.2.2(4) Provide Fireman's handsets adjacent to all stairs.

7.10.2.2(5) Provide visual signal devices at all corridors, public spaces, staff and Patient toilets and common use spaces.

7.10.2.2(6) Provide fire alarm Emergency Voice Communications (EVAC) speakers throughout the Facility. EVAC Speaker system will be used to broadcast all alarm conditions and emergency voice communication paging. The system will accommodate the use of pre-programmed messages will be transmitted to annunciate origin of alarm.

7.10.2.2(7) Use combination audible alarm and visual signal devices where applicable.

7.10.2.2(8) Include control devices and connection to close fire and smoke doors on activation of alarm condition.

7.10.2.2(9) Incorporate smoke control systems with control fans and dampers.

7.10.2.2(10) Provide a class A addressable loop for all detection circuits. Provide isolation modules at each penetration of a fire separation or fire alarm zone.

7.10.2.2(11) Provide interconnections from the fire alarm system to the Building Automation System (BMS) to provide complete read only data transfer.

7.10.2.2(12) Integrate the fire alarm system with the Existing Hospital Edwards fire alarm system. Provide general alarm and trouble annunciation from the MHSU Fire Command Centre to and from the main Campus CACF. Upgrade all graphic annunciator panels and screens within the Existing Hospital to reflect the addition of the new Facility.

7.10.2.2(13) Provide new fire alarm devices and wiring for work within the Existing Hospital and tie into the existing fire alarm system. Test and verify all changes to the existing system.

7.10.2.2(14) Provide functionality for the fire alarm system to automatically broadcast EVAC voice messages through the radio system to all maintenance radios. Provide all required middleware, converters and connections to the radio system. Confirm actual programming, priorities, and overrides with the Authority prior to implementation.

7.10.2.2(15) Provide a Main Annunciator at the Fire Command Center complete with:

7.10.2.2(15)(a) LCD alphanumeric display of all alarm and trouble conditions for each zone and as required and approved by the local fire department; and

7.10.2.2(15)(b) a main graphic network annunciator workstation complete with touch screen monitor (including viewport windows) for annunciation of each zone as shown on drawings as approved by the local fire department, including scaled floor plans of the Facility as well as a plan of the entire Campus noting all buildings, the CACF location and all designated firefighter entrances.

7.10.2.2(15)(c) LED annunciator for all alarm and trouble indications on the system

7.10.2.2(16) Provide an emergency voice communication system (EVAC) to give the fire department the capability of providing evacuation instructions to all or selected areas of the Facility from the Fire Command Center. Include two-way voice communication capability from the Fire Command Center to each floor (or zone) via firefighters emergency telephone system.

7.10.2.2(17) Provide LED type indicators for remote indication that a heat and/or smoke detector has been activated in a lockable room (located outside room adjacent to door), in an elevator shaft (located at elevator lobby ceiling) or duct sensors that are not readily visible (located on ceiling or at visible location nearest to sensor installation).

7.10.2.2(18) In consultation with the Authority, provide remote annunciators at key locations throughout the Facility. At a minimum, these will include all secondary entrances to all buildings for firefighter's use. Remote annunciators will be complete with an alphanumeric LCD display for all alarms and troubles on the system and to include a microphone for "all-call" EVAC paging and a remote master fireman's handset.

7.10.2.2(19) If LCD Display Annunciators are provided at each care team base to meet code requirement for localized annunciation of Patient Bedroom smoke detectors. Confirm desired location of Annunciator with Authority. Mitigate nuisance noise of events not requiring local care team base staff response occurring from system testing, upgrades, faults, etc.

7.10.2.2(20) Design remote fire alarm panels (or control units) to operate in a stand-alone mode and transmit data using a multiplex data line connecting the entire Facility via a full complement of communication cable. Provide the fire alarm cable network with a redundant backbone taking different physical paths to enhance reliability of communication. A trouble status

will annunciate at the main fire alarm panel if a partial break or fault occurs in the data link between any control panel and the main fire alarm panel. Locate the main fire control panel in the Fire Command Center.

7.10.2.2(21) Ensure the appropriate electronic interlocking with the general paging system, so as to ensure automatic priority is given to operating the fire alarm during initial time periods as required by BCBC.

7.10.2.2(22) Coordinate with the Authority to establish a secure backup of the fire alarm system event log.

7.10.2.2(23) Provide fire alarm system computer workstation with high resolution colour touch screen monitor capable of monitoring system performance and annunciation. Include hardware and software for complete interface suitable to annunciate all alarms and troubles on the system and also use of workstation to examine status of individual sensors and set parameters as allowed by applicable codes. Computer to include its own dedicated 5 minute UPS. System computer to be located in the Fire Command Center and in the maintenance department office.

7.10.2.2(24) Provide a printer with each fire alarm workstation to generate a hard copy of the system's event log.

7.10.2.2(25) Provide gel electrolyte type batteries with overcharge protection for FACP and all transponders. Provide solid state battery charger(s) with capacity to recharge entire battery system in 4 hours. Ensure batteries will have enough capacity (with 25 percent spare time) to operate entire system (except magnetic door holders) in accordance with the BCBC.

7.10.2.2(26) Include transmission of alarm signal to remote emergency response centre as approved by the Authority.

7.10.2.3 Operational requirements:

7.10.2.3(1) Design the fire alarm system to incorporate the following operations to provide a safe environment for all Facility Users:

7.10.2.3(1)(a) Stage 1:

(a).1 Silent stage 1 alarm throughout MHSU, CCH and EC.

(a).2 Audible signal at Security, FMO, Care Team Bases and Fire Command Center.

(a).3 Zone alarm on fire alarm graphic displays.

(a).4 The Security will be able to cancel the alarm if investigation reveals false alarm within five minutes.

(a).5 Authorized third party (external) agency contracted by the Authority for monitoring of the fire alarm system.

7.10.2.3(1)(b) Stage 2:

(b).1 A Stage 2 alarm may be initiated by any of the following:

(b).1.1 If first stage alarm has not been acknowledged after 5 minutes.

(b).1.2 Inserting a key in a key switch at a manual pull station.

(b).1.3 Inserting a key in a key switch in a staff workstation.

(b).1.4 Initiated from Security or FMO.

(b).2 For stage 2 alarm, speakers will sound in a temporal pattern at 120 strokes per minute in the alarm zone.

(b).3 Speakers will sound at 20 strokes per minute in all other zones.

(b).4 If the alarm zone is in a Patient wing, trigger an automatic 'Fire Unlock' of all Patient Bedroom doors in the Patient Unit. All exit doors will remain locked.

(b).5 If the alarm zone is in visiting area, trigger an automatic lock release of all secure visiting booth doors. All exit doors will remain locked.

7.10.2.3(2) Ensure smoke and heat detectors are individually field programmable and include multiple elements for earliest detection, and are individually adjustable for ambient environmental conditions. Detectors in the Patient accessible areas SRC A, C, D.E, F and G to be security-type, tamper-proof, and resistant to self-harm.

7.10.2.3(3) Design the fire alarm system to monitor:

7.10.2.3(3)(a) Solenoid valve positions of sprinkler system zones;

7.10.2.3(3)(b) All generators for run and trouble alarms;

7.10.2.3(3)(c) Any pre-action or dry agent fire suppression systems for trouble and alarms; and

7.10.2.3(3)(d) Fire pump for pump running, loss of phase, phase reversal and connected to alternate source.

7.10.2.3(4) Synchronize the fire alarm system clock with the security systems and the synchronized clock system.

7.10.2.3(5) Provide signals to elevator controllers for elevator recall operation and elevator homing functions.

7.10.2.4 Integration

7.10.2.4(1) Ensure the fire alarm system may be monitored by the Authority's approved third party monitoring agency.

7.10.3 Electronic Security Systems

7.10.3.1 General

7.10.3.1(1) Design, provide and install a security system in consultation with the Authorities Security Department (Integrated Protection Services) to meet the Authority's security programs within a care facility environment.

7.10.3.1(2) Provide fully networked integrated security systems to protect Facility Users and property. As part of this security management program, at a minimum, provide: an access control system to restrict access to secure areas to authorized personnel only and to support the safe operation of the facility; A panic/duress system to increase staff and visitor safety; an intrusion alarm detection systems to detect and report unauthorized entry into protected spaces; and a video surveillance system for site security (recorded) and clinical observation (non-recorded) purposes.

7.10.3.1(3) The Design-Builder will be responsible for programming all systems including the initial programming of staff proximity cards (including existing cards). Programming to include the programming of access levels and the assignment of access levels to individual staff.

7.10.3.1(4) Design-Builder will be responsible for providing all hardware, software, licensing, devices and all associated infrastructure required for full and complete security systems as specified. Workstations and monitors required for Access control and video surveillance systems shall be provided and installed by the Authority, all other workstations and monitors shall be provided and installed by the Design-Builder and shall meet Authority specifications.

7.10.3.1(5) Design all electronic security systems to reside on dedicated security systems VLAN as part of the Authority's information technology

infrastructure connected via the structured cabling system and network devices to allow the Authority the opportunity to review events and monitor the status of security systems from off-Site locations. The system will be accessible through the Authority's network, in accordance with Authority polices.

7.10.3.1(6) All cabling is required to meet Authority structured cabling standards.

7.10.3.1(7) Ensure electronic security systems are scalable to allow for future additions and interconnections of many devices and subsystems from different manufacturers.

7.10.3.1(8) Incorporate commercial off-the–shelf equipment and proven designs from manufacturers regularly engaged in the production of models and types of equipment used in the security industry. Ensure products are quality control tested and verified for the intended operation prior to installation in the Facility.

7.10.3.1(9) Ensure all materials, including hardware and software provided are fully compatible with the Authority’s head-end systems and are new and the most current version or production model.

7.10.3.1(10) Ensure electronic security systems will maintain dependability and reliability under all operational environmental conditions, capable of 24 hours per day, seven days per week continuous operation.

7.10.3.1(11) Interconnect security systems to the fire alarm system and other systems as required by applicable codes and standards.

7.10.3.1(12) Arrange meetings with the Authority to develop the system design, interconnections and programming requirements to integrate with the Authority’s security systems, and receive sign-off on design before proceeding. Conform to requirements of Division 27.

7.10.3.1(13) Train Authority staff (minimum 8 hours per system) on the use and operation of security systems and location of all security devices. Consult and schedule training with the Authority.

7.10.3.1(14) Ensure security systems infrastructure complies with the manufacturer’s technical specifications and configuration requirements.

7.10.3.1(15) All electronic security systems will meet all Authority privacy standards pertaining to storage and operation of devices. Provide all necessary documentation and completed privacy impact assessment required to meet Authority privacy/confidentiality standards.

7.10.3.1(16) All cabling and communications infrastructure is required to meet authority standards. See Division 27.

7.10.4 Access Control

7.10.4.1 Basic Requirements

7.10.4.1(1) An access control system (ACS) will be installed throughout the Facility for the purpose of restricting access to designated individuals from entering secured or restricted areas. Access control system shall be an extension of the existing ACS.

7.10.4.1(2) The Design-Builder will ensure the new ACS utilizes the existing database of users, groups and schedules such that any change to one system will effect and cause the same change on the other system with no additional input or action.

7.10.4.1(3) The ACS is to be designed in consultation with the Authority.

7.10.4.2 Performance Criteria

7.10.4.2(1) The Design-Builder will provide and install an Andover Continuum ACS for the Facility connected to the Authority's existing off site enterprise server.

7.10.4.2(2) The ACS shall utilize the Authority's existing file server and allow multiple workstations to access the file server for control and annunciation purposes.

7.10.4.2(3) The ACS shall be interconnected to the electrified locks to lock and unlock doors via time schedule and card readers utilizing proximity field effect technology. Requirements for doors shall be determined through user group meetings. The ACS shall grant or restrict access to employees on a door by door basis via a programmable classification system and shall operate over the Authority's network.

7.10.4.2(4) The ACS shall have the capability to lock down departments or other areas identified by the Authority in the event of an emergency or global command. Determine and program final access control system configuration in consultation with the Authority.

7.10.4.2(5) The ACS shall function at the field controller level without connection to the PC host or gateway. All electrified locks shall be hard wired to the field control panels. The field controllers shall be located in Communications Rooms (see Division 27) and shall be connected to the access control server via TCP/IP using the structured cabling.

7.10.4.2(6) The ACS shall use hard-wired proximity type readers and shall be capable of reusing all existing cards presently distributed across the Authority. Existing cards are HID Corporate 1000, 35 bit, with embedded Gemalto .net V2 chip for single sign on to client PCs. The ACS shall be compatible with the Authority's existing systems to allow existing Authority cards to work on the system and allow new cards for the Facility to work on systems in the rest of the Authority's regions.

7.10.4.2(7) Access controlled doors shall have a local sounder (independent of the card reader) to annunciate door held open and door forced open alarms. The tone shall be adjustable in volume and shall have a programmable option allowing the tone to be turned on/off via the ACS graphical user interface (GUI) by authorized system administrators. By default, door held open and door forced open alarms to be programmed in the off position.

7.10.4.2(8) The ACS shall be complete with mapping and shall be implemented to match the existing format in use in the Existing Hospital (format to be developed through user group meetings). The maps shall include interactive alarm points for all (access doors, intrusion detection, video surveillance cameras and panic/duress stations).

7.10.4.2(9) Provide card readers, locking hardware, request-to-exit devices, door position/alarm contacts with all associated mechanical and electric hardware and field devices, including power supplies for a fully operational system.

7.10.4.2(10) Power supplies shall be on a dedicated UPS vital circuit and centralized within the Communications Rooms (see division 27) . All access control and door hardware components shall be powered via individually fused outputs from the power supplies.

7.10.4.2(11) Individual power supply shall not serve more than eight (8) doors, more than one (1) department, or multiple floors in the Building.

7.10.4.2(12) The use of system integration points within the Access Control System is not permitted.

7.10.4.2(13) Provide secure, simplified local control panels for access devices at care team stations and other areas as required.

7.10.4.2(14) Control panels to provide momentary lock/unlock; permanent lock/unlock; and other functions as required by staff in order to meet functional requirements.

7.10.4.2(15) Control panels to provide LED status indicators to indicate device state.

7.10.4.2(16) The Design-Builder will provide five hundred (500) blank proximity cards for Authority staff (HID Corporate 1000, 35 bit with embedded Gemalto Ver. V2 chip for single sign on to client PCs). Consult with the Authority on card numbering sequence and format before ordering cards to ensure compatibility with existing cards and equipment.

7.10.4.2(17) The Design-Builder will provide combination pin code/proximity card readers at all required access/egress locations to/from all controlled areas as identified through the consultation process. All readers shall be proximity field effect readers.

7.10.4.2(18) Combination pin code/proximity card readers shall be fully integrated into the Building's access control platform. Combination pin code/proximity card readers shall facilitate access by the following methods:

7.10.4.2(18)(a) Pin code only;

7.10.4.2(18)(b) Card read only and

7.10.4.2(18)(c) Pin code and card read.

7.10.4.2(18)(d) Biometric functions to be determined in consultation with the Authority

7.10.4.2(19) At designated door locations determined in consultation with the Authority and code consultant, the Design-Builder will provide delayed egress operation or impeded egress operation and alarms at emergency exit doors; alarms shall annunciate both locally and via the integrated ACS.

7.10.4.2(20) All delayed-egress alarms shall be silenced through the use of a key-switch integral to the panic hardware. The key cylinder shall be keyed to match the Building master key.

7.10.4.2(21) Impeded egress zones may also be required. ACS functionality in impeded egress zones to be determined in consultation with the Authority.

7.10.4.2(22) Where required, the Design-Builder will provide clear signage indicating entry and existing procedures. Consult with the Authority for appropriate and acceptable wording.

7.10.4.2(23) The access control system shall be interconnected to the elevator controls for floor by floor access control via card readers in all elevators

& elevator lobbies. Card readers in cabs and elevator lobbies shall be flush mounted to the car operating panel or hall stations respectively. Coordinate with the Authority's Security Programs, Clinical Specifications and section 6.13 for the sequencing and Medical Emergency Operation requirements for each elevator.

7.10.4.2(24) Interconnect the access control system to the fire alarm system to release doors in the event of a fire as required by applicable Laws and or standards.

7.10.4.2(25) Access control workstation(s) are not required. Local security access to the system will be provided via Andover Webclient software. The Design-Builder will provide licenses, installation and setup of the software as required.

7.10.4.2(26) Intercommunication devices (intercoms) with integrated momentary remote door release are required at designated restricted access entry/exit points. Refer to Division 27 for functional requirements. Determine, through the consultation process, the location of all intercom locations within the Building. Areas requiring intercoms shall include but not be limited to:

7.10.4.2(26)(a) Public entrances into the facility

7.10.4.2(26)(b) Entry to restricted clinical units

7.10.4.2(26)(c) Restricted areas

7.10.4.2(26)(d) Other designated exterior doors

7.10.4.2(26)(e) Sally-Port(s); Secure vestibules

7.10.4.2(26)(f) Ante rooms

7.10.4.2(26)(g) Areas designated by the Authority;

7.10.4.2(26)(h) Areas identified in the Functional Plans, Clinical Specifications and user consultation.

7.10.4.2(27) All security alarms will be logged for a minimum period of one (1) year. Logging system will be capable of external archiving/backup on external storage.

7.10.4.2(28) Security recording will provide, as a minimum, the following information for each alarm:

7.10.4.2(28)(a) Date;

7.10.4.2(28)(b) Time;

7.10.4.2(28)(c) Device identification;

7.10.4.2(28)(d) Descriptive code;

7.10.4.2(28)(e) User/cardholder ID (when applicable); and

7.10.4.2(28)(f) Acknowledgement and action taken (when applicable).

7.10.4.2(29) Provide interconnection of the ACS to other security systems as required.

7.10.4.2(30) Determine, through the User Consultation process, the location of all access controlled areas within the Building and the exact devices required for each location. In addition to the locations identified in Appendix 1E [Door Operations Matrix], areas requiring access controls shall include but not be limited to:

7.10.4.2(30)(a) Offices containing cash or valuables;

7.10.4.2(30)(b) Sally-PortParkade gates

7.10.4.2(30)(c) All elevators & elevator lobbies

7.10.4.2(30)(d) Rooms with multi user workstations

7.10.4.2(30)(e) Rooftop access

7.10.4.2(30)(f) Restricted areas and high risk areas as designated by the Authority in further consultation during the User Consultation process.

7.10.4.3 Programming

7.10.4.3(1) The Design-Builder will be responsible for programming all systems including the initial programming of staff proximity cards (including existing cards). Programming to include the programming of access levels and the assignment of access levels to individual staff.

7.10.4.3(2) The Design-Builder will retain the value added reseller (VAR) of the Authority's choice to program all devices, data bases, and schedules as well as coordinate software integration with the Authority's existing equipment infrastructure. Coordinate meetings as required. The associated cost is the responsibility of the Design-Builder.

7.10.4.3(3) All programming by the VAR must be completed before commissioning of the Building. The VAR will also be responsible for the programming of any access control cards required during the course of construction up until commissioning acceptance.

7.10.4.3(4) Program the system to the satisfaction of the Authority.

7.10.4.3(5) For each elevator with card readers installed:

7.10.4.3(5)(a) Access to floors designated as low security to be unrestricted and accessible to the general public;

7.10.4.3(5)(b) Access to floors designated as moderate security available to all general staff using proximity card HID facility code only; and

7.10.4.3(5)(c) Access to floors designated as high security available to restricted/designated staff using proximity card plus pin entry."

7.10.4.4 Asset Management

7.10.4.4(1) Physically tag the following devices as required for data entry in to the asset management system owned and operated by the Authority:

7.10.4.4(1)(a) Door controllers;

7.10.4.4(1)(b) Field panels;

7.10.4.4(1)(c) UPS devices;

7.10.4.4(1)(d) Power supplies;

7.10.4.4(1)(e) Door frames with connected access control devices.

7.10.4.4(2) Asset tags to be provided by the Authority; data entry to be provided by the Authority.

7.10.4.4(3) Provide individual asset information, as required, to facilitate asset management database requirement

7.10.5 Panic/Duress System

7.10.5.1 Basic Requirements

7.10.5.1(1) The Design-Builder will provide an integrated hard wired and wireless Panic/Duress System(s) throughout and around the Facility.

7.10.5.1(2) The Design-Builder will provide a hard wired and location-based wireless Panic/Duress System(s) in appropriate areas in accordance with the level of security risk in each location.

7.10.5.1(3) The Panic/Duress System design is to be developed in consultation with the Authority.

7.10.5.1(4) Coordinate with millwork, as required, for all hardwired staff locations.

7.10.5.1(5) System shall include alerting and reporting functionality capable of showing time, location and (if initiated on the wireless system) the name of the staff member for all incidents, and shall be capable of sending text (SMS) messages.

7.10.5.2 Wired System – General

7.10.5.2(1) The Design-Builder will provide fixed, hard wired, push button Panic/Duress Stations for staff and or public to initiate emergency assistance calls in designated areas.

7.10.5.3 Wired System – Performance Criteria

7.10.5.3(1) All fixed Panic/Duress Stations shall be hard wired, supervised for faults, strategically located, suitably sized, suitable for its environment and clearly labelled for “security emergency only”.

7.10.5.3(2) Approved manufacturer: Code Blue Corporation or approved equal as follows, graphics and configuration to be determined in consultation with the Authority:

7.10.5.3(2)(a) Model CB1-e for all exterior parking areas

7.10.5.3(2)(b) Model CB2-e for all interior parking areas (parkades)

7.10.5.3(3) Fixed Panic/Duress Buttons to be provided in two form factors:

7.10.5.3(3)(a) Button Type 1: Fixed Panic/Duress Stations for staff safety shall be a latching single button device requiring a deliberate insertion of a finger to activate the alarm, installed such that they can be easily reached and operated inconspicuously.

7.10.5.3(3)(b) Button Type 2: Fixed Panic/Duress Stations in areas intended for public safety use shall be wall mounted and located in areas easily seen to the user. The fixed Panic/Duress Stations shall have an illuminated mushroom style twist lock push button that will change its state of color to (red) when activated and will then resume back to its stand by color (yellow) when reset.

7.10.5.3(4) Button type 2 may be required in designated staff safety locations. Determine locations in consultation with the Authority.

7.10.5.3(5) Affixed wireless buttons are not acceptable; fixed buttons are to be hard wired.

7.10.5.3(6) Clear protective/anti tamper covers may be required in designated locations. Determine locations in consultation with the Authority.

7.10.5.3(7) Exterior Panic/Duress Stations shall come with a protective cover sufficient to protect against accidental activation.

7.10.5.3(8) The exterior stations and enunciators shall be weather proof and suitable for the environment.

7.10.5.3(9) Parkades, parking lots, exterior walk ways and court yards shall have fixed Panic/Duress Stations located such that there will be a duress station within 30 metres of a person in any direction.

7.10.5.3(10) The Panic/Duress System will report the alarm location to the remote Authority ULC listed central call centre using a duress system specific monitoring/control panel. Coordinate directly with this service provider as required. See intrusion section.

7.10.5.3(11) The Panic/Duress System to be zoned or partitioned to allow for different annunciation and alarm reporting based on each zone i.e.: Interior zones is a clinical team annunciation for response; exterior zone is a security only annunciation for a security specific response.

7.10.5.3(12) The hard wired system and wireless Panic/Duress System to be fully integrated on to the same platform for reporting, alarm response and enunciation purposes.

7.10.5.3(13) The Design-Builder will provide fixed Panic/Duress Buttons for staff and or public to initiate emergency assistance calls in areas in areas including but not limited to:

7.10.5.3(13)(a) Reception areas;

7.10.5.3(13)(b) Each department team/care station and substation;

7.10.5.3(13)(c) Care/sub care station reception desks;

7.10.5.3(13)(d) Pharmacy and medication rooms;

7.10.5.3(13)(e) Isolated work stations (night use);

7.10.5.3(13)(f) Staff locker rooms and showers;

7.10.5.3(13)(g) Stairwells;

7.10.5.3(13)(h) Interview/Consultation/Therapy rooms;

7.10.5.3(13)(i) Staff and public parking areas

7.10.5.3(13)(j) Parkades

7.10.5.3(13)(k) Exterior walk ways and court yards

7.10.5.3(13)(l) Secure Outdoor Spaces

7.10.5.3(13)(m) Areas designated as high risk by the Authority.

7.10.5.3(13)(n) Areas identified within clinical specifications and functional programming

7.10.5.3(13)(o) Areas identified through the consultation process

7.10.5.4 Wireless System – General

7.10.5.4(1) The wireless Panic/Duress System shall supplement the installation of the fixed Panic/Duress System for a reliable and dependable operation under all operational and environmental conditions. The wireless system will not be affected by or interfere with any equipment in use in the Building or the rest of the Campus.

7.10.5.5 Wireless System – Performance Criteria

7.10.5.5(1) The wireless Panic/Duress System shall be a separate from other systems unless authorized by the Authority and the system will utilize the Authority's Wi-Fi network.

7.10.5.5(2) The wireless Panic/Duress System will not interfere with any Authority systems including, but not limited to distributed antenna systems or medical systems. The Design-Builder must demonstrate to the Authority

that the wireless Panic/Duress System does not interfere with the Authority's wireless networks. Refer to division 27.

7.10.5.5(3) Rooms within the Facility that are 5m x 5m (25 Square Metres) and smaller shall require room by room locating. Persons in all other areas of the Facility shall be able to be located within a 6m horizontal radius of where they are. Antennas shall be strategically located to prevent bleeding between floors resulting in false reporting of a person's location.

7.10.5.5(4) The wireless staff Panic/Duress System will provide 100% coverage throughout the interior of the Facility including elevator cabs, mechanical spaces, service areas and stairwells. The wireless Panic/Duress System is not required to function outside the Building other than areas specifically identified by the Authority which includes, but not limited to, Secure Outdoor Spaces, Staff Outdoor Spaces and parkades.

7.10.5.5(5) Approved manufacturer: Sonitor Sense or approved equal.

7.10.5.5(6) Provide 225 Personal Protective Device (PPD) pendants. Pendants shall have minimum 1 year battery life, two buttons, LED indicator and be provided with attachment accessories.

7.10.5.5(7) The Panic/Duress System will report the alarm location to the remote Authority ULC listed central call centre using a Panic/Duress System specific monitoring/control panel. Coordinate directly with this service provider as required. See intrusion section.

7.10.5.5(8) The Panic/Duress System to be zoned or partitioned to allow for different annunciation and alarm reporting based on each zone i.e.: Interior zones is a clinical team annunciation for response; exterior zone is a security only annunciation for a security specific response.

7.10.5.5(9) Provide each department utilizing wireless Panic/Duress System with a Personal Protective Device (PPD) pendent test device that audibly and visually indicates on a pass / fail basis the functionality and battery life of the pendent. The testing device will be a closed loop device/station that allows for full functional testing without activating the Facility's staff Panic/Duress System and will provide audit function as required.

7.10.5.5(10) The fixed Panic/Duress System will interconnect and integrate with the wireless staff Panic/Duress System, such that the alarm signal, name of device, and exact location of the panic/duress station, is displayed on the map of the Panic/Duress work station(s).

7.10.5.5(11) The hard wired and wireless Panic/Duress Systems to be fully integrated on to the same platform for reporting, alarm response and enunciation purposes.

7.10.5.6 Alarm Notification & Enunciation (Wired and Wireless Systems)

7.10.5.6(1) Local sounders and visual display devices (enunciators) will be required for alarm notification and other system information in addition to workstation displays.

7.10.5.6(2) Local department, floor and building alarm notification and alert methods may include, but not limited to:

7.10.5.6(2)(a) Audible and visual enunciation at each individual hard wired button

7.10.5.6(2)(b) Audible and visual enunciation at nursing stations or designated locations

7.10.5.6(2)(c) Computer display screens (touchscreen)

7.10.5.6(2)(d) Pagers, cellular phones

7.10.5.6(2)(e) Computer or tablet type devices

7.10.5.6(3) More than one type of enunciator will be required. The Design-Builder is to consult with the authority to determine suitable enunciator(s) and alert methods for use at various locations throughout and around the Facility.

7.10.5.6(4) The hard wired and wireless Panic/Duress Systems to be fully integrated on to the same platform for reporting, alarm response and enunciation purposes.

7.10.5.6(5) Placement of enunciators may include the following locations:

7.10.5.6(5)(a) Directly above and out of reach at Staff/public wall mounted station.

7.10.5.6(5)(b) Outside each room above the door that has a staff Panic/Duress Button.

7.10.5.6(5)(c) On the ceiling at each reception and/or care team base station

7.10.5.6(5)(d) Directly above and out of reach at each staff/public outdoor station and parkade areas

7.10.5.6(6) The exterior stations and enunciators shall be weather proof and suitable for the environment.

7.10.5.6(7) Locations of all fixed and wireless Panic/Duress alarms will be annunciated and displayed on the geographical map at each workstation associated to the applicable department and or area of the alarm.

7.10.5.6(8) The Panic/Duress System to be zoned or partitioned to allow for different annunciation and alarm reporting based on each zone i.e.: Interior zones is a clinical team annunciation for response; exterior zone is a security only annunciation for a security specific response.

7.10.5.6(9) Alerts shall be zone dependent and configurable such that a head nursing staff member is alerted of incidents that occur on their unit only. Confirm workflow via user group meetings prior to programming.

7.10.5.7 Workstations and Displays

7.10.5.7(1) Workstations and/or display only monitors, or touchscreen monitors will be required. All hardware (excluding network hardware as supplied by the Authority) to be supplied by the Design-Builder.

7.10.5.7(2) Panic/Duress workstations are to be single screen Panic/Duress workstation, complete with PC (including CD/DVD burner; minimum 2 spare USB ports), keyboard, mouse, 21” or 24” monitor (minimum 1920x1080 resolution, HD Display, IPS display type, with integrated speakers), operating system, software and licences. The location is to be determined in consultation with the Authority.

7.10.5.7(3) Panic/Duress display monitors are to be 24” displays which illustrate alarm activations; system status and other required information. Acknowledgment and reset of alarms is not required.

7.10.5.7(4) Workstations and display monitors to be programmed with floorplans/graphical displays.

7.10.5.7(5) One (1) workstation to be provided at each of the following locations:

7.10.5.7(5)(a) Building Security Office (one location) - This workstation will receive all Panic/Duress alarm signals and associated maps for the entire facility, including the exterior and parkade areas. 21” monitor required.

7.10.5.7(6) One (1) workstation or display monitor (to be determined) to be provided at each of the following locations:

7.10.5.7(6)(a) Care Team Bases (five locations) - This workstation or monitor display will receive Panic/Duress signals to be determined in consultation with the Authority. Functionality related to acknowledging alarms, resetting alarms to be determined. Configuration may differ from location to location.

7.10.5.7(6)(b) Areas identified within clinical specifications and functional programming

7.10.5.7(6)(c) Areas identified through the consultation process

7.10.5.8 Programming

7.10.5.8(1) All programming associated with the hardwired and wireless Panic/Duress System(s), including workstations, shall be by the Design-Builder.

7.10.5.8(2) System programming is to be completed to the satisfaction of the Authority.

7.10.5.9 Facility Asset Management

7.10.5.9(1) Physically tag the following devices as required for data entry in to the asset management system owned and operated by the Authority:

7.10.5.9(1)(a) Panels;

7.10.5.9(1)(b) Keypads;

7.10.5.9(1)(c) Fixed buttons;

7.10.5.9(1)(d) Portable transmitters;

7.10.5.9(1)(e) Receivers/transceivers;

7.10.5.9(1)(f) Connected network equipment.

7.10.5.9(2) Asset tags to be provided by the Authority; data entry to be provided by the Authority.

7.10.5.9(3) Provide individual asset information, as required, to facilitate asset management database requirements.

7.10.6 Intrusion Detection System

7.10.6.1 Basic Requirements

7.10.6.1(1) Intrusion detection systems will be installed in all areas where protection of physical assets is critical.

7.10.6.1(2) The intrusion alarm system and all associated alarm panels must be compatible and remotely programmable through the Authority's existing intrusion system administration software.

7.10.6.1(3) Intrusion systems are to be designed in consultation with the Authority.

7.10.6.2 Performance Criteria

7.10.6.2(1) The intrusion detection system(s) will utilize industry proven devices for intrusion alarm detection and reporting capable of 24 hours per day, seven days per week continuous operation, with 4 hour minimum battery backup operation in the event of power outages.

7.10.6.2(2) The Design-Builder will provide intrusion detection system(s) including alarm controllers, local keypads, motion sensors, shock sensors, glass break sensors, door contacts, strobes, sirens and other alarm initiating devices as needed for a reliable and fully operational system(s).

7.10.6.2(3) Acceptable manufacturer: Provide and install a Digital Security Controls (DSC) intrusion detection system(s) for the facility.

7.10.6.2(4) Control each system with keypad(s) located inside the department or area being protected.

7.10.6.2(5) Provide one (1) master intrusion alarm panel for the facility. Local intrusion alarm controllers will be integrated with the master intrusion alarm panel.

7.10.6.2(6) The master intrusion alarm panel is required to communicate with the Authority's off-site ULC monitoring station. Coordinate directly with this service provider as required. Provide one (1) dedicated telephone line for alarm monitoring.

7.10.6.2(7) Intrusion systems to be integrated in the site access control system for annunciation purposes and graphical display.

7.10.6.2(8) The Design-Builder will install intrusion detection systems in all areas where protection of physical assets is critical as determined through the consultation process. Areas may include:

7.10.6.2(8)(a) Departmental office suites (ie: Administration; Outpatient Psychiatry; other)

7.10.6.2(8)(b) Nuclear medicine and/or areas where nuclear material is utilized or stored

7.10.6.2(8)(c) Pharmacy spaces

7.10.6.2(8)(d) Cash Offices

7.10.6.2(8)(e) Data centres (server Communication equipment and computer rooms)

7.10.6.2(8)(f) Communications Rooms

7.10.6.2(8)(g) Videoconferencing rooms

7.10.6.2(8)(h) Critical infrastructure areas

7.10.6.2(8)(i) Health records storage

7.10.6.2(8)(j) Stores (shipping/receiving)

7.10.6.2(8)(k) Ground level departments

7.10.6.2(8)(l) Large Multipurpose Room and associated Projection and Control Room.

7.10.6.2(8)(m) Perimeter windows and openings that may compromise integral security of the Facility.

7.10.6.2(8)(n) Areas designated as high risk by the Authority

7.10.6.2(8)(o) Areas identified within clinical specifications and functional programming

7.10.6.2(8)(p) Areas identified through the consultation process.

7.10.6.2(8)(q) Duress System Integration

7.10.6.2(9) Provide one (1) dedicated intrusion alarm panel for dedicated purpose of reporting duress system alarms to the Authority's off-site ULC monitoring station. Coordinate directly with this service provider as required. Provide one (1) dedicated telephone line for alarm monitoring.

7.10.6.2(10) The hard wired panic/duress system will inter-connect to the intrusion alarm system and separately report alarms to the Authority's off site monitoring station; Each button to be individually zoned to indicate specific alarm location.

7.10.6.2(11) The wireless panic/duress system will inter-connect to the intrusion alarm system and separately report one generic alarm upon system activation. The wireless system will report as one intrusion zone.

7.10.6.3 Programming

7.10.6.3(1) All programming of the intrusion alarm systems shall be by the Design-Builder, in accordance with the monitoring company.

7.10.6.3(2) The access control VAR will be responsible for the programming of the intrusion alarm points within the access control geographical map. The Design-Builder is responsible for all associated costs.

7.10.6.3(3) System programming is to be completed to the satisfaction of the Authority.

7.10.6.4 Asset Management

7.10.6.4(1) Physically tag the following devices as required for data entry in to the electronic security asset management system owned and operated by the Authority:

7.10.6.4(1)(a) Panels;

7.10.6.4(1)(b) Keypads;

7.10.6.4(1)(c) Field devices such as PIRs, contacts, glass break sensors, other sensors.

7.10.6.4(2) Asset tags to be provided by the Authority; data entry to be provided by the Authority.

7.10.6.4(3) Provide individual asset information, as required, to facilitate asset management database requirements.

7.10.7 Video Surveillance

7.10.7.1 Basic Requirements

7.10.7.1(1) Provide a complete video surveillance system, including but not limited to all cameras, equipment, hardware software and licensing required for a fully functional system, throughout and around the Facility, for the purposes of 1) Site Security and 2) Clinical Observation

7.10.7.1(2) Video surveillance systems are to be designed in consultation with the Authority.

7.10.7.2 General

7.10.7.2(1) The Design-Builder will provide a Facility Security Video Surveillance system to enhance the level of security; assist in providing a safe environment for Patients, staff and visitors; and to protect assets and infrastructure.

7.10.7.2(2) Cameras solely intended for Site Security purposes will be viewable by security staff and recorded on the digital video management system (DVMS) system.

7.10.7.2(3) Designated cameras may be used for site security as well as clinical observation. In which case, the cameras will be recorded and viewed by both security and clinical staff and recorded on the DVMS.

7.10.7.2(4) Clinical cameras will be viewable by clinical staff only and will not be recorded.

7.10.7.3 Surveillance System – Performance Criteria

7.10.7.3(1) The (DVMS) shall be a network-based client application allowing for authorized users to remotely view, control, and manage all aspects of the video surveillance system across the network. The DVMS will have network and web access for remote monitoring, using predefined user authentication.

7.10.7.3(2) Acceptable Manufacturer: Provide and install a new Avigilon DVMS for the facility.

7.10.7.3(3) Utilize the existing management server in the Existing Hospital, and supply and install new recording and archive server(s) in the new Facility, as required to support the additional storage and bandwidth for all new devices, including video intercom (refer to Division 27) New recording and archiver servers are to be located on site within the CCH and provided in accordance with Division 27 requirements.

7.10.7.3(4) Cameras and all peripheral devices from manufacturers other than Avigilon must have a fully developed software interface from the manufacturer supporting all feature sets of the device through the Avigilon video management software.

7.10.7.3(5) The DVMS shall reside on the Authority’s network on a separate VLAN and be part of the Authority’s structured cabling plan.

7.10.7.3(6) The DVMS will provide recorded images of sufficient quality to be used as court evidence in Canada. Designated objects within each camera's field of view require specific pixel densities in the following areas:

7.10.7.3(6)(a) Identification: 250 horizontal pixels/m for individuals at main entry and exit points to the Facility, department entry and exit points, emergency drop off zones, elevator lobbies, drug storage and medication rooms, high risk areas and at each public panic station location.

7.10.7.3(6)(b) Recognition: 125 horizontal pixels/m for individuals in public lobbies, waiting and gathering areas, areas where cash is exchanged, entrances to locker change rooms, equipment/server rooms and hallways/corridors.

7.10.7.3(6)(c) Observation: 62 horizontal pixels/m for exterior walkways, court yards and parking lots.

7.10.7.3(6)(d) LPR: Licence plate recognition will be required at emergency drop-off zones and entrances, and exits to parkades.

7.10.7.3(7) Video surveillance processes will be governed by the Video surveillance processes will be governed by the Public Surveillance System Privacy Guidelines for the Province of British Columbia as well as the Freedom of Information and Protection of Privacy Act (British Columbia).

7.10.7.3(8) Provide security video surveillance coverage at locations determined in consultation with the Authority, including but not limited to:

7.10.7.3(8)(a) Main entrances & exits to the Facility;

7.10.7.3(8)(b) Vehicle drop off and pickup locations;

7.10.7.3(8)(c) Entrance and exit doors and corridors to all departments;

7.10.7.3(8)(d) Public lobbies and waiting and gathering areas;

7.10.7.3(8)(e) Pharmacy; Dispensary/medication rooms; narcotic storage locations;

7.10.7.3(8)(f) Loading docks;

7.10.7.3(8)(g) Sally-Port and Controlled vestibules;

7.10.7.3(8)(h) Entrances to locker rooms;

7.10.7.3(8)(i) Elevator lobbies (public and service);

7.10.7.3(8)(j) Parking entrances and exits, including stairwells; parking traffic routes in parking areas;

7.10.7.3(8)(k) Parking pay stations;

7.10.7.3(8)(l) Bicycle lockers/storage;

7.10.7.3(8)(m) Publicly accessible Panic/Duress Stations

7.10.7.3(8)(n) (Communication Rooms ; server rooms; rooms and/or areas identified as key building infrastructure;

7.10.7.3(8)(o) Perimeter walkways and walkways connecting to other buildings on the Campus;

7.10.7.3(8)(p) Inside exit stairwells at grade or exit door

7.10.7.3(8)(q) Secure Outdoor Spaces on all Building levels

7.10.7.3(8)(r) Staff Outdoor Spaces on all Building levels

7.10.7.3(8)(s) Areas where cash is exchanged

7.10.7.3(8)(t) Accessible roof areas

7.10.7.3(8)(u) Locations of all Intercom Door stations

7.10.7.3(8)(v) Areas identified through the consultation process

7.10.7.3(8)(w) Areas designated as high risk by the Authority

7.10.7.3(9) All entry and exit points to strictly controlled high risk departments and associated areas require recorded video surveillance (areas and design to be determined in consultation with users). Provide one (1) HD Display monitor suitably sized for the number of cameras to be viewed in each high risk department, for staff to locally monitor cameras associated with the general activity outside the main entrance and adjoining waiting areas.

7.10.7.3(10) The DVMS shall be a network based client application allowing for authorized users to remotely view, control, and manage all aspects of the video surveillance system across the network. System will have network and web access for remote monitoring, using predefined user authentication.

7.10.7.3(11) The digital recording and storage solution shall record throughout the Facility and shall be adequate for a minimum 30 days storage based on: a minimum resolution of 1280x720, 15 images per second continuous recording of all cameras. Configure storage solution with adequate input/output operations and read/write speeds to ensure there is no negative impact on system performance during normal operation, drive failure or drive rebuild/recovery. Allow for an additional 15% usable spare recording capacity. Storage capacity calculations to be provided by the Design-Builder.

7.10.7.3(12) The DVMS will integrate with the access control, Panic/Duress Stations, and intrusion alarm system to allow for higher recording rates (30 images per second) during alarm conditions. This shall be taken into consideration when doing the storage calculations.

7.10.7.3(13) All video streams from IP cameras shall be digitally encoded in H.264 compression format and recorded simultaneously in real time.

7.10.7.3(14) Each camera's bit rate, frame rate and resolution shall be set independently from other cameras in the system, and altering these settings will not affect the recording and display settings of other cameras.

7.10.7.3(15) Consult with the Authority's Security Programs for use of 360- degree cameras in locations acceptable to the Authority.

7.10.7.3(16) Position cameras to minimize possibility of reflection including glare created by bright light sources, both natural and artificial.

7.10.7.3(17) All indoor and outdoor cameras shall have vandal -resistant housings with tamper, capable of being surface or flush mount according to the surface it's being mounted to.

7.10.7.3(18) Integrate the video surveillance system with other systems as identified in other sections. Including but not limited to video surveillance alarm call up on a panic/duress alarm activation.

7.10.7.3(19) Indoor cameras shall be dome cameras, colour, IP, PoE 802.3af with a minimum resolution of 1280x720, and shall be capable of recording in H.264.

7.10.7.3(20) Cameras within the Building viewing outside entrances through glass windows or doors shall have a wide dynamic range image setting.

7.10.7.3(21) Outdoor cameras shall be colour, IP, PoE 802.3af with a minimum resolution of 1280x720 and capable of recording in H.264 format.

7.10.7.3(22) The outdoor cameras shall have a day night cut filter and be able to operate in temperatures ranging from -40° to 50°

7.10.7.3(23) Outdoor cameras shall be complete with weatherproof housing and internal heater/blower/wiper as required for suitable operation under varying environmental conditions. Provide hood extensions and shields where required to prevent picture degradation due to direct sunlight or lamp glare.

7.10.7.3(24) Outdoor camera brackets and hardware shall be furnished with weather resistant coatings preventing corrosion and staining. The housings shall be capable of mounting on poles parapets and walls.

7.10.7.3(25) Pan-tilt-zoom (PTZ) cameras shall be color, IP, PoE, with a minimum resolution of 1080p, capable of minimum 35x optical zoom, high-speed with low light day/night operation capability with 360 degrees rotation in less than 3 seconds. Domes will mount on poles, parapets and walls located to provide optimum unobstructed viewing of the area under surveillance. PTZ cameras will have the ability to mask portions of view through software and remote programming.

7.10.7.3(26) At a minimum, Category 6A UTP cable shall be run to each camera. All wire runs shall be a continuous home run back to the head end or closest Communications Room as per section 7.9.5 Structured Cabling specifications. Where runs exceed 80m, and only with approval from the Authority provide media converters complete with power source and fibre optic cable to ensure TIA/EIA compliance; if media converters are located outdoors they must be provided in a weatherproof housing. Design-Builder must receive approval from the Authority prior to utilizing media converters.

7.10.7.3(27) Where fibre optic cable is required, fibre connectors shall be TIA/EIA compliant and rated for indoor and outdoor use. Installation of fibre optic cabling to outdoor applications shall be done so that the weatherproofing characteristics of the cabling are not compromised;

7.10.7.3(28) Cameras will not be set up in private areas such as Patient Bedrooms or treatment rooms (unless specifically identified for use by clinical department staff), locker rooms, or washrooms. Cameras will not be placed or reviewed for the purpose of observing work performance of employees.

7.10.7.3(29) Video surveillance processes will be governed by the Public Surveillance System Privacy Guidelines for the Province of BC as well as the Freedom of Information and Protection of Privacy Act (British Columbia).

7.10.7.3(30) Areas which have video surveillance cameras installed will have signage posted at all entrances to the Building. The signage will notify the public that the area is under video surveillance. Consult the Authority for appropriate wording.

7.10.7.4 Surveillance System – Programming

7.10.7.4(1) All programming of the video surveillance system shall be by the Design-Builder in conjunction with the Authority.

7.10.7.4(2) The access control VAR will be responsible for the programming of the video surveillance camera points within the access control geographical map.

7.10.7.4(3) System programming is to be completed to the satisfaction of the Authority.

7.10.7.5 Clinical Observation System – General

7.10.7.5(1) The Design-Builder will provide a Clinical Observation video surveillance system to allow clinical and other staff to monitor Patient and other activity in designated areas of the facility.

7.10.7.5(2) Cameras solely intended for Clinical Observation purposes will be viewable by clinical staff and not recorded on the digital video management system (DVMS) system.

7.10.7.5(3) Designated cameras may be used for site security as well as clinical observation. In which case, the cameras will be recorded and viewed by both security and clinical staff and recorded on the DVMS.

7.10.7.5(4) Provide point-to-point cameras and monitors for clinical purposes at locations described in the Clinical Specifications and requirements.

7.10.7.5(5) It is permissible for the Clinical cameras to reside on the Facilities DVMS, but the cameras must be configured such that they cannot be viewable by site security staff or recorded on the DVMS.

7.10.7.5(6) Coordinate location of video surveillance monitors in clinical space with Clinical programs and the millwork design to ensure ergonomic viewing and usage in conjunction with other systems.

7.10.7.6 Clinical Observation System – Performance Criteria

7.10.7.6(1) Clinical cameras shall be dome cameras, colour, IP, PoE 802.3af with a minimum resolution of 1280x720, and shall be capable of recording in H.264. Mounting will be appropriate for the environment, unobtrusive with no protruding cabling.

7.10.7.6(2) Infrared illuminated cameras are required for Patient observation in low or no light environments.

7.10.7.6(3) Corner mount correctional style cameras shall be installed in areas such as seclusion rooms and other specialized environments where Patient safety is a concern. Coordinate with the clinical Specifications and in consultation with the Authorities Security Programs for exact locations.

7.10.7.6(4) Provide a minimum of one (1) LED-backlit monitor suitably sized for the number of cameras to be viewed at each nursing station in the clinical department, for staff to monitor all cameras associated within the clinical space. Additional monitors may be required as determined in consultation with the authority.

7.10.7.6(5) The clinical cameras shall stream live to the display monitors with no more than a 1000ms latency at each nursing station within the clinical space.

7.10.7.6(6) Provide clinical observation video coverage at locations determined in consultation with the Authority, including but not limited to:

7.10.7.6(6)(a) Secure rooms; Seclusion Rooms;

7.10.7.6(6)(b) Corridors within clinical units;

7.10.7.6(6)(c) Clinical unit entry doors;

7.10.7.6(6)(d) Secure Outdoor Spaces;

7.10.7.6(6)(e) Areas identified through the consultation process;

7.10.7.6(6)(f) Areas designated as high risk by the Authority: and

7.10.7.6(6)(g) Comfort Rooms.

7.10.7.7 Asset Management

7.10.7.7(1) Physically tag the following devices as required for data entry in to the electronic security asset management system owned and operated by the Authority:

7.10.7.7(1)(a) Power supplies;

7.10.7.7(1)(b) Monitors;

7.10.7.7(1)(c) Camera bodies;

7.10.7.7(1)(d) PTZ keyboards and controller;

7.10.7.7(1)(e) Encoders;

7.10.7.7(1)(f) Enclosures;

7.10.7.7(1)(g) UPS units;

7.10.7.7(1)(h) Connected network equipment

7.10.7.7(2) Asset tags to be provided by the Authority; data entry to be provided by the Authority.

7.10.7.7(3) Provide individual asset information, as required, to facilitate asset management database requirements.

Part 8. SITE, INFRASTRUCTURE AND LANDSCAPE SUBGROUP SPECIFICATIONS

8.1 Exterior Improvements

8.1.1 General

8.1.1.1 All works shall be designed and constructed in accordance with the latest version of the BCBC.

8.1.1.2 All works shall be designed and constructed in accordance with the City of New Westminster's Subdivision & Development Control Bylaw No 7142, 2007.

8.1.1.3 All works shall be designed and constructed in accordance with the latest edition of the Master Municipal Construction Documents.

8.1.2 Aggregate Base Courses

8.1.2.1 Basic Requirements

8.1.2.1(1) Utilize granular sub-base for stability of surface treatment through freeze thaw cycles and for its ability to store moisture.

8.1.2.1(2) Place granular sub-base and base only on an underlying subgrade that has been properly compacted and approved by the geotechnical engineer.

8.1.2.1(3) The granular sub-base and base course will consist of crushed rock, gravel and sand consisting of hard, clean durable material, free from coatings of silt, clay or other deleterious materials and containing no organic matter acceptable to the Geotechnical Engineer.

8.1.2.2 Performance Criteria

8.1.2.2(1) Design the depths of aggregate base courses to exceed limits defined by regional average freeze thaw cycles averaged over a twenty year period.

8.1.2.2(2) Design aggregate base courses to meet or exceed the specifications of the pavement structure design for intended loads and climate conditions found on site.

8.1.3 Asphalt Paving

8.1.3.1 Basic Requirements

8.1.3.1(1) Utilize asphalt paving in areas where vehicle traffic and snow clearing equipment require a smooth surface for travel.

8.1.3.1(2) Place hot mix asphalt only on an underlying base course that has been compacted and approved by the geotechnical engineer.

8.1.3.1(3) Design asphalt mix for the intended load and climate conditions found on site.

8.1.3.1(4) Asphalt paving to be minimum 100mm thick.

8.1.3.2 Performance Criteria

8.1.3.2(1) Asphalt will meet or exceed the specifications of the pavement structure design and asphalt mix design. Pavement structure thicknesses will be as required by The Design-Builder's geotechnical engineers, based on assessment of specific Site conditions but no less than 100mm in two lifts.

8.1.3.2(2) Asphalt design will meet or exceed the intended loads and climate conditions found on site

8.1.4 Concrete Curbs

8.1.4.1 Basic Requirements

8.1.4.1(1) Provide concrete curbs with gutter along the perimeter of asphalt surfaces, unless otherwise reviewed by the Authority.

8.1.4.1(2) Provide concrete roll-type curbs with gutter along each side of the Service Lane between the Site and the Existing Hospital as required to provide separated sidewalks while maintaining a 7.3m wide emergency vehicle corridor.

8.1.4.1(3) All concrete works are to meet or exceed Best Practice requirements for load and climate conditions found on site.

8.1.5 Interlocking Concrete Paving

8.1.5.1 Basic Requirements

8.1.5.1(1) Precast Concrete Unit paving shall be (at a minimum) utilized at the following locations;

8.1.5.1(1)(a) Service Lane North of the Energy Centre

8.1.5.1(1)(b) Drop-off layby at the main entrance to the Mental Health Building

8.1.5.1(1)(c) Pedestrian entrance plaza area adjacent to the intersection of the main entry drive and Keary St.

8.1.5.1(1)(d) The “Garden Walk” along the west side of the Mental Health Building

8.1.5.2 Performance Criteria

8.1.5.2(1) All interlocking concrete pavement products and installation methods shall comply with ICPI standards.

8.1.5.2(2) Thickness of interlocking concrete pavers shall vary according to application;

8.1.5.2(2)(a) Pedestrian areas shall be paved with 60mm (min.) thick units

8.1.5.2(2)(b) Vehicular areas shall be paved with 80mm (min.) thick interlocking units

8.1.6 Painted Pavement Markings

8.1.6.1 Basic Requirements

8.1.6.1(1) Provide temporary and permanent painted pavement markings.

8.1.6.1(2) All pavement markings to be in accordance with the latest edition of TAC Manual of Uniform Traffic Control Devices.

8.1.6.2 Performance Criteria

8.1.6.2(1) Taped, painted and thermoplastic pavement markings to be selected for their suitability and durability or at the discretion of the AHJ.

8.1.7 Tree Retention and Protection

8.1.7.1 Basic Requirements

8.1.7.1(1) Conduct a predesign assessment of the existing vegetation to identify existing trees and mature plant communities to be retained.

8.1.7.1(2) Retain existing trees and mature vegetation where they do not conflict with Site development or Site grading. Protect trees and mature vegetation that will be retained during construction.

8.1.7.1(3) To reinforce the image of a well-established landscape, retain and incorporate mature trees and landscaping into the Site development. Develop a tree salvage plan that notes trees to be cut down, trees to remain, and trees to be relocated.

8.1.7.1(4) Review the site for plants on the BC Weed Control Act and prepare and execute a strategy to clear site of problem plants.

8.1.7.2 Performance Criteria

8.1.7.2(1) Engage a certified arborist (licensed with the International Society of Arboriculture – ISA) to evaluate the existing trees to remain.

8.1.7.2(2) Treat the retained trees as directed by the arborist and under the direct guidance of the arborist (e.g. root pruning, spiral pruning, watering, fertilizing).

8.1.7.2(3) Control plants on the BC Weed Control Act by appropriate means with the assistance of a certified Agrologist prior to the development of the site including any stockpiling of existing soils.

8.1.7.2(4) Protect trees and mature vegetation that will be retained during construction with fencing to the Critical Protection Zone as defined herein as the drip line of the canopy of foliage.

8.1.7.2(5) Surround trees and vegetation that will be retained by Protective Fencing to the Critical Protection Zone.

8.1.7.2(6) Avoid excavating, storage of materials, parking, vehicular driving, preloading, or filling within the Critical Protection Zone of the trees being preserved.

8.1.7.2(7) Comply with applicable tree protection bylaws with regard to tree replacement ratios and sizes.

8.1.7.2(8) If there is no tree protection bylaw applicable to the Site, then comply with the following tree replacement requirements: a) whenever a tree over 300 mm diameter at breast height is removed, The Design-Builder will replace the tree at a 3:1 ratio; and b) replacement trees will be specimen trees and must have a minimum calliper of 14 cm (5.9 in.) in diameter at breast height for deciduous trees, or 3.0 m ht. for coniferous trees.

8.1.7.2(9) Provide tree wells and/or creative grading of the ground away from existing vegetation to remain. Where tree wells are to be constructed, the wells must be a minimum distance of 1.5 times the distance from the trunk of the tree to the drip line.

8.1.8 Not used

8.1.9 Trees, Shrubs and Groundcover

8.1.9.1 Basic Requirements

8.1.9.1(1) Plant material shall be nursery grown, conforming to the Canadian Nursery Trades Association Landscape Canada “Metric Guide Specifications for Nursery Stock” and to the “British Columbia Nursery Trades Standard for Container Grown Plants.”

8.1.9.1(2) Provide plantings to support the landscape design by reinforcing spatial relationships and wayfinding. The plant selection and placement will address micro-climates surrounding the Facility and mitigation of heating and cooling loads.

8.1.9.1(3) Provide landscape treatments that provide view corridors and means for engaging the surrounding built and natural landscape.

8.1.9.1(4) Provide landscape treatments for the complete Site that contributes to the creation of a liveable, healthy and responsive community.

8.1.9.1(5) Provide planting that is responsive to views from habitable/Patient interior spaces. Planting will provide a positive benefit for Patients equally from the interior and the exterior of the building.

8.1.9.1(6) Use large caliper deciduous trees and evergreen trees that provide seasonal interest in association with ground covering shrub plantings.

8.1.9.1(7) Use a variety of plant material to provide year round interest and reflect seasonal change.

8.1.9.1(8) Use similar plant species to help unify the site character, create recognizable spaces, contribute to site orientation and create a strong sense of place, recognizing that a diversity of tree specifies may increase the survival ratio of new landscaping.

8.1.9.1(9) Use of indigenous flora will be a priority, in terms of minimizing maintenance.

8.1.9.1(10) All landscape plantings shall be irrigated by a permanent, high efficiency, automatically timed and condition controlled, irrigation system.

8.1.9.2 Performance Criteria

8.1.9.2(1) All planting is to be suitable for plant hardiness zone 7 or hardier and be grown in a nursery within the same hardiness zone.

8.1.9.2(2) Imported plant material must be accompanied with necessary permits and import licenses. Transportation of elm trees must comply with Provincial DED regulations.

8.1.9.2(3) Source any roses from areas free of the pathogen Pytophthora ramorum. Roses must be on their own roots and not grafted.

8.1.9.2(4) No medium or large trees are permitted within 5m of the exterior walls of the Facility

8.1.9.2(5) No trees are permitted within 5m of the exterior walls of the Energy Centre.

8.1.9.2(6) 450mm deep Root barrier must be provided where trees are proposed within 2 metres of a sidewalk or other hardscape feature.

8.1.9.2(6)(a) Root barrier shall be commercially manufacture red for the sole purpose of deflecting roots downward and must be installed per the manufacturer’s instructions.

8.1.9.2(6)(b) Root barrier shall extend a minimum of 2.5m on each side of tree in a linear application.

8.1.9.2(7) Quantity of Trees.

8.1.9.2(7)(a) Provide off-site street trees where the site fronts Keary St., Brunette Avenue and Allen Street, at the following average spacing;

(a).1 Large Trees:9-11 metre
(a).2 Medium Trees: 8-10m
(a).3 Small Trees: 8-10m
(a).4 Columnar Trees: 6-10m

8.1.9.2(7)(b) Provide a minimum of 15 small and medium specimen trees as part of the overall on-site landscape planting.

8.1.9.2(8) Quantity of Shrubs

8.1.9.2(8)(a) 40% of all on-site soft landscape space shall be planting beds consisting of shrubs, ground covers and perennial plants.

8.1.9.2(9) Trees to be no smaller than 7 cm cal for deciduous shade trees, 2 m ht. Or 3 cm cal for ornamental/understory trees and 2.5 m ht. for coniferous trees upon installation.

8.1.9.2(10) Shrubs will be no smaller than #2 pot size upon installation.

8.1.9.2(11) Landscape treatment and circulation routes must be in accordance with Section 4.3 Urban Design and Site Development.

8.1.9.2(12) To ensure safety and security in areas of entry/egress, areas open to the public, and areas of security concern, provide sightlines through any cluster of tall growing vegetation by keeping all under storey plants to a maximum of 1.2 m (3.9 ft.) in height. All tree canopies are to be no lower than 1.5 m (5.0 ft.) in height, at the time of installation.

8.1.9.2(13) At least 50% of the total number of plants on the Site are to be native to British Columbia.

8.1.9.2(14) Use some flowering and fruiting trees and shrubs to promote natural avian habitat.

8.1.9.2(15) Do not install any plants listed as poisonous to humans by the Canadian Government's 'Canadian Poisonous Plants Information System'.

8.1.9.2(16) Group plants to minimize the use of water, chemicals and fossil fuel use for routine maintenance and to promote a healthy local ecosystem using sustainable measures.

8.1.9.2(17) Shrubbery within 2 m of walkways will not exceed 50 cm in height.

8.1.9.2(18) Trees planted in narrow planting areas (e.g. 'Street Trees') between hard surfaces (e.g. curbs, sidewalks, roads, buildings) will have a continuous volume growing medium available to their roots along the length of the planting area (i.e. no tree pits). Additionally, a 2,0m wide growing medium volume shall be established perpendicular to the narrow planting area for bridging across (under) adjacent sidewalks. Minimum widths of planting areas to be 1.5 m, but wider planting areas are encouraged.

8.1.9.2(19) Trees will be planted in areas that will provide root zone access to a volume of growing medium sufficient to support proper growth. This may include linear tree trenches, structural soil beneath pavement or other means necessary to provide ample growing medium. Provide minimum soil volume per tree as follows:

8.1.9.2(19)(a) 5 cubic metres for small trees;

8.1.9.2(19)(b) 10 cubic metres for a medium-sized tree; and

8.1.9.2(19)(c) 20 cubic metres for a large tree.

8.1.9.2(20) Irrigation: Trees

8.1.9.2(20)(a) Trees in lawn areas shall be irrigated by a drip system. Drip line shall have pressure compensating emitters. Each drip zone shall have an inline filter, inline prv and air relief valve.

8.1.9.2(20)(b) Tree drip systems shall be zoned separately to allow for irrigation under restricted watering conditions when lawn irrigation is not permitted.

8.1.9.2(20)(c) Irrigation of off-site trees and lawn areas shall be provided per City of New Westminster specifications and the water supply shall be independent of the Facilities' service.

8.1.9.2(21) Irrigation: Grass/Lawn and Shrub Beds

8.1.9.2(21)(a) Lawn areas and shrub beds shall have a high-efficiency irrigation system which includes, but is not limited to the following features; pressure regulating sprinklers, check valve in sprinklers at low areas, matched precipitation rate nozzles, separate zones base on micro climate, wind resistant nozzles).

8.1.9.2(22) Lawn areas shall be zoned separately from shrub beds

8.1.10 Growing Medium

8.1.10.1 Basic Requirements

8.1.10.1(1) Supply and placement of all growing medium shall conform to section 6 of the 2012 BCLNA Standards

8.1.10.1(2) All proposed topsoil to be reviewed and approved by the Project Landscape Architect and City of New Westminster Parks Department where work occurs on City property.

8.1.10.2 Performance Requirements

8.1.10.2(1) All growing medium placed over slabs or under cover shall conform to Growing Medium Type 1L in table T-6.3.5.2 of the 2012 BCLNA Standards

8.1.10.2(2) All growing medium placed over native subgrade or fill at planting bed areas shall conform to Growing Medium Type 1P in table T-6.3.5.2 of the 2012 BCLNA Standards

8.1.10.2(3) All growing medium placed over native subgrade or fill at lawn areas and tree planting areas shall conform to Growing Medium Type 2L in table T-6.3.5.2 of the 2012 BCLNA Standards

8.1.10.2(4) Where a portion tree's required soil volume extends below a paved surface the Design-Builder shall place Structural Soil below the pavement. Structural soil shall consist of an approved blend of 60-75mm clear, clean crushed stone, growing medium, and soil stabilizer.

8.1.10.2(5) Where a tree planting occurs in pavement, (e.g the required soil volume is below a paved surface) the Design-Builder shall install soil cells such as "Silva Cell" or Strata Cell" per the manufacturer's specifications, including approved growing medium.

8.1.10.2(6) Provide Minimum depths of growing media as per Table T-6.3.5.5 of the 2012 BCLNA Standards.

8.1.11 Mulches

8.1.11.1 Basic Requirements

8.1.11.1(1) Provide mulch to planting beds and tree wells to increase moisture retention.

8.1.11.2 Performance Criteria

8.1.11.2(1) Provide wood mulch that is untreated, locally sourced, composted, and free from deleterious materials and weed sources. Wood mulch must be designed to a depth so as to retain moisture and reduce weed growth without the use of landscape fabric.

8.1.11.2(2) Rock mulch will be clean washed rock, installed over professional grade landscape fabric. Rock mulch will only be used in areas without perennials, shrubs, needle bearing plants, and fruit bearing plants.

8.1.11.2(3) Mulch will be tapered to base of tree, shrub or perennial.

8.1.12 Establishment Maintenance

8.1.12.1 The date of Substantial Completion, or the completion of landscape planting (whichever occurs last) shall constitute the beginning of the 24 month Establishment Maintenance period.

8.1.12.2 Maintenance during the 24 month period of Establishment Maintenance is essential to ensure the validity of the Design-Builder's guarantee for the same period.

8.1.12.3 Replace for a period of 24 months beginning from completion of landscape planting, all unsatisfactory plant material and continue to replace such plant material until the replacement is acceptable, at no cost to the Authority.

8.1.12.4 Establishment maintenance procedures apply to all new plants and planting as well as cultivated turf grass, seeded areas, and all trees and shrubs.

8.1.12.5 A log book shall be kept in which maintenance activities are recorded. This will include a record of when and what operations are carried out, as well as notations about site conditions which require attention. A copy of this information shall be forwarded to the Authority each time a report is written. A minimum of three maintenance reports shall be made during each growing season.

8.1.12.6 Work included:

8.1.12.6(1) Maintaining all newly planted areas in a weed-free condition.

8.1.12.6(2) Fertilizing the planting areas and lawn areas.

8.1.12.6(3) Pruning.

8.1.12.6(4) Replacement of dead or diseased plants.

8.1.12.6(5) Watering in sufficient quantities and frequency to maintain optimum soil moisture.

8.1.12.6(6) Lawn mowing.

8.1.12.7 Protect all pre-existing and newly planted trees, shrubs and other plant materials, site services, curbs, asphalt, and structures against any damage throughout the establishment maintenance period.

8.1.12.8 Lawn mowing shall be carried out at regular intervals to maintain grass at a maximum height of 60mm (2.5”). Edges of sodded areas shall be straight and neatly trimmed.

8.1.12.9 In March and June of the first growing season, fertilize all exterior planting areas with the fertilizer recommended by the Landscape Architect. Repeat the fertilizer application in March of the second growing season.

8.1.12.10 The Design-builder is responsible for all losses due except those related to vandalism.

8.2 Landscape

8.2.1 Basic Requirements

8.2.1.1 Provide outdoor spaces in the design of the Facility in accordance with Appendix 1A [Clinical Specifications] and all applicable provisions in this Schedule.

8.2.1.2 Outdoor spaces are to be incorporated as an integral extension of the Building interiors, linking its internal spaces to view vistas of the exterior greenspace.

8.2.1.3 If the Design proposed by the Design-Builder provides Patient Bedrooms and Patient common (day) spaces facing the Energy Centre the Design-Builder will provide a Living Wall on the façade of the Energy Centre that those spaces will be facing. The purpose of this Living Wall is so that Patient Bedrooms and Patient common (day) spaces can enjoy such feature. The Living Wall will extent to the entirety of such façade.

8.2.1.4 Provide landscape that contributes to a liveable, healthy and responsive community.

8.2.1.5 Provide streetscape treatments (e.g. street trees, boulevards and sidewalks) per the guidelines, standards and bylaws of the City of New Westminster.

8.2.1.6 Provide landscape site plans prepared by a BCSLA registered landscape architect.

8.2.1.7 Installation of the landscape to be supervised and approved by a BCSLA registered landscape architect.

8.2.1.8 Work and materials are to meet requirements of the latest edition of the B.C. Landscape Standard, prepared by the B.C. Society of Landscape Architects and the BC Landscape and Nursery Association.

8.2.1.9 Provide landscaped surfaces to entire site, exclusive of hard-surfaced circulation and paved areas. Grassed areas are to be sodded

8.2.1.10 The selection of outdoor plantings in all outdoor spaces will be low maintenance.

8.2.1.11 All landscape plantings shall be irrigated by a permanent, high efficiency irrigation system:

8.2.1.11(1) the irrigation design must be supervised and approved by a BCSLA registered landscape architect;

8.2.1.11(2) the irrigation system must be reviewed by a Certified Irrigation Designer and Certified Landscape Irrigation Auditor (CLIA); and

8.2.1.11(3) the irrigation system must be installed by a IIABC Certified Irrigation Contractor – Commercial (CIC).

8.2.1.12 Maximize the amount of landscape areas on the Site and minimize the amount of impervious surfaces to increase the natural absorption rate of storm water, targeting a goal of 25% of the Site to have soft landscape, including trees, shrubs, groundcover and grass.

8.2.2 Performance Criteria

8.2.2.1 Provide outdoor spaces in the design of the Facility to accommodate activities, including:

8.2.2.1(1) space at the Keary St, entrance which acts as “an entrance plaza ” to the Facility which will be fully accessible to the public with strong connections to the site and the neighbourhood;

8.2.2.1(2) spaces which provide respite to pedestrians; and

8.2.2.1(3) spaces which provide a convenient and comfortable environment for staff breaks and outdoor eating.

8.2.2.2 Provide access to the outdoor spaces from the public areas of the Facility.

8.2.3 Secure Outdoor Spaces

8.2.3.1 Basic Requirements

8.2.3.1(1) In addition to general outdoor spaces, provide distinct, separate Secure Outdoor Spaces to accommodate programmed and un-programmed activities in the Building in accordance with this Schedule and Appendix 1A [Clinical Specifications]:

8.2.3.2 Performance Criteria

8.2.3.2(1) The selection and placement of outdoor plantings and furnishings in all Secure Outdoor Spaces will be safe for Patients and will not allow for opportunities of hiding. Plants that are sharp, poisonous, climbable, or otherwise dangerous, or that can potentially cause allergic reactions are not permitted.

8.2.3.2(2) Plantings within all Secure Outdoor Spaces shall be irrigated by a permanent, high efficiency, automatically timed and condition controlled, irrigation system.

8.2.3.2(2)(a) Raised Planters and pots shall have a drip system

(a).1 Drip line shall have pressure compensating emitters.

(a).2 Each drip zone shall have an inline filter, inline pressure regulating valve and air relief valve.

8.2.3.2(2)(b) Grass areas shall have a high-efficiency spray irrigation system, which includes, but is not limited to the following features; pressure-regulating sprinklers, check valve in sprinklers at low areas, matched precipitation rate nozzles, separate zones based on microclimate, wind resistant nozzles.

8.2.3.2(2)(c) All valves, controllers or other irrigation equipment located in Secure Outdoor Spaces shall be housed in non-freeze exterior enclosures with lockable hinged doors.

8.2.3.2(2)(d) The controller for the Green Roof and Secure Outdoor Space irrigation systems shall be an electronic,

programmable, multi-zone controller with weather sensor, meeting the EPA's WaterSense Criteria.

8.2.3.2(3) The Design-Builder will design the Secure Outdoor Spaces:

8.2.3.2(3)(a) to provide a sense of control, security, and safety:

(a).1 must be observable from indoor areas as described in Appendix 1A [Clinical Specifications];

(a).2 provide a variety of sitting areas from which to choose, including covered areas (protected from the elements) as well as areas exposed to the weather;

(a).3 provide fixed furniture as indicated in Appendix 1A [Clinical Specifications];

(a).4 seating material to be constructed of warm, comfortable material that does not get excessively hot or cold (e.g. wood) and facilitates the shedding of water. Avoid the use of concrete, aluminum & steel seats.

(a).5 seating surfaces must have rounded corners with no sharp edges; and

(a).6 seating must include back rests.

8.2.3.2(3)(b) to provide for social support:

(b).1 provide areas with seating to encourage conversation;

(b).2 provide areas of solitude;

(b).3 provide areas for reading, resting, meditation, contemplation and reflection; and

(b).4 provide areas for Patients to have scheduled visits outdoors under supervision from Staff

8.2.3.2(3)(c) to provide for physical movement and exercise:

(c).1 pathway loops where space permits;

(c).2 provide for areas or spaces for horticultural therapy programs (may include raised garden planters, storage of gardening supplies, access to water etc.);

(c).3 accommodate for behavioural difficulties or challenges;

(c).4 utilize pavement edging to prevent those using wheelchairs from rolling into planting beds;

(c).5 paved areas will be a minimum 1.5m in width and will have a surface that accommodates Patients with intravenous equipment, gurneys and wheelchairs or walkers;

(c).6 provide a minimum of one handrail between the entrance to any Secure Outdoor Space and a seat for Patients experiencing difficulties with strength or balance; and

(c).7 pavement expansion joints to be no more than 3mm in width to prevent the wheels of equipment getting caught and stuck;

8.2.3.2(3)(d) to provide access to positive distractions:

(d).1 incorporate visibility and visual interest both into and out of the Secure Outdoor Space;

(d).2 provide adequate signage within the Building to alert people of the Secure Outdoor Spaces;

(d).3 to be fully accessible with low entry lips to facilitate wheelchair access;

(d).4 provide plant material that provides seasonal interest;

(d).5 provide visual relief and interest in vertical and horizontal dimensions;

(d).6 provide bright colours;

(d).7 provide views to the greater surrounding landscape;

(d).8 provide a home-like environments (Patient scale); and

(d).9 provide landscape accent lighting to provide night time interest and enhanced views from interior spaces.

8.2.3.2(3)(e) to minimize intrusive stimuli:

(e).1 must be enclosed with Security Screens and sheltered from the wind;

(e).2 provide separation or screening from adjacent Patient Bedrooms;

(e).3 within the same designated Secure Outdoor Space provide gathering/seating areas that are sheltered from the sun and rain as well as areas that are exposed to them (from above);

(e).4 surfaces must reduce glare (e.g. tinted concrete) and be slip resistant; and

(e).5 to avoid bright lights.

8.2.3.2(3)(f) as outdoor “green space”:

(f).1 A minimum of 30% of each Patient Secure Outdoor Space shall be landscaped.;

(f).2 stimulate the senses of sight, sound, smell and touch;

(f).3 provide natural lighting and sounds;

(f).4 design with an emphasis on natural features such as plants, stone, and wood; and

(f).5 provide at least one hose bib in each therapeutic garden.;

8.2.3.2(3)(g) to minimize ambiguity:

(g).1 provide a well-defined and inviting entrance;

(g).2 provide a design that is easy to interpret by the majority of people; and

(g).3 avoid the use of abstract art;

8.2.3.2(4) Design the Older Adult Psychiatric Patient Unit Secure Outdoor Space so that it provides a wheelchair accessible raised planter for one Patient to support horticultural therapy.

8.2.3.2(5) Design the Staff Outdoor Space so that it:

8.2.3.2(5)(a) provides Staff outdoor resting areas in close proximity to the Staff facilities;

8.2.3.2(5)(b) provides visual privacy from public and Patient care areas so Staff members do not have to mingle with Patients on their breaks;

8.2.3.2(5)(c) has moveable furniture;

8.2.3.2(5)(d) has at least one (1) covered area (protected from the elements);

8.2.3.2(5)(e) includes tables and chairs, with seating for at least 30 people; and

8.2.3.2(5)(f) has a minimum of 35% of the area landscaped.

8.2.4 Site Slopes and Retaining Walls

8.2.4.1 Basic Requirements

8.2.4.1(1) Site grading is to provide positive drainage throughout (except where required for storm water detention/retention).

8.2.4.1(2) Site grading is to avoid over-steepened slopes that cause erosion, cause pedestrian instability and will not hold growing medium and plants.

8.2.4.1(3) Retaining walls to be architecturally finished.

8.2.4.1(4) Provide ‘green’ retaining walls.

8.2.4.2 Performance Criteria

8.2.4.2(1) Adequate gradients are required to avoid ponding throughout the site except where required for storm water detention/retention.

8.2.4.2(2) Steep slopes are to be no steeper than 4:1 and finished with growing medium and plant material. Prohibit riprap on slopes.

8.2.4.2(3) Slopes steeper than 4:1 are to be retained using structural, architecturally-finished retaining walls (e.g. cast-in-place C.I.P concrete).

8.2.4.2(4) Retaining walls greater than 1.5m in height are to be 'green' retaining walls (e.g. terraced planters) planted with vegetation to cover the face of the retaining walls.

8.2.5 Street Furniture

8.2.5.1 Basic Requirements

8.2.5.1(1) Unify the exterior ground plane treatment through the use of common paving materials, tree grates, lighting and other landscape furniture items.

8.2.5.1(2) Provide and coordinate design for street furniture, including benches provided at regular intervals for ease of use particularly for the infirm.

8.2.5.1(3) Ensure accessibility to Persons with Disabilities at grade changes through sloped walkways and ramps, and avoid the use of stairs.

8.2.5.1(4) Seating in public areas must: be designed for a variety of people; be designed to allow a wheelchair to sit alongside fixed seating or, where tables are provided, to allow a wheelchair to pull up to each table; have a minimum of 25% with backrests; and shed rain water.

8.2.5.2 Performance Criteria

8.2.5.2(1) Seating areas with benches will be located within the landscape areas adjacent to Allen and Keary Streets, no more than 12 m apart from each other. Select products on the basis of safety, comfort, design and

materials that relate to the Facility architecture and landscape design, durability and required maintenance.

8.2.5.2(2) Provide exterior trash receptacles at all gathering spaces and main entrances to the Facility.

8.2.5.2(3) Select products for their suitability and durability in the climatic conditions found at the Facility.

8.2.5.2(4) Select products with vandal proof design features

8.2.5.2(5) Utilize a variety of scales, locations and orientations of seating areas and site furnishings to cater to varied outdoor activities and varied experiences of the staff and visitors.

8.2.6 Green Roof

8.2.6.1 Basic Requirements

8.2.6.1(1) Extensive Green Roofs (all green roofs except areas identified as Staff Outdoor Space or Secure Outdoor Space) shall utilize a proprietary pre-grown tray system such as “LiveRoof Maxx 8” system”.

8.2.6.1(2) Intensive Green Roofs (all areas identified as Secure Outdoor Space) shall be a build-up system such as the “Roof Garden” system by ZinCo and shall accommodate a variety of plant types from lawn and perennials to shrubs and small trees.

8.2.6.2 Performance Criteria

8.2.6.2(1) Green Roof assemblies shall, as a minimum, consist of a root repellent membrane, a leak detention system, a drainage system, a filtering layer, minimum 200mm growing medium and plants, and shall be installed on a waterproof membrane of an applicable roof.

8.2.6.2(1)(a) Parapet height and/or Overflow Scupper Locations

(a).1 Parapets and scuppers shall be specified in the design, as required, to limit retained rain water loads to within structural limits in the event of obstructed internal drains.

8.2.6.2(1)(b) Waterproofing

(b).1 The design and construction shall include installation of a root barrier in all vegetated roofing systems.

8.2.6.2(1)(c) Drainage

(c).1 The design hydraulic load shall be evaluated assuming that the green roof system is fully saturated prior to the maximum fifteen-minute rainfall.

(c).2 Positive slope to drain shall be provide at the level of the waterproofing membrane.

(c).3 The system shall permit effective drainage beneath the growth media.

(c).4 Vegetation-free zones shall be provided around all drains.

8.2.6.2(1)(d) Water Retention

(d).1 Water retention mats or equivalent materials shall be employed as required to promote vegetation growth.

(d).2 The drainage layer shall be appropriate for storm water retention and must be selected following “ASTM E2398-05 Standard Test method for Water Capture and Media Retention of Geo-Composite Drain Layers for Green Roof Systems.

8.2.6.2(1)(e) Plant Selection

(e).1 Vegetation on a green roof will not include noxious weeds as defined in the latest revision of the British Columbia Noxious Weed Control Act.

(e).2 The plant selection and design shall be such that within three years of the planting date the selected plants shall cover no less than 80% of the vegetated roof.

8.2.6.2(1)(f) Irrigation

(f).1 Adequate measures will be provided to permit irrigation necessary to initiate and sustain the vegetation during the service life of the green roof.

(f).2 Green Roofs shall have a high-efficiency irrigation system which includes, but is not limited to the following features; pressure regulating sprinklers, check valve in sprinklers at low areas, matched precipitation rate nozzles,

separate zones based on micro climate, wind resistant spray nozzles).

(f).3 Proprietary drip or capillary irrigation is permitted where manufacturer designed build-up green roof systems are employed.

8.2.6.2(1)(g) Fire Safety.

(g).1 Where roof penetrations, intersecting walls, parapets, upturns or mechanical equipment are clad with combustible materials the design shall include a vegetation-free border zone abutting such feature and the vegetation-free border shall be equal to the vegetation height at maturity but in no case be less than 0.5m.

8.2.7 Living Wall

8.2.7.1 Basic Requirements

8.2.7.1(1) The Living Wall must be a self-sufficient vertical planting system which can be fastened to an exterior building wall without impacting the performance or maintenance of the envelope.

8.2.7.1(2) The Living Wall will not be connected to the ground. Plants must be supported and derive all necessary nutrients, and water from the wall mounted system.

8.2.7.1(3) The Design-Builder shall provide a Living Wall system designed by a specialized Living Wall supplier with a minimum of 5 installations located in the Metro Vancouver area which are similar in size and complexity.

8.2.7.2 Performance Criteria

8.2.7.2(1) The Living Wall system shall include but is not limited to the following components:

8.2.7.2(1)(a) A structural frame or panel for supporting the plants and making the connection to the building wall which also allows for easy removal and replacement of individual plants;

8.2.7.2(1)(b) A waterproof backing panel or membrane to protect the building envelope from moisture damage;

8.2.7.2(1)(c) A purpose designed high efficiency automatic irrigation and fertilization system;

8.2.7.2(1)(d) Specialized materials for supporting the plant roots

8.2.7.2(1)(e) Suitable plant material in a variety of colours and textures, arranged to create a visually appealing composition. System must be supplied with pre-grown plants.

8.2.7.2(2) The system must be hydroponic or employ a non-soil growth medium.

8.3 Utilities (Division 33)

8.3.1 Manholes and Catch Basins

8.3.1.1 Basic Requirements

8.3.1.1(1) Provide monolithic concrete manholes with transition to lid frame, covers, anchorage, and accessories.

8.3.1.1(2) Provide modular precast concrete manhole sections with tongue and groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

8.3.1.2 Performance Criteria

8.3.1.2(1) Locate and size manholes and catch basins in accordance with MMCD and **BCBC**. Avoid catch basins in walking areas.

8.3.1.2(2) All joints will be watertight.

8.3.1.2(3) All manholes and catch basin lids, frames and grates in vehicle traffic areas to be designed for H20 traffic loading.

8.3.2 Site Water Utility Distribution Piping

8.3.2.1 Provide a looped watermain system capable of providing domestic and fire fighting capacity for the Facility

8.3.2.2 Provide reduced pressure backflow preventer(s) to protect the municipal system and onsite facilities from contaminants

8.3.2.3 Provide adequate fire hydrants around the site in accordance with NFPA-24 and the City of New Westminster Fire Department requirements.

8.3.3 Site Sanitary Sewer Piping

8.3.3.1 Basic Requirements

8.3.3.1(1) The sanitary sewer system will include the pipes, manholes, quality testing and all other required appurtenances to comply with applicable Municipal and Provincial Standards.

8.3.3.1(2) Cleanout/manhole access.

8.3.3.1(3) Refer to Section 4.5.

8.3.4 Site Storm Sewer Piping

8.3.4.1 Basic Requirements

8.3.4.1(1) The storm sewer system will include the pipes, manholes, and all other required appurtenances to comply with applicable Municipal and Provincial Standards.

8.3.4.1(2) Cleanout/manhole access.

8.3.4.1(3) Refer to Section 4.5.

8.3.4.2 Performance Criteria

8.3.4.2(1) Flooding/ponding are not permitted except in designated stormwater detention facilities.

8.3.4.2(2) Utilize best management practices for stormwater management.

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ROYAL COLUMBIAN HOSPITAL REDEVELOPMENT

APPENDIX 1A: CLINICAL SPECIFICATIONS

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APPENDIX 1A

CLINICAL SPECIFICATIONS

Part 1. INTRODUCTION

1.1 Background and Scope

1.1.1 The purpose of the Clinical Specifications is to describe and outline the key needs and building design attributes required by the Authority to successfully implement clinical operations and achieve their desired model of care and clinical outcomes. This document describes both big picture concepts and detailed specific clinical needs. It includes numerous data that will directly and indirectly influence design decisions. This document contains a Space Table in each section, which outlines the spaces the Design-Builder will provide in the building.

1.2 Purpose Value and Vision Statement

1.2.1 As an outcome of the visioning work shop sessions held by the key stakeholders within the Authority the following statements will be used as guidance in the development of the Building:

1.2.1.1 Purpose:

1.2.1.1(1) To achieve excellence in the wellness and recovery process for people living with mental illness and/or problematic substance use, and for their natural supports through a commitment to quality, safety, partnership, accessibility and efficiency.

1.2.1.2 Values:

1.2.1.2(1) Services that are based on mutual respect, compassion, integrity and accountability.

1.2.1.3 Vision:

1.2.1.3(1) Achieving optimal mental wellness for all.

1.3 Delivery Standards – Models of Care

1.3.1 The Authority promotes the following (service delivery standards) models of care:

1.3.1.1 Patient Centred Care privileges the involvement of Patients and families in care decisions and the primacy of the respect and response given to individual Patient preferences, needs and values.

1.3.1.2 Trauma Informed Care will guide the delivery standards by recognising, and seeking to avoid or ameliorate, that the experience of a mental health crisis and subsequent admission to hospital carries with it elements that adversely affect the individual's sense of autonomy, self-regulation and control. As a result, the admission itself may cause reactions as debilitating and diverse as anxiety, fear, shame, powerlessness, hopelessness and disconnection.

1.3.1.2(1) Trauma Informed Care will be based on the following:

1.3.1.2(1)(a) Awareness at the Patient, staff, agency, and system levels based on the core principles of:

(a).1 trauma awareness;
(a).2 safety;
(a).3 trustworthiness, choice and collaboration; and
(a).4 building of strengths and skills.

1.3.1.2(1)(b) Understanding the connections between trauma, mental health, and substance use in the course of work with all Patients; identifying trauma symptoms or adaptations; and, offering supports and strategies that increase safety and support connection to services.

1.3.1.3 Safety within Secure Perimeters:

1.3.1.3(1) By operating within secure perimeters it is possible to optimise Patient safety while observing the least restrictive alternative.

1.3.1.4 A Therapeutic Environment:

1.3.1.4(1) Which is and of itself a systemic support to, and enhancement of, the psycho-social-bio-spiritual needs of Patients and families; and

1.3.1.4(2) Respects the dignity of the individual.

1.4 Guiding Principles

1.4.1 The guiding principles are grouped into six categories:

1.4.1.1 Evidence-Based Design for Behavioural Health

1.4.1.1(1) Provide and promote a Patient-centred and therapeutic environment for Patients and families by:

1.4.1.1(1)(a) Designing approaches that incorporate esthetic and sensory, non-institutional and Patient-centred environment that focuses on healing, familiarity and sense of being valued;

1.4.1.1(1)(b) Providing a positive, safe environment focusing on wellness, sensory and aesthetically pleasing healing environment throughout the building;

1.4.1.1(1)(c) Developing and applying integrated resources to enable seamless and safe care for Patients;

1.4.1.1(1)(d) Providing a professional and supportive environment for staff in order to provide the best possible evidence-informed practices;

1.4.1.1(1)(e) Building and promoting partnerships and collaborative working relationships with community partners, which will lead to improved Patient outcomes.

1.4.1.1(1)(f) The character of the immediate surroundings can have a profound effect on the experience of a psychiatric Patient. The Design-Builder will create a therapeutic environment by:

- (f).1 Using familiar and non-institutional materials with varied colors and textures, keeping in mind that some colors and patterns are inappropriate and can disorient older impaired Patients, or agitate Patients while others can be shown to be soothing and calming;
- (f).2 Admitting ample natural light;
- (f).3 Providing a window for every Patient bed, and views of the outdoors from other spaces that are located along exterior faces and/or have ability to have borrowed light. Views of nature can be restorative;
- (f).4 Providing Inpatients with direct and easy access to safe and controlled outdoor areas;
- (f).5 Providing adequate separation and sound insulation to maintain speech privacy and confidentiality;
- (f).6 Giving each Patient visual privacy, and control over it, as is consistent with the need for supervision;
- (f).7 Giving each Patient the ability to control the immediate environment determined viable by the Authority; e.g. lighting; temperature and fresh air;
- (f).8 Providing computer stations and/or phone stations for Patient use when Patient profile and treatment program allow;
- (f).9 Designing features to assist Patient orientation, such as direct and obvious travel paths, key locations for clocks and calendars, avoidance of glare, and avoidance of unusual configurations and excessive corridor lengths;

(f).10 Designing a "wayfinding" strategy to enhance a Patient's sense of competence by making spaces easy to find, identify, and use without asking for help. Color, texture, and pattern, as well as artwork and signage are all examples of a wayfinding strategy;

(f).11 Providing exercise equipment for Patient use where determined appropriate by the Authority for the program of care;

(f).12 Providing access to kitchen facilities for teaching purposes in the Life Skills Assessment Room and

(f).13 Providing access to Nourishment Stations in the Dining Room/Lounge, within Inpatient Units, where snacks or meals can be prepared by Patients, when Patient profile allows.

1.4.1.2 Performance Optimization

1.4.1.2(1) Program and design in accordance with Lean Design tools and techniques:

1.4.1.2(1)(a) Actively incorporate and reference Lean Principles and Evidence-Based Design to support the building design;

1.4.1.2(1)(b) Encompass universal design concepts to maximize flexibility in caring for Patients with diverse needs, which are likely to change over time;

1.4.1.2(1)(c) Promote design that is flexible, adaptive and responsive to Patient needs and future changes in service delivery; and

1.4.1.2(1)(d) Maximize cost effectiveness and operational efficiencies.

1.4.1.3 Integration

1.4.1.3(1) Develop and apply integrated resources to enable:

1.4.1.3(1)(a) Seamless and sustainable care and support for Patients and their families;

1.4.1.3(1)(b) Effective exchange of information;

1.4.1.3(1)(c) Sharing of technology and services;

1.4.1.3(1)(d) Advancement of the integration of clinical care, education and applied research;

1.4.1.3(1)(e) Development of a centre of excellence for care, study and teaching in mental health and substance use, focusing on assessment, stabilization, rehabilitation and re-integration into the community;

1.4.1.3(1)(f) Incorporate and acknowledge the Authority's university and college affiliations;

1.4.1.3(1)(g) Facilitate the integration of mental health care with efficient, effective inter-disciplinary teams;

1.4.1.3(1)(h) Creation of areas for learning and integration of the applied research within clinical services; and

1.4.1.3(1)(i) To enable environmental sustainability and minimize impact on the natural and physical environment.

1.4.1.3(2) Support concept of safety and security.

1.4.1.3(2)(a) Demonstrate the importance of design in balancing safety and security, and discouraging isolation and detachment.

1.4.1.4 Adaptability, Flexibility and Expandability

1.4.1.4(1) Design that is adaptable, flexible and expandable, which supports:

1.4.1.4(1)(a) Changes, innovation and implementation in clinical and non-clinical work processes and technological advances;

1.4.1.4(1)(b) Changes in program, services, work and equipment with minimal infrastructure and process impact;

1.4.1.4(1)(c) Multi use and adaptable spaces utilizing open planning principles and flexible zones; and

1.4.1.4(1)(d) Infrastructure systems capacity upgrades.

1.4.1.5 Innovation

1.4.1.5(1) Reduce stigmatization associated with mental illness by:

1.4.1.5(1)(a) Providing a design that communicates openness, accessibility, hope, and that is inviting and welcoming. Recognize and strengthen the relationship between communities served, thereby contributing to the de-stigmatization of mental illness, and substance use.

1.4.1.6 Sustainability and High Performance Integrated Design

1.4.1.6(1) Design that promotes and supports environmental quality, social benefits and economic vitality through appropriate materials selection, operational practices, energy efficiencies and life cycle considerations.

1.5 Key Patient-driven Criteria

1.5.1 The following criteria were developed through consultation with the Authority representatives. The design will include the following:

1.5.1.1 Views to the natural environment;

1.5.1.2 Natural light throughout in order of room priority as indicated in Appendix 1N [Daylighting Matrix];

1.5.1.3 A warm, inviting and safe environment;

1.5.1.4 Temperature controllable environment (i.e. ability to make warmer or cooler);

1.5.1.5 Proximity to bathrooms;

1.5.1.6 Areas for Patient privacy;

1.5.1.7 Areas that are calming;

1.5.1.8 Therapeutic space that meets Patient's needs and reduces conflicts;

1.5.1.9 Access to therapy and program areas;

1.5.1.10 Space for visiting with family;

1.5.1.11 Outdoor space for walking, visiting, and therapeutic activities;

1.5.1.12 Staff and Patient security & safety;

1.5.1.13 Flexible and adaptable spaces;

1.5.1.14 Adjacencies to reduce travel distances for staff;

1.5.1.15 Quiet spaces;

1.5.1.16 Access for Persons with Disabilities;

1.5.1.17 Direct Line of Sight from the Care Team Base to Patient Bedrooms and activity areas; and

1.5.1.18 Walking loop for Older Adult Psychiatric Unit.

1.6 Scope

1.6.1 The Building will contain the following service components:

1.6.1.1 An Outpatient Mental Health and Substance Use Services Program;

1.6.1.2 A Mental Health and Substance Use Clinical Education and Applied Research Program; and

1.6.1.3 An Inpatient Mental Health and Substance Use Services Program.

1.6.2 Outpatient Mental Health and Substance Use Services Program

1.6.2.1 The Outpatient Mental Health and Substance Use Services program supports a spectrum of care to deliver appropriate healthcare outcomes, prevent hospitalization, facilitate discharge, and to ensure specialized expertise and treatment is available to complement community based services.

1.6.2.2 Services are provided during regular weekday business hours and range from individual to group therapy.

1.6.2.3 The Outpatient Mental Health and Substance Use Services Program delivers care to individuals across the age-range experiencing mental health and/or substance use disorders through a spectrum of interventions including, but not restricted to, individual assessment and counselling, specialty clinics, group therapies, Electroconvulsive Therapy (ECT) and Transcranial Magnetic Stimulation (TMS). The following lists specialized services and therapies:

1.6.2.3(1) Outpatient Clinics including:

1.6.2.3(1)(a) Psychiatric Urgent Referral Clinic;

1.6.2.3(1)(b) Psychosis Treatment Optimization Program;

1.6.2.3(1)(c) Group Therapy for Patients and Families;

1.6.2.3(1)(d) Neuropsychology;

1.6.2.3(1)(e) Reproductive Mental Health;

1.6.2.3(1)(f) Older Adult Mental Health;

1.6.2.3(1)(g) General Psychiatry Outpatient Program and

1.6.2.3(1)(h) Neurostimulation Clinic;

1.6.2.3(1)(i) Addictions Medicine Clinic;

1.6.2.3(1)(j) Child & Youth Psychiatry;

1.6.2.3(1)(k) Dialectical Behaviour Therapy;

1.6.2.3(1)(l) Metabolic Monitoring;

1.6.2.3(1)(m) Mood & Anxiety Disorders;

1.6.2.3(1)(n) Neuropsychiatry and;

1.6.2.3(1)(o) Older Adult Mental Health Service.

1.6.3 Mental Health and Substance Use Clinical Education and Applied Research Program

1.6.3.1 The Existing Hospital has a strategic role in providing teaching training opportunities, driving innovation and supporting clinical specialty development, as follows:

1.6.3.1(1) The Existing Hospital delivers Mental Health interdisciplinary training and education and research for the Authority. As an Education Centre for the Psychiatry Residency Program, the Authority and its partners can be viewed as becoming national leaders in integrated community and acute Mental Health and Substance Use service and treatment models.

1.6.4 Inpatient Mental Health and Substance Use Services Program

1.6.4.1 The Inpatient Mental Health and Substance Use Services program will provide 75 beds which will be distributed as follows:

1.6.4.1(1) Three Inpatient Adult Psychiatric Units– each consisting of 15 Beds

1.6.4.1(1)(a) This program will support an adult acute psychiatric Inpatient population. There will be a total of 45 beds. The Existing Hospital has an average length of stay (ALOS) of approximately 14 days for this population type.

1.6.4.1(2) One Psychiatric High Acuity Inpatient Unit (PHAU) – consisting of 10 Beds

1.6.4.1(2)(a) This specialized unit will provide a safe environment for therapeutic interventions for an adult population with acute and severe psychiatric

disorders. The functions in the unit will support the comprehensive assessment, rapid stabilization and treatment interventions to a level of recovery where this level of observation is no longer necessary and continuum of care can be safely delivered either on a general Inpatient Unit or in a community care setting.

1.6.4.1(3) One Older Adult Psychiatric Inpatient Unit – consisting of 20 Beds

1.6.4.1(3)(a) This specialized unit will have dedicated staff in a safe and supportive environment, aligned with best practices and designed specifically for this population. The Older Adult Psychiatric Patient population represents 20% of the adult psychiatric Patients and it is expected to increase based on demographic trends. RCH has an average length of stay (ALOS) of approximately 29 days.

1.6.5 Spatial Zones / Hours of Operation

1.6.5.1 A controlled access system, supplemented by security cameras between various areas is required to facilitate appropriate building use and the safety of Patients and staff.

1.6.5.2 Refer to Attachment 1 [Staffing Models] of this Appendix, for the anticipated staffing for the operation of the Building.

1.6.5.3 The Outpatient Mental Health and Substance Use Services Program

1.6.5.3(1) Hours of operation will be from 06:30 - 22:00 Monday - Friday

1.6.5.4 The Mental Health and Substance Use Clinical Education and Applied Research Program

1.6.5.4(1) Hours of operation will be 06:30 – 22:00 Monday – Sunday

1.6.5.5 The Inpatient Mental Health and Substance Use Services Program

1.6.5.5(1) Hours of operation will be 24 hours

1.6.6 Essential Clinical Staff Interactions:

1.6.6.1 Therapeutic programs will occur within the Inpatient Units, managed by appropriate clinical staff.

1.6.6.2 Patients will be assessed at admission and a Care Plan will be developed, taking into account that Patients participate in the creation of their own Care and Activities Plans, and the identification of therapeutic goals. A Care Plan is developed on first admission and continually reviewed and developed and evaluated throughout a Patient's stay. Clinical staff

will be knowledgeable about each Patient's assessment and any factors that may impact their behavior or attainment of goals.

1.6.6.3 Clinical staff will work closely with Patients to engage them in constructive and responsible behavior, observing and assessing behaviors that are critical to maintaining a safe and therapeutic environment, documenting and sharing behavioral information with other staff and reporting any behavior that may jeopardize the safety or therapeutic advancement of any one within the Building.

1.7 Building Concepts

1.7.1 Functional Requirements:

1.7.1.1 Each department and component in the Building has a Functional Space Requirement table. Each room and area listed in the table will be provided in the applicable department of the Building. The Functional Space Requirement tables list additional requirements in the design criteria column for each room. The net square meter area provided will be the minimum area to be provided. The rooms may need to be larger than the minimum area provided in the space tables. The Design-Builder will be responsible to demonstrate the design of the rooms and spaces accommodate all listed fittings, furniture and equipment, and is fit for its intended clinical purpose to the acceptance of the Authority.

1.7.1.2 To assure functionality, all departments will be designed as cohesive entities and will not be fragmented.

1.7.1.3 A variety of lighting strategies will provide a safe environment for Patients and staff, a calming environment and accurate and safe working conditions. Refer to Schedule 1 [Statement of Requirements] for specific lighting requirements.

1.7.1.4 Acoustics is an important element in the design of mental health facilities to both provide the ability to have calming, quiet environments when desired as well as to allow for audible supervision of some spaces. Refer to Schedule 1 [Statement of Requirements] for acoustic requirements by room type.

1.7.1.5 Electrical outlets and data outlets will be provided in equipment rooms, supply rooms, soiled utility, holding rooms, storage and closets and be positioned at a height which promotes ease of access without unnecessary bending. Refer to Schedule 1 [Statement of Requirements]

1.7.1.6 All dimensions of counters and desks will act as an appropriate barrier and provide adequate protection from violent or threatening behaviour.

1.7.1.7 It is expected that staff, physicians, service providers, and Facilities' staff should be able to connect to information services using mobile devices. Refer to Schedule 1 [Statement of Requirements].

1.7.2 Outdoor Space Concepts:

1.7.2.1 The connection to the landscape, the outdoors and views is a critical element of the healing process. Outdoor spaces will fall into the following categories:

1.7.2.1(1) Patient Secure Outdoor Spaces:

1.7.2.1(1)(a) The Building will have a selection of outdoor program spaces, on the Inpatient Units, for Patients to use in their journey to recovery;

1.7.2.1(1)(b) The Inpatient Units will have Dedicated Secure Outdoor Spaces with direct access from each Inpatient Unit. The Patients, staff and visitors on that specific unit, will have access to these spaces. Security will be provided by either the building envelope or secure screens, or both;

1.7.2.1(1)(c) For details on the specific design requirements, refer to Part 4 of this Appendix.

1.7.2.1(2) Staff Outdoor Spaces:

1.7.2.1(2)(a) Provide staff with access to designated outdoor space. This space will enable staff to rest and interact with other staff members;

1.7.2.1(2)(b) Staff Outdoor Space will have visual privacy from public and Patient areas of the Building and will have controlled access. Neither public, nor the Patients, will have access to this space;

1.7.2.1(2)(c) Location of the Staff Outdoor Space will be in close proximity to the staff only areas (e.g. Staff Lounge, Multipurpose Room); and

1.7.2.1(2)(d) At least a portion of the Staff Outdoor Space will have protection from the elements. A minimum of 30% of the total Staff Outdoor Space will be covered and protected from the elements.

1.7.2.1(3) Building Outdoor Spaces:

1.7.2.1(3)(a) All outdoor spaces will allow for maintenance and cleaning to the satisfaction of the Authority.

1.7.3 External Circulation and Links:

1.7.3.1 Patient Entrances – The Building Main Lobby will serve as the primary entrance/exit for Patients upon arrival and discharge to the Outpatient clinics and secondary entrance/exit for Patients destined to the Inpatient Units, unless Patients are transferred to the Inpatient Units from the Emergency Department or from another facility through the Sally-Port.

1.7.3.2 Visitor Entrances - The Building Main Lobby will serve as the visitors' entrance.

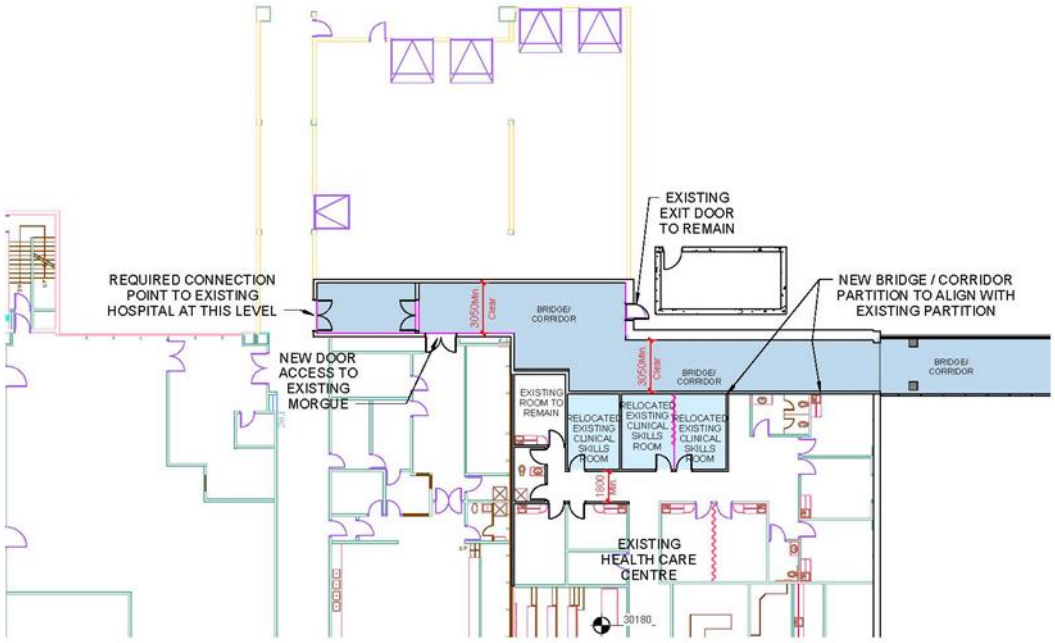
1.7.3.3 Staff Entrances - Staff will utilize the entrance at the Building Main Lobby. A Bridge/Corridor connection to the Existing Hospital will be used by a clinical staff for Patient transfers **only** or by the support staff for housekeeping/food/linen transport **only**. The Bridge/Corridor connection will not be used for any other purposes.

1.7.3.4 Support Services Entrance - One service Bridge/Corridor link will be provided that connects the facility (both Mental Health Substance Use and Energy Centre) to the support services located on level 0 of the Health Care Centre. This dedicated service link will provide supply and delivery for food, supplies, pharmaceuticals, linens, equipment and mail. Within the service delivery area differentiation and physical separation of clean and soiled zones will be required.

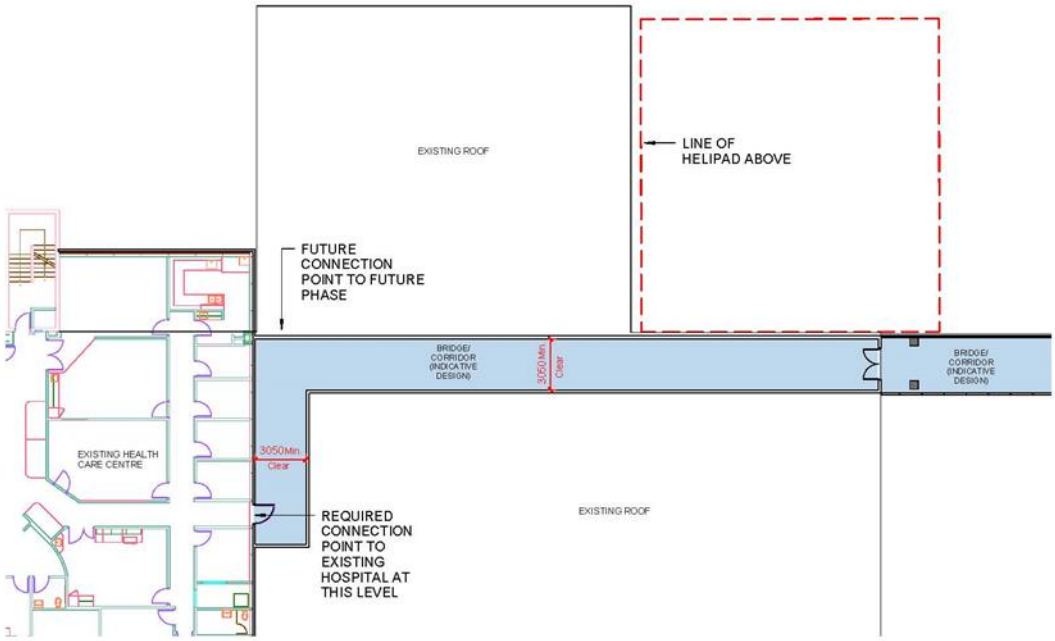
1.7.3.5 Existing Hospital – A Patient and staff only Bridge/Corridor will connect the Existing Hospital (Level 1 of the existing Health Care Centre) to the Building Patient Elevators. This Bridge/Corridor is to be at the same datum elevation as Level 1 of the existing Health Care Centre.

1.7.3.6 The diagrams below identify mandatory connection points between the Facility and the Existing Hospital, mandatory location and layout of the Bridge/Corridor in Level 0 of the existing Health Care Centre, and preferred location and layout of the Bridge/Corridor in Level 1 of the existing Health Care Centre.

1.7.3.6(1) Bridge/Corridor Connection to the Existing Hospital Level 0:



1.7.3.6(2) Bridge/Corridor Connection to the Existing Hospital Level 1:



1.7.4 Internal Circulation and Links:

1.7.4.1 The general configuration of horizontal and vertical circulation systems has a direct impact on healthcare delivery, visitor orientation and wayfinding and the efficiency of logistical activities. Its structure greatly influences travel times and is a key element that will determine the Building organization and layout.

1.7.4.2 The architectural circulation systems help enhance Patient, user and staff satisfaction in the healing environment. The design of the Building will include differentiated public circulation systems adapted to a mental health setting. The design of the Building needs to provide three main circulation systems for the flow of persons and goods, as outlined below:

1.7.4.2(1) Public circulation reserved for visitors, Patients and caregivers.

1.7.4.2(2) General clinical circulation located within departments and functional units, and reserved for staff, Patients, and supplies.

1.7.4.2(3) Circulation reserved for logistics, in particular support services.

1.7.4.3 Stairwells will be located to shorten staff travel distance between the Units and departments. The design of the Building will be with windowed exit stairwells with views of the outdoors to facilitate employee orientation and comfort, encourage the use of the stairwells and increase safety. The design of the Building will avoid placing stairwells in areas which restrict exterior views. Staff in the Care Team Base will have line of sight to the stairwell doors and be able to see the movement of people near them. The end of all corridors must have direct natural light and views to the exterior.

1.7.4.4 There will be muster areas for all Patients and staff, in the Inpatient, Outpatient Units and the Clinical Education Space in the event of a forced evacuation.

1.7.4.5 Elevators will be located for convenient staff and Patient movement and the efficient movement of support services. The Service elevator will be located to allow efficient ease of access for material movement. Public elevators will be visible and easily accessible from the entrances, underground parkade levels and main circulation on each floor. The Service elevator will be able to accommodate a bariatric stretcher in a horizontal position, with two staff; the supply-distribution equipment and supply and linen carts.

1.7.5 Sally-Port

1.7.5.1 Refer to Section 4.6.2.1(2)(b).

1.7.6 Risk Reduction

1.7.6.1 The following Building planning and design concepts will be integrated to reduce the following risks:

1.7.6.1(1) Elopement

1.7.6.1(1)(a) Allowing one way in and out of Inpatient Units;

1.7.6.1(1)(b) Electronic door controls for emergency egress;

1.7.6.1(1)(c) Simple circulation with no blind spots;

1.7.6.1(1)(d) Passive observation (visibility from staff spaces and work areas that are not directly responsible for observing Patients);

1.7.6.1(1)(e) High perimeter around Patient Secure Outdoor Spaces.

1.7.6.1(2) Patient Behavioural Incidents

1.7.6.1(2)(a) Visibility.

1.7.6.1(2)(b) Design appropriate abuse resistance in areas where Patients are left alone for periods of time in accordance with SRC requirements.

1.7.6.1(2)(c) Integrate technology to assist in observing and maintaining security in areas not readily visible to staff.

1.7.6.1(2)(d) Equipment, carts, supplies, linen hampers will be stored either in enclosed rooms or in enclosed alcoves within the Patient corridors. The Closed alcoves will have controlled access and will be accessed by the staff only. Lighting in enclosed rooms/ alcoves will be motion activated.

1.7.6.1(3) Reducing Patient/Staff Injuries

1.7.6.1(3)(a) Rooms and spaces will be sized appropriately and suitable for accommodation of Persons with Disabilities and Bariatric Patients.

1.7.6.1(3)(b) Elimination of balconies and openings that would allow a Patient to jump from an elevated platform.

1.7.6.1(3)(c) Patient rooms and other areas where a Patient is alone will have enough abuse resistance to allow time for an appropriate response team to arrive before the Patient harms themselves or is able to exit the area.

1.7.6.1(4) Reducing Patient and Staff Stress

1.7.6.1(4)(a) Natural light in staff/Patient areas.

1.7.6.1(4)(b) Noise control.

1.7.6.1(4)(c) Open layouts, with minimal barriers between staff and Patients.

1.7.6.1(4)(d) Space for both Patients and staff is designed so neither feels trapped nor vulnerable; overcrowding is avoided.

1.7.6.1(4)(e) Views of the outdoors.

1.7.6.1(4)(f) Use of natural materials, soothing color palette and calming character in the interior design of the building.

1.7.6.1(4)(g) Familiar and healing environments.

1.7.6.1(4)(h) Patient and staff areas allow for relaxation and the control of one's environment (Patient Bedrooms, Exercise Rooms, Lounges (Quiet), Dining Room / Lounges, Staff Lounges and Secure Outdoor Spaces).

1.7.6.1(4)(i) Providing a Comfort Room.

1.7.7 Patient Security and Safety

1.7.7.1 Patient and staff safety will be a high planning and design priority. The design will ensure that the Building has products and installations that are durable, anti-ligature, vandal resistant and support the model of care.

1.7.7.2 Various electronic security systems will be employed in an unobtrusive way complemented by design elements such as good visibility; no hidings spots and clear wayfinding.

1.7.8 Emergency Response

1.7.8.1 Facilities will be planned to minimize staff response time in emergencies. Emergency equipment will be portable and stored, when not in use, in the Care Team Base. The design will support staff safety (e.g., by providing a clear path to the door or two doors and by providing a staff alarm system); provide good visibility of Patient activity areas (e.g., Direct Line of Sight) and avoid blind corners.

1.7.8.2 The Authority has clinical policies and processes (referenced in the Data Room) to respond to the following:

1.7.8.2(1) Code Blue

1.7.8.2(2) Code White

1.7.8.2(3) Code Red

1.7.8.2(4) Code Black

1.7.8.2(5) Code Green

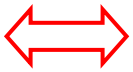
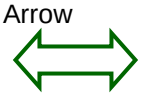
1.7.8.2(6) Code Orange

1.7.8.2(7) Code Yellow

1.7.8.2(8) Code Brown

1.8 Key Terms and Notations

1.8.1 The following table provides definitions for key terms and notations used throughout this Appendix

Term or Notation	Definition
Direct Access	Components are located side-by-side. Direct Access will be via horizontal adjacency unless otherwise noted.
Convenient Access	Components are located side-by-side or with minimal horizontal or vertical separation.
Internal Circulation	Connection between components provided with no separation or via dedicated connection.
General Circulation	Connection between components provided via shared spaces or hallways.
Proximity Relationship: Red Arrow 	Required Direct Access and Internal Circulation between components. Horizontal adjacency required unless otherwise specified.
Proximity Relationship: Yellow Arrow 	Required Direct Access and General Circulation between components.
Proximity Relationship: Green Arrow 	Required Convenient Access and General Circulation between components.
Horizontal Adjacency	Components located side-by-side on the same level.
Vertical Adjacency	Components located one or multiple levels apart, directly on top of one another with a vertical connection (i.e. elevator).

1.8.2 Safety and Risk Category

1.8.2.1 All areas of the building require different treatment with respect to Patient and staff safety and risk reduction. A Safety and Risk Classification (SRC) has been assigned to each space in the Building. The Safety and Risk Classification designation for each space can be found in the SRC column of the Space Table for each functional component. Refer to Schedule 1 [Statement of Requirements] for the description of each classification.

1.8.2.2 Staff facilities, including toilets, showers, and change rooms, will be separate from Patient areas to reduce the risk of staff being isolated with a Patient or visitor.

1.8.2.3 While design and construction of all spaces must be consistent with the requirements based on their SRC, the Design-Builder must ensure that a friendly, inviting, safe and non-institutional appearance is maintained.

1.8.3 Standardization:

1.8.3.1 It is the intent of the Authority that the Building will be standardized. All rooms that have similar functions will be standardized. This means that where rooms have a similar function they will be standardized within the Building. The Inpatient Care Units will be designed in standardized, modular, flexible configurations so that they can adapt to changes in Patient types and care-delivery practices over time. For example, interchangeability of Inpatient Care Units will be a goal of the design.

1.8.3.2 The following Patient Bedroom elements will be standardized:

1.8.3.2(1) Patient Room length and width;

1.8.3.2(2) Fixed Equipment;

1.8.3.2(3) Millwork;

1.8.3.2(4) Plumbing Fixtures and Location;

1.8.3.2(5) Furniture locations;

1.8.3.2(6) Patient bed/desk and wardrobe location;

1.8.3.2(7) Door Location; and

1.8.3.2(8) Lighting.

1.8.3.3 Spaces will be flexible in design to accommodate a range of functions (eg. Large Group Therapy Room may be used for a meeting if not being used for Clinical Operations).

1.8.3.4 Standardization of unit layouts will be developed to reduce care team orientation to different units and to streamline maintenance of each unit.

1.8.3.5 Group spaces will be designed and grouped to accommodate a range of functions and to accommodate change of use over time.

1.8.4 Family Participation

1.8.4.1 The Building design will support and encourage family participation in the Patient care.

1.8.4.2 The care areas of the Building will be easily accessible for families to engage in activities with Patients.

1.8.5 Optimized Outcomes

1.8.5.1 The Design-Builder will design the Building such that:

1.8.5.1(1) The layout of clinical areas supports the Authority's staffing models and optimizes key staff workflows;

1.8.5.1(2) It includes highly efficient and effective corridor and circulation systems for key paths of travel; and

1.8.5.1(3) It is optimized for maximum Direct Line of Sight from key staff locations to promote and support staff observation of Patients in all care areas.

1.8.6 Support Services Concepts:

1.8.6.1 Support service areas will have an appropriate location that improves efficiency and reduces travel distances for support staff.

1.8.6.2 Support service areas need to be convenient to the Inpatient Units however they will not cross Patient corridors.

1.8.6.3 Support services will be clustered to maximize the utilization of shared spaces.

1.8.6.4 Spaces will be designed to minimize staff travel distances and ease of external accessibility for delivery services. The following rooms will be centrally located between the Inpatient Units with controlled access:

1.8.6.4(1) Clean Supply Room

1.8.6.4(2) Soiled Utility Room

1.8.6.4(3) Soiled Holding Room

1.8.6.4(4) Housekeeping Room

1.8.7 Infection Control

1.8.7.1 The design will include the selection of finishes and fixtures that maximize the ability to reduce infection and disease transmission and the safe placement of hand hygiene stations and Clean/Soiled Utility Rooms.

1.8.7.2 Hand hygiene sinks will be provided in the following rooms:

1.8.7.2(1) Care Team Base (enclosed portion)

1.8.7.2(2) Dining Room/Lounge

1.8.7.2(3) Exam/Treatment Room

1.8.7.2(4) Patient Bedroom Contact Isolation Ante Room

1.8.7.2(5) Patient Bedroom Bariatric Contact Isolation Ante Room

1.8.7.2(6) Secure Room Ante Room

1.8.7.2(7) Medication Room

1.8.7.2(8) Café, Patient-run

1.8.7.2(9) Patient Corridors at every 5 Patient Bedrooms alternating on both sides of the Patient Corridor.

1.8.7.2(10) Soiled Utility Room

1.8.7.2(11) Learners' Lounge

1.8.7.2(12) Soiled Holding Room

1.8.7.2(13) Phlebotomy Station

1.8.7.2(14) Nourishment Station

1.8.7.2(15) Staff Lounge

1.8.7.3 Utility sinks will be provided in the following rooms:

1.8.7.3(1) Nourishment Station

1.8.7.3(2) Soiled Utility Room

1.8.7.3(3) Staff Lounge

1.8.7.3(4) Nourishment Station

1.8.7.3(5) Learners' Lounge

1.8.7.4 Bedpan Sanitizers will be provided in the Soiled Utility Rooms. One bedpan sanitizer will be provided per Soiled Utility Room, typical, except on the Older Adult Inpatient Unit, which will have two bedpan sanitizers.

1.9 The Virtual Care Team Approach and Capability

1.9.1 Technology will be leveraged to enable more effective collaboration among administrative and clinical care teams in the management of Patients, clinical programs, resources, and health records. Refer to the Data Room for the corresponding documents.

1.9.2 Virtual Care technologies will be utilized to:

1.9.2.1 Enable remote specialist consultation, discharge planning to the community, better clinical collaboration, and more efficient consultations with Patients.

1.9.2.2 Increase capacity while reducing bottlenecks and pressure points. Examples that adversely affect capacity include:

1.9.2.2(1) Delays in discharge of Patients from acute sites until consults and hand-off to community services and case managers is completed;

1.9.2.2(2) Patients being transferred from one ED to another for psychiatric assessment, only to be decertified and discharged by the receiving ED;

1.9.2.2(3) Reducing time spent in emergency rooms by adults, youth and children waiting for a specialist;

1.9.2.2(4) Delays in discharge and increased readmit rates of substance use Patients that are unable to receive appropriate levels of support, monitoring and encouragement when returned to their community setting; and

1.9.2.2(5) Improving access to MHSU services by bringing specialist services to under-served areas.

1.9.2.3 Virtual Care's network of videoconferencing locations is extensive, connecting health care professionals in a variety of specialties with Patients in remote and distant communities across British Columbia and the Yukon, including First Nations communities. The Existing Hospital will provide Virtual Care service and will extend its reach to different services, and additional sites.

1.9.2.4 Become a routine means for Patients and their families to interact with MHSU staff and service providers. Psychiatrists, Psychologists, Case Managers, Psychiatric Liaison Nurses (PLNs) and Pharmacists may go to their next appointment in which the Patient may be present in person, or may be attending the session by video-link, or this session may be held in their own office.

1.9.2.5 For Patients and families, they will go to an appointment at a convenient location for them, and may see their care professional in person or by video link, or the care professional is brought to them remotely wherever they may be in the Fraser Health healthcare system (e.g., an Emergency Department, Patient Bedroom at a Fraser Health Facility, etc).

1.9.2.6 Ensure that MHSU care professionals can conduct remote interviews and assessments as effectively and efficiently as if they were in-person. The quality and effectiveness of the service provided remotely using a video-link will not differ to an equivalent face-to-face interaction. The links may not only be two-way, but may include participants from several different locations.

Part 2. OUTPATIENT MENTAL HEALTH and SUBSTANCE USE SERVICES PROGRAM

This Specification outlines the functional, operational and physical requirements for the Outpatient Mental Health and Substance Use Services Program.

2.1 Guiding Design Principles

2.1.1 The following design principles will be in the Outpatient Mental Health and Substance Use program:

2.1.1.1 Develop and maintain Outpatient programs that will provide Patients and families with support and knowledge for effective treatments;

2.1.1.2 Outpatient spaces will be organized around one welcoming central point, Main Reception and Registration area. From there, access to the spaces that require Patient privacy and dignity will be provided an in obscure manner (e.g. Neurostimulation Clinic entrance point); and

2.1.1.3 Patient consultation areas will be organized in a grouped manner along Patient Corridors for ease of access and wayfinding.

2.2 Outpatient Unit Design Priorities

2.2.1 Layout of the Outpatient spaces will be functional and will support the optimal care for the Patients.

2.2.2 Design of the space will enable efficient service delivery.

2.3 Functional Description

2.3.1 Outpatient Mental Health and Substance Use services support a spectrum of care to deliver appropriate health outcomes, prevent hospitalization, facilitate discharge, and ensure specialized expertise and treatment is available to complement community-based services.

2.4 Statement of Purpose

2.4.1 The Outpatient Mental Health and Substance Use services exists as adult and youth Outpatient treatment program which provides screening, assessment, treatment, planning, group education, group support recovery and relapse prevention, intensive therapeutic groups, intensive one to one therapy, consultations, referrals and case management activities.

2.5 Guiding Principles

2.5.1 The following are the guiding principles for the Outpatient program:

2.5.1.1 A multi-disciplinary team environment that will facilitate and enhance Patient's support and treatment;

2.5.1.2 Clinical collaboration spaces that will facilitate improved communication amongst the interdisciplinary teams. This specifically means that any clinical space can be truly multi-use multifunctional space; and

2.5.1.3 Capabilities for viewing/observation of therapy sessions (individual and group) will be required for clinical supervision and education.

2.5.2 Scope of Services

2.5.2.1 Functional Content

2.5.2.1(1) The following are individual and group based Outpatient services:

2.5.2.1(1)(a) Addictions Medicine Clinic: Specialized clinic for primary substance use.

2.5.2.1(1)(b) Group Therapy (Patients and families) Clinic: Includes a range of therapies for conditions including depression, anxiety and stress management.

2.5.2.1(1)(c) Mood and Anxiety Disorder Clinic: Specialized clinic and research for the assessment and treatment of mood disorders including bipolar disorders.

2.5.2.1(1)(d) Neuropsychiatry Clinic: Specialized clinic for consultation, assessment and treatment of Patients with neuropsychiatric symptomatology, including acquired brain injury.

2.5.2.1(1)(e) Neuropsychology Clinic: Specialized clinic for consultation, assessment and treatment of Patients with neuropsychiatric symptomatology, including acquired brain injury

2.5.2.1(1)(f) Psychiatry Urgent Referral Clinic (PURC): Daily clinic treating urgent referrals from GP and ER referrals. The clinic is designed to respond to, assess and treat presentations that may otherwise, for lack of immediate service, require Inpatient care.

2.5.2.1(1)(g) Psychosis Treatment Optimization Program (PTOP): Specialized clinic for the assessment and treatment of Patients presenting with treatment-resistant psychosis. Includes need for Patient area for up to four with some hospitality as at times, for some therapies, Patients are required to be on-site and be closely monitored for six hours.

2.5.2.1(1)(h) Reproductive Mental Health Clinic: A Psychiatrist and nurse run this specialized clinic for the assessment and treatment of anxiety, depression and psychosis associated with the prenatal, perinatal and post-partum period. The clinic is run by a Psychiatrist and nurse and includes individual counseling and group therapy.

2.5.2.1(1)(i) Child and Youth Psychiatry Outpatient Clinic: Specialized clinic for anxiety, depression and personality disorders within the youth population

2.5.2.1(1)(j) Dialectal Behaviour Therapy Clinic: An evidence-based, intensive, Outpatient cognitive-behavioural treatment for persons who meet the criteria for borderline personality disorder or Patients who experience recurrent self-harm.

2.5.2.1(1)(k) Older Adult Mental Health Service: This service consists of a number of clinics including a Memory Clinic specializing in the elderly with Mental Health and Substance Use issues. A specific clinic for this population is essential for several reasons:

(k).1 Support altered metabolism of medication;

(k).2 Address specific risks associated with this population, including a higher risk of suicide.

2.5.2.1(1)(l) Older Adult Psychiatric Consult Liaison Outpatient Clinic: This clinic serves the general outpatient population with medical issues comorbid with psychiatric issues, including Patients who are discharged from the acute hospital setting with psychiatric morbidity or who are at high risk of developing psychiatric complications.

2.5.2.1(1)(m) Neurostimulation Clinic:

(m).1 Electroconvulsive Therapy (ECT) is a safe and effective treatment for a variety of psychiatric and some medical conditions. When Patients are identified early in the course of hospitalization and offered ECT as a treatment option, there can be a reduction in the length of stay and hospitalization cost, owing to both efficacy and rapidity of response. While ECT is used primarily for depressive illnesses or acute psychosis, it is usually reserved for situations where medications have not worked, but it may be the first choice of therapy for frailer, older Patients for whom medications may be more of a problem. If a Patient has responded well to ECT in the past, it may be his or her own first choice. ECT is also used occasionally in mania, schizophrenia, and in severe Parkinson's disease.

(m).2 Transcranial Magnetic Stimulation (TMS) is a safe, effective, and fairly new treatment option for those suffering with depression. TMS is a procedure that uses magnetic fields to stimulate nerve cells in the brain to improve symptoms of depression.

2.5.2.2 Operable Windows

2.5.2.2(1) No exterior windows, will have the ability to be opened, anywhere on the Outpatient Mental Health and Substance Use Unit.

2.5.2.3 Natural and Artificial Light

2.5.2.3(1) There will be a variety of lighting options in the Outpatient program, each suited to the functions accommodated in a specified space.

2.5.2.3(2) Consultation/Therapy Room(s) will have access to natural light. Those rooms will be located along the perimeter of the Building for maximum exposure to natural light.

2.5.2.3(3) A Post-Recovery Room within the Neurostimulation Clinic will have access to natural light.

2.5.2.3(4) Artificial lighting throughout the Outpatient spaces will provide indirect lighting. Specifically, this means fixtures that reflect light upwards, away from direct eye contact.

2.5.2.3(5) Artificial lighting in the administrative, clinical spaces and staff support areas will be variable to accommodate different levels of ambient lighting depending on the functions performed at any one time in the space. Individual workstations will have dedicated task lighting.

2.5.2.3(6) Medication Room and Exam/Treatment Room where specialized work is conducted will have dedicated special task lighting.

2.5.2.3(7) Surfaces, including walls and floors, throughout the spaces will avoid the use of highly reflective materials.

2.5.2.4 Anticipated Trends in Service Delivery

2.5.2.4(1) Volume of individuals diagnosed with treatable behavioral health disorders is projected to increase. There are three major trends impacting this increase:

2.5.2.4(1)(a) Population growth;

2.5.2.4(1)(b) Population aging; and

2.5.2.4(1)(c) The increase in identification of chronic conditions.

2.5.2.4(2) Better early identification of disorders, including, but not restricted to, diagnosis in young adulthood, the recognition of depression and anxiety disorders in the elderly and successful outreach and anti-stigma initiatives that encourage help-seeking.

2.5.2.4(3) Adolescents, Young Adults and in particular Older Adults, are age groups in which symptoms become apparent and mental health services are most utilized. These population groups are increasing, and as a result, the number of diagnoses and the demand for services is expected to increase as well.

2.5.2.4(4) The preferred care delivery model for Patients with mental health disorders is shifting. Where previously long-term institutionalization was deemed appropriate, advances in treatment and a reduction in stigma have led the treatments shift to the Outpatient model with behavioral health screenings, particularly in primary care. This earlier detection means that more Patients can be treated in lower acuity Outpatient sites, before their condition leads to unnecessary Emergency Department (ED) utilization or hospitalization.

2.6 Operating Principles

2.6.1 Hours of Operation:

Monday – Friday 06:30 – 17:00 (Hours may be extended on as need basis or as staffing models support it)

2.6.2 People Management System

2.6.2.1 Patients are largely seen for individual psychiatric assessment and group therapy interventions.

2.6.2.2 Patients arrive to the Building for a scheduled visit; enter through the Building's Main Lobby; register at the main reception or at a self-serve kiosk.

2.6.2.3 Patients are referred to the program in several ways:

2.6.2.3(1) Patients may be referred by a physician, community mental health team or nurse practitioner; and/or

2.6.2.3(2) Patients from within the Existing Hospital would be escorted by staff and may be in a wheelchair or on a stretcher. Patients from other facilities will also be escorted and may arrive by hospital transport (in which case they may arrive at a central drop off point or in the MHSU Sally-Port);

2.6.2.3(3) Patients may be escorted by Provincial Health Services Authority, Patient Transport Network or Corrections staff will enter through the Sally-Port.

2.6.3 Material Management Systems

2.6.3.1 Centralized Management of Equipment

2.6.3.1(1) Equipment storage will be provided at each care cluster in the Outpatient setting.

2.6.3.1(2) Authority will tag critical equipment and supplies to allow for tracking and monitoring. Once an equipment garage is established on the Existing Hospital as part of the campus redevelopment, MHSU will utilize this method of equipment storage maintaining only a necessary equipment level in the Building.

2.6.3.2 The following rooms will be able to deliver/retrieve supplies or perform work without directly interacting with Patients and staff: Housekeeping Closet, Soiled Holding Room, Telecom Rooms, Electrical Riser Room and Electrical Closets as well as the Clean Supply Room and Soiled Utility Rooms within the Neurostimulation Clinic.

2.6.3.3 Spaces will have adequate safety and security to ensure Patients cannot access harmful materials or objects.

2.6.4 Consumable Supplies

2.6.4.1 Supplies will come from the Existing Hospital supply chain; a two bin system will be used to store supplies in the Clean Supply room.

2.6.5 Linen

2.6.5.1 Soiled linen will be taken to the Soiled Holding Room on the floor and placed into linen carts. These carts will be picked up by linen services staff and taken to a larger Soiled Holding Room near the Bridge/Corridor connection to Level 0 of the Existing Hospital. Tow motors will be used to move the full linen carts (with soiled items) from MHSU building to the Existing Hospital.

2.6.5.2 Clean linen will be delivered to the Clean Supply Room in the Neurostimulation Clinic.

2.6.5.3 The Clean Supply Room will be inaccessible to Patients and public and will have controlled access.

2.6.6 Pharmaceutical Products

2.6.6.1 Distribution will be sourced from a community pharmacy for PTOP Clinic and the Existing Hospital pharmacy for Neurostimulation Clinic.

2.6.6.2 Medications will be stored in a locked cabinet within a secure Medication Room that is accessed by nurses when medications are required, in the PTOP Clinic.

2.6.6.3 Neurostimulation Clinic will have the Automated Drug Dispensing System (ADDS) which will be kept in the Recovery Room.

2.6.6.4 A Pneumatic Tube System will be utilized for the quick movement of medications, specimens, and supplies throughout the Building.

2.6.7 Food Services

2.6.7.1 Food services will not be provided in the Outpatient program.

2.6.7.2 A Casual Food service will be provided on the main level of the Building. A Café style kiosk that is run by Patients will provide coffee and snacks for staff, visitors and Patients.

2.6.8 Waste Management

2.6.8.1 This service will be provided by the Existing Hospital environmental service; including organic waste and recycling programs established as per the Authority.

2.6.8.2 Regular waste will be removed by Housekeeping staff to the Soiled Holding Rooms on the floor, then moved to a Large Soiled Holding Room near the Bridge/Corridor connection to Level 0 of the Existing Hospital.

2.6.8.3 Segregation of wastes will accommodate the following categories of products:

2.6.8.3(1) General garbage;

2.6.8.3(2) Sharps (including potentially bio hazardous items);

2.6.8.3(3) Infectious or contaminated waste (excluding sharps);

2.6.8.3(4) Confidential paper;

2.6.8.3(5) Confidential non paper products (e.g. Patient ID, dose strip, multimedia recycling/disposal consoles);

2.6.8.3(6) Mixed media for confidential plastics from Automated Unit Dose (AUD);

2.6.8.3(7) Clean paper and cardboard;

2.6.8.3(8) Clean metal (tin and aluminum);

2.6.8.3(9) Clean recyclable plastics; and

2.6.8.3(10) Compostable materials.

2.6.9 Information Management Systems

2.6.9.1 The provision of Virtual Care technologies will enable clinical consultations with other Authority's facilities including community clinics. This will divert cases from admission and will support safe transition back into the community.

2.6.9.2 A Patient Electronic Medical Record will greatly enhance the information that can be available to mental health clinicians and Allied Health professionals external to The Existing Hospital enabling them to better manage a Patient's condition and improve standardization of Patient documentation.

2.6.9.3 Virtual Care Facilities

2.6.9.3(1) Virtual Care offers live videoconferencing services for clinical consultations, professional development, and administrative collaboration.

2.6.9.3(2) The Building will include rooms designed for video conferencing to support Virtual Care sessions.

2.6.9.3(3) Refer to BC Practice Guidelines for Video-based Telehealth Services (2014), MHSU Video-Based Telehealth Direction Paper 2015-2020 and Briefing Note – Telehealth (Virtual Care) Explained, located in the Data Room for further details.

2.6.9.3(4) The Design-Builder will design and construct the following rooms to support Virtual Care; these rooms are specific to the Outpatient Mental Health and Substance Use Program:

2.6.9.3(4)(a) Large Multipurpose Room will be Type 4. This room type will be used by both Inpatient and Outpatient programs as well as the Existing Hospital programs;

2.6.9.3(4)(b) All Consultation/Therapy Rooms will be Type 5a Virtual Care (Telehealth) ready (infrastructure only) with an exception as follows:

(b).1 Four (4) of those Consultation/Therapy Rooms will be 5b Virtual Care (Telehealth) equipped;

(b).2 Five (5) of those Consultation/Therapy Rooms will be Type 6 (Interview) with Clinical Education and Observation Camera System in addition to the Type 5a capability;

2.6.9.3(4)(c) The Large Consultation/Therapy Room in the Outpatient area will be Type 5b Virtual Care (Telehealth) equipped. In addition, it will be equipped with screens and speakers for viewing the Clinical Education and Observation Camera System and will be Type 6 (Interview);

2.6.9.3(4)(d) Large Group Therapy Room will be Type 6 with screens and speakers for viewing the Clinical Education and Observation Camera System. This room will be equipped with microphones so that occupants in the Observation Room can listen in on therapy sessions;

2.6.9.3(4)(e) Observation Room will be Type 6 with screens and speakers for viewing the Clinical Education and Observation Camera System. There will be two-way audio, allowing up to two teams to listen in on simultaneous therapy sessions in adjacent spaces. This room will not be used for video conferencing.

2.6.9.3(4)(f) Conference/Team Room will be Type 2 (AV and Video Conference equipped). In addition, it will be equipped with screens and speakers for viewing the Clinical Education and Observation Camera System and will be Type 6 (Interview).

2.6.9.3(4)(g) Consultation/Therapy Room will be Type 5a Virtual Care (Telehealth) ready (infrastructure only).

2.6.9.3(5) Rooms used for Virtual Care will have:

2.6.9.3(5)(a) Roller blinds on all windows (where applicable);

2.6.9.3(5)(b) A computer that will be wall mounted below one of the monitors, equipped with a wireless keyboard and mouse, and directly wired into one of the Virtual Care monitors and/or the projector.

2.6.9.3(6) Placement of lights, switches, data ports in the room, power receptacles, blinds and possible paint colour/finish and specification for the vendor/model of Virtual Care equipment to conform to the Authority's standard will be provided by the Design-Builder and reviewed in further consultation with the Authority.

2.6.9.3(7) For details and technical requirements for each Multimedia Room type refer to the Schedule 1[Statement of Requirements].

2.6.10 Wireless Capability

2.6.10.1 Wireless and cellular services will be provided to facilitate access to information and health care records.

2.6.10.2 Integrated technologies will allow the coordination and communication of Patient care.

2.6.10.3 There will be provision for safe and secure Patient and visitor WI-FI access.

2.7 Design Criteria

2.7.1 Clinical Requirements

2.7.1.1 Provide a broad range of specialized clinics and enhanced capacity that is in alignment with the Patients' needs;

2.7.1.2 Adequate Outpatient services with timely access for children, adolescents, young adults and others;

2.7.1.3 Provisions for regional ECT, TMS treatment and PTOP services;

2.7.1.4 Patients that are referred to these services will receive an improved response that matches their needs with the service provided and in the most appropriate location;

2.7.1.5 Reduce wait lists by 25% for the short term (less than 6 months); and by 50% for the long term (greater than 6 months) within 2 years.

2.7.2 Standardization

2.7.2.1 Each room that serves the same function (e.g. Consultation/Therapy Room, Large Group Therapy Room)) will be designed; configured; equipped and furnished to a common standard and design. The intent of this requirement is to facilitate staff moving from room-to-room without having to reorient themselves with respect to frequently accessed key features.

2.7.3 Proximity Relationships

2.7.3.1 Line of Sight and Space Adjacencies

2.7.3.1(1) Consultation/Therapy Room will be adjacent to the Exam/Treatment Room and Medication Room within the PTOP Clinic space.

2.7.3.1(2) ECT Treatment Room will be adjacent to the waiting area.

2.7.3.1(3) TMS Treatment Room will be adjacent to the waiting area.

2.7.3.1(4) Waiting area within the Neurostimulation Clinic will be contiguous space with the treatment and support areas. No crossing of corridors will be allowed in the Patient process flow from the arrival to the end of the treatment.

2.7.3.1(5) ECT Treatment Room will have direct connection to the Recovery Room. Door between these rooms will be provided for access in an emergency situation.

2.7.3.1(6) Recovery Room will have direct connection with Post-Recovery Room

2.7.3.1(7) Patient flow within the Neurostimulation Clinic will be in a circuit pattern. Refer to description and diagrams below for details:

2.7.3.1(7)(a) ECT Patient Flow - Outpatient Assumptions:

(a).1 Patients are gowned for ECT Treatment.

(a).2 Patients require IV insertion for medication administration.

(a).3 Patients receive general anesthesia for treatment.

(a).4 Patients require post-treatment monitoring and observation.

(a).5 Due to sedation medications, Patients are not to drive themselves home (Patients are to be transported home by a family member, friend, or inter-hospital transport).

(a).6 Patients remain on the same stretcher from pre-treatment in the Exam/Treatment Room to Recovery Room.

2.7.3.1(7)(b) ECT Patient Flow - Inpatient Assumptions:

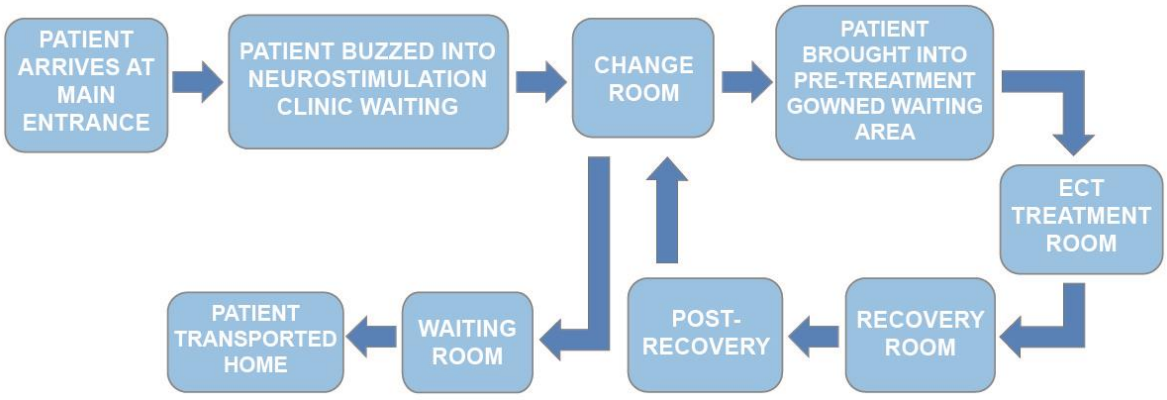
(b).1 Patients are prepped for ECT treatment on sending Inpatient Unit (IV insertion, wearing gown, pre-meds as required).

(b).2 Patients receive a general anesthesia for ECT treatment.

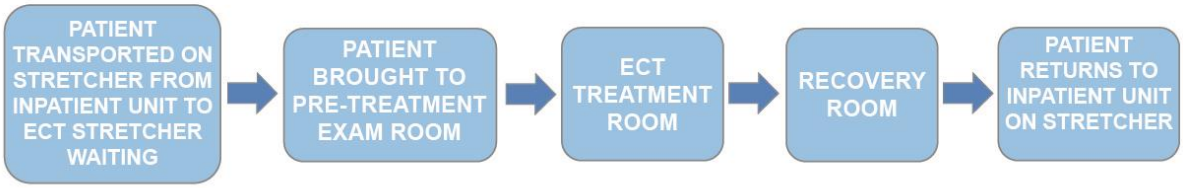
(b).3 Patients require post-treatment monitoring and observation.

(b).4 Patients remain on same stretcher and are transported back to the Inpatient Unit.

ECT PATIENT FLOW - OUTPATIENT



ECT PATIENT FLOW - INPATIENT



2.7.3.1(7)(c) TMS Patient Flow - Outpatient Assumptions:

(c).1 Patients arrive to the Building and registers at the main reception or self kiosk.

(c).2 Patients are greeted by an ECT clerk.

(c).3 Patients wait in the ECT waiting area.

(c).4 Patients wear street clothes for procedure and are brought into the TMS Treatment Room.

(c).5 Patients do not require pre-meds or pre-treatment preparation.

(c).6 Patients do not receive sedation.

(c).7 Patients do not require post-treatment observation or monitoring.

(c).8 Patients are able to drive self to and from treatment.

2.7.3.1(7)(d) TMS Patient Flow - Inpatient Assumptions:

(d).1 Patients are checked-in by an ECT clerk. Patients are transported by Porter Service to be taken to the waiting area.

(d).2 Patients do not need to change into gown for procedure.

(d).3 Patients do not require pre-meds or pre-treatment preparation.

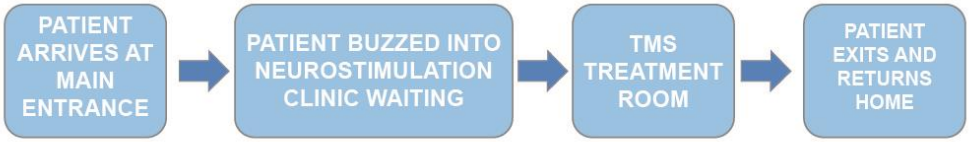
(d).4 Patients do not receive sedation.

(d).5 Patients do not require post-treatment observation or monitoring.

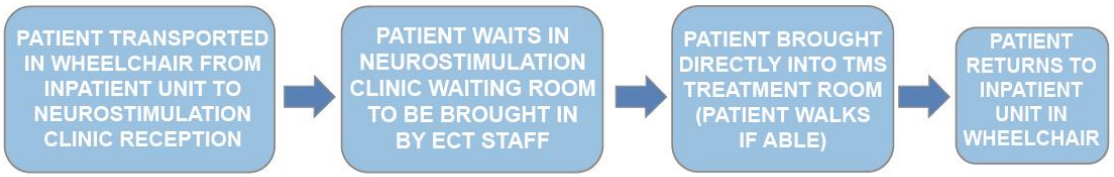
(d).6 Porter Service called at the end of the treatment.

(d).7 Porter Service returns Patients to the sending unit, post-treatment.

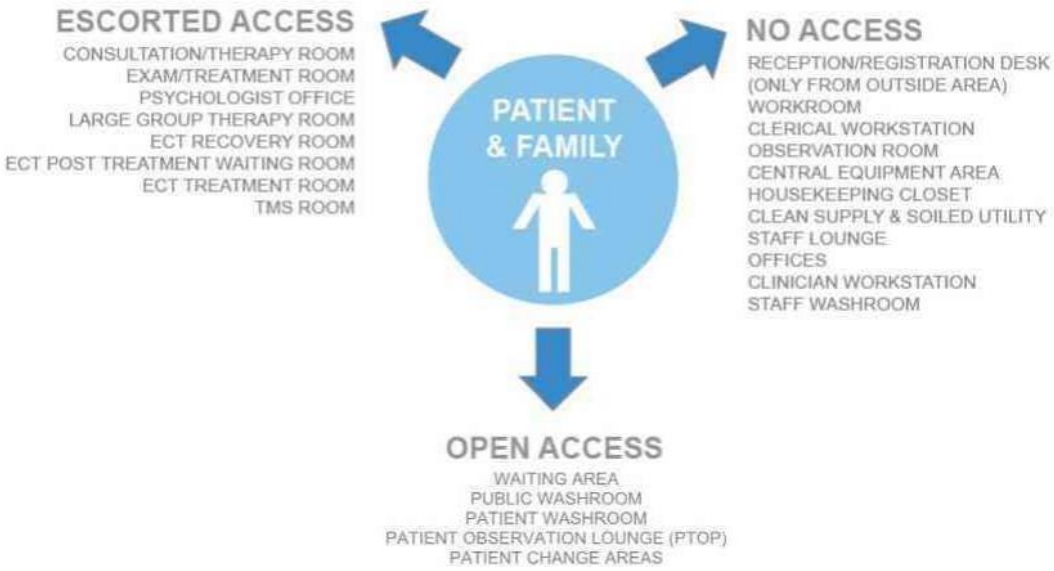
TMS PATIENT FLOW - OUTPATIENT

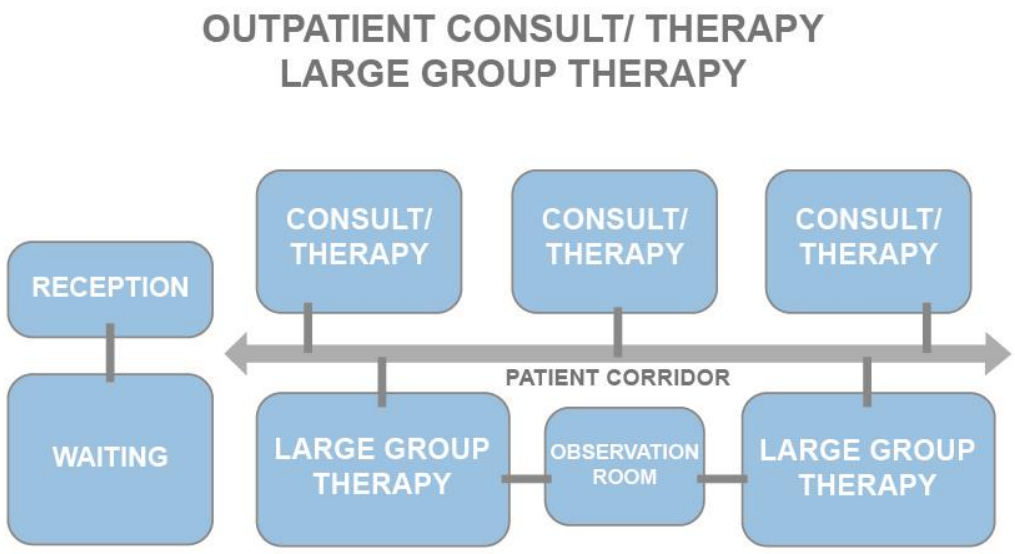


TMS PATIENT FLOW - INPATIENT



OUTPATIENT FLOW





2.7.4 Specific Design Requirements

2.7.4.1 The following will describe in detail specific design requirements that will be applicable to MHSU Outpatient program.

2.7.4.2 Internal Design Criteria

2.7.4.2(1) General Internal Layout

2.7.4.2(1)(a) Outpatient program will be organized in two major groupings:

(a).1 Large Multipurpose Room and associated spaces, located off a Building's Main Entry Lobby; and

(a).2 Outpatient clinics as one contiguous space with a separate suite for a Neurostimulation Clinic with associated program spaces.

2.7.4.2(2) Unit Organization

2.7.4.2(2)(a) All Consultation/Therapy Rooms will be organized along Patient corridors for easy Patient access.

2.7.4.2(2)(b) Five of the Consultation/Therapy Rooms will have double egress. Another five Consultation/Therapy Rooms will have provisions for the virtual care as outlined in the section 2.6.9.2 Virtual Care Facilities of this Appendix. High Risk rooms (double egress) will not be the same rooms with virtual care provisions.

2.7.4.2(2)(c) Neurostimulation Clinic will have ECT and TMS programmed spaces and will be organized as a separate suite, having access to a designated waiting area from the general waiting/registration area of the Outpatient program.

2.7.4.2(2)(d) Neurostimulation Clinic will have controlled access.

2.7.4.2(2)(e) Outpatient and Inpatient flows to and from the ECT and TMS treatments will be streamlined and separated.

2.7.4.2(2)(f) ECT Treatment Room will have direct connection to the ECT Recovery Room. Crossing corridors between the two rooms will not be allowed.

2.7.4.2(2)(g) Crossing corridors from intake at the waiting rooms to change rooms and treatment areas will not be allowed.

2.7.4.2(2)(h) There will be window between the ECT Treatment and ECT Recovery room with an automated door that will provide easy and quick access in an emergency situation.

2.7.4.2(2)(i) ECT Treatment Room will be sufficient in size to accommodate 10 people and will have two treatment bays. Each bay will have headwall with medical gases.

2.7.4.2(2)(j) ECT Recovery Room will have six bays and all of them will be equipped with the headwalls with medical gases.

2.7.4.2(2)(k) ECT Recovery Room will have adequate space for blanket warmer, automated medication dispensing system and counter space for clinical staff.

2.7.4.2(2)(l) Post-Recovery Room will be directly adjacent to the ECT Recovery Room. It will accommodate 6 chairs and counter space with fridge for refreshments.

2.7.4.3 Staff Safety

2.7.4.3(1) There will be number of passive and active design provisions ensuring staff is safe and secure in their daily interactions with the Patients.

2.7.4.4 Outpatient Area Security

2.7.4.4(1) Controlled access to the Mental Health areas and the use of passive security systems such as CCTV are critical to the effective management of the Outpatient spaces.

2.7.4.4(2) To augment CCTV, purposeful unit design that facilitates an unobstructed line of sight from the staff areas to the Patient areas as well as the appropriate use of door windows, CCTV monitoring of Consultation/Therapy Rooms and space design to prevent staff entrapment, is essential.

2.7.4.4(3) Information Technology solutions will be designed to assist in ensuring the safety of staff and Patients. Staff worn Personal Protective Devices (PPD) will provide panic alert notification to allow for the appropriate and immediate communication of the precise location and staff member in need of assistance.

2.7.4.4(4) Space will be included for a physical security presence in the Building's Main Lobby area.

2.7.5 Specific Room Types

2.7.5.1 Consultation/Therapy Rooms

2.7.5.1(1) A warm and welcoming environment will be provided. Consultation/Therapy Rooms will have direct natural light.

2.7.5.1(2) Design will promote a configuration that will enable easy access and exit from the room. All rooms will facilitate Persons with Disabilities. Five rooms will have double egress.

2.7.5.1(3) Furniture and services layout (e.g. electrical receptacles) will be flexible to allow multiple layouts that support multiple and flexible uses of the rooms. The furnishings arrangement will promote a non-hierarchical atmosphere.

2.7.5.1(4) Rooms will be designed to provide a safe, optimal therapeutic environment and to relieve a sense of confinement.

2.7.5.1(5) Artificial lighting options will be variable to accommodate different levels of ambient lighting, each suited to the functions ongoing in the space. Lighting will have dimming options.

2.7.5.1(6) Surfaces, including walls and floors will avoid the use of highly reflective materials. Reflected light will be muted.

2.7.5.1(7) The acoustical design will support privacy between the adjoining consult rooms and corridors. Refer to Appendix 1 [Statement of Requirements].

2.7.5.1(8) Technology will be leveraged to enable more effective collaboration among administrative and clinical care teams in the management of the Patients, clinical programs, resources and health records.

2.7.5.1(9) All rooms will be designed to support Virtual Care capability in future. Five rooms will be fitted out for Virtual Care technology to enable remote specialist consultation and better clinical collaboration.

2.7.5.1(10) All rooms will have full height glazing towards the corridors to observe if there is a problem in the room. Use translucent glazing in order to provide indication of an occupant location and movement in the room without breaching privacy.

2.7.5.1(11) Provide a secondary exit from high risk rooms that opens either into the corridor or staff only zone, to allow safe egress for staff in the event of a Patient door being barricaded. Secondary exit doors into the adjacent Consultation/Therapy rooms will not be permitted.

2.7.5.1(12) All rooms will have a Panic/Duress button on the wall as a secondary Panic/Duress system. The primary system will consist of Personal Protective Devices (PPD). The Personal Protective Device will be sufficient to locate staff throughout the Building when it is activated.

2.7.5.1(13) All rooms will have controlled access by clinical staff. The doors in each room will have anti- barricade features.

2.7.5.2 Exam/Treatment Rooms

2.7.5.2(1) These spaces will be used for physical examination, minor procedures, medication administration and wound management.

2.7.5.2(2) Spaces will be flexible to support changes in programming over time.

2.7.5.2(3) The design will provide a welcoming, comfortable and calming environment. As a minimum all rooms will have either direct or indirect natural light.

2.7.5.2(4) The design will promote a configuration that will enable easy access and exit from the room. All rooms will be accessible for Persons with Disabilities.

2.7.5.2(5) The room configuration will enable privacy when Patient is examined on the bed in relation to the entry door.

2.7.5.2(6) Hand hygiene sinks c/w hands free faucets will be located directly along the path of entry of the clinical staff.

2.7.5.2(7) The acoustical design will support privacy between the adjoining rooms and corridors. Refer to Schedule 1 [Statement or Requirements].

2.7.5.2(8) The location and quantity of electrical receptacles/data outlets will allow flexibility of multiple layouts that support flexible uses of the rooms.

2.7.5.2(9) Artificial lighting options will be variable to accommodate different levels of ambient lighting, each suited to the functions ongoing in the space and have the ability to be dimmed.

2.7.5.3 Medication Room:

2.7.5.3(1) Medication Room allows for convenient, secure and quick staff access. Medication room is to be fully enclosed. Medication room will have one entry door only. Access to a Medication Room will be from a secured staff corridor only (controlled access to enter end motion sensor to exit). The Medication Room will have no less than 2800mm in countertop length. The Medication Room in the Outpatient PTOP Clinic does not require a fridge but does require a locked cupboard for medications. Medication room will have a touchdown workstation. Space for an under counter mixed media console for the plastic with Patient names will be provided.

2.7.5.4 Large Multipurpose Room

2.7.5.4(1) A Large Multipurpose Room will have the following spaces that support the room function:

2.7.5.4(1)(a) Lobby;

2.7.5.4(1)(b) Patient/Public Washrooms;

2.7.5.4(1)(c) Projection Room; and

2.7.5.4(1)(d) Staging/Preparation Room.

2.7.5.4(2) The Multipurpose room will be one contiguous space and will not be sub-dividable;

2.7.5.4(3) The room size and proportion will enable multiple seating configurations depending on the function performed;

2.7.5.4(4) The Large Multipurpose Room will be sized to accommodate 120 people. An adjoining Lobby and Patient/Public Washrooms will be sized accordingly;

2.7.5.4(5) The Large Multipurpose Room's Lobby will be directly adjacent to the Building's Main Lobby but will also be able to provide access directly from the exterior;

2.7.5.4(6) Access to the Multipurpose Room and all associated spaces will be controlled; and

2.7.5.4(7) The Multipurpose Room specific design requirements are outlined in Appendix 1J (I) [RCH MHSU Large Multipurpose Room Specifications].

2.7.5.5 Security Office

2.7.5.5(1) A Security Office will be located immediately adjacent to the Building's Main Lobby. It will have Direct Line of Sight to the Building's Main Lobby.

2.7.5.5(2) The Security office will accommodate space for two (2) workstations. The workstations will be of a millwork type, extending along perimeter of the room.

2.7.5.5(3) The Security Office will have windows, for interaction with public, opening to the Building's Main Lobby and to the outside.

2.7.5.6 Café, Patient-run

2.7.5.6(1) A space within the Building's Main Lobby will be provided for a Patient-run Café. An associated storage space will also be provided.

2.7.5.6(2) The Café will accommodate space for a hand hygiene sink, display cabinet, counter space with some cabinetry for supplies, cash register etc. There will be up to 3 people at any given time (a manager and 2 trainees).

2.7.5.6(3) The Café will allow Patients to acquire work experience, that is in line with a participatory model of care and will be based on a social enterprise model.

2.7.5.6(4) Café will be open daily mostly in the mornings, serving hot beverages and ready-made food.

2.7.5.6(5) The design of the Café as well as the Main Lobby will be welcoming, encouraging people to stay on.

2.8 Space Table

	Description	Unit	Unit/ NSM	Total NSM	Safety/ Risk Category	Comments	Multimedia Category
G1.0	**Mental Health Outpatient Area**						
G1.0.1	**MAIN ENTRANCE LOBBY**						
G1.0.1.1	Café, Patient-run	1	**9.0**	**9.0**	**A**	2 phones in cafe (1 analog and 1 for credit card/ debit)	
G1.0.1.2	Café, Storage	1	8.5	8.5	**C**		
G1.0.1.3	Security Office	1	9.5	9.5	**C**	2 PC workstations, 1 CCTV/duress workstation with 2 monitors, 2 chairs, phone, locking storage;	

						Direct Line of Sight to lobby; millwork for specific configuration around the room; opening window for interaction with public on lobby and perhaps to outside of building	
G1.0.1.4	Lobby	1	122.5	122.5	**A**	Public phone (analog) and Taxi phone (analog)	
G1.0.1.5	Patient/Public Washroom (Male)	1	12.6	12.6	**G**	Accessible; access from both lobbies G1.0.1.4 & G1. 0.2.4; one stall and one urinal (in accordance with applicable building codes); Anti-ligature	
G1.0.1.6	Patient/Public Washroom (Female)	1	12.6	12.6	**G**	Accessible; Access from both lobbies G1.0.1.4 & G1. 0.2.4; three stalls (in accordance with applicable building codes); Anti-ligature	
	Sub-total (CNSM)			**174.7**			
G1.0.2	**LARGE MULTIPURPOSE ROOM**						
G1.0.2.1	Large Multipurpose Room, 120 seat	1	280.0	280.0	**A**	Accommodates seating for 120 people; PC; voip phone; Accessible; moveable podium (millwork); Use SOR Appendix 1J	Type 4 Room
G1.0.2.2	Projection Room	1	17.0	17.0	**C**	PC; voip phone	
G1.0.2.3	Staging/ Preparation Room	1	30.7	30.7	**C**	wall mounted voip phone	
G1.0.2.4	Lobby	1	40.0	40.0	**A**		
	Sub-total (CNSM)			**367.7**			
G1.0.3	**RECEPTION**						
G1.0.3.1	Reception/Registration Desk	2	4.5	9.0	**H**	Sit down workstation, PC; phones (1 analog back-up for area; each workstation 1 voip), clerical storage; consider wheelchair accessible interviews; mobile chart rack. This space will be out front.	

G1.0.3.2	Not Used					deleted Kiosk, Self check-in	
G1.0.3.3	Clerical Workstation	3	7.5	22.5	**C**	Each sit down workstation with PC and voip phone, clerical storage; this space will be in behind	
G1.0.3.4	Office, Intake Nurse	1	9.5	9.5	**C/D**	Private office with desk, PC, chair, voip phone, cabinets, visitor chairs; extra ports for 2nd workspace (4 data drops)	
G1.0.3.5	Work Room	1	11.0	11.0	**C**	Floor model MFD, large colour printer; paper supply; lockable door; adjacent to Reception	
G1.0.3.6	Waiting Area (for 25 people)	1	50.0	50.0	**E**	Includes tables, chairs, shelving; Anti-ligature; children's play area	
G1.0.3.7	Not Used					deleted wheelchair alcove	
G1.0.3.8	Patient/Public Washroom (Unisex)	2	4.5	9.0	**G**	Accessible; 2-piece washroom; Anti-ligature	
	Sub-total (CNSM)			**111.0**			
G1.0.4	**OUTPATIENT TREATMENT**						
G1.0.4.1	Consultation / Therapy Room	26	11.0	286.0	**D**	Accommodates 4 tub chairs and coffee table; desk; voip phone; Anti-ligature; PC; hardwired with panic/duress buttons; 5 rooms with double egress; Locate on the outside perimeter of the building as much as possible for maximum exposure to natural light through a window; Use SOR Appendix 1J(II))[Clinical Education and Applied Research Space Infrastructure Specifications].	5(a); 5(b); 6(i) refer to the Appendix 1A; Appendix 1J(II)[Clinical Education and Applied Research Space Infrastructure Specifications] and SoR
G1.0.4.2	Large Consultation / Therapy Room	1	16.0	16.0	**D**	PC, conference phone, coffee table and 8 chairs; Anti-ligature.	Virtual Care (Telehealth) fit up (Type 5b

						Includes storage cupboards	room); Also equipped with Screens + Speakers for viewing Education Camera System (Type 6 room); refer to the Appendix 1A; Appendix 1J(II))[Clinical Education and Applied Research Space Infrastructure Specifications] and SoR
G1.0.4.3	Exam / Treatment Room	2	13.5	27.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button. 1 room in close proximity to PTOP Clinic and Patient Washroom	
G1.0.4.4	Neuropsychologist Consultation / Office	2	11.0	22.0	**C/D**	Private counseling/office space with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; high level of acoustic privacy required; location preferably in interior of outpatient space	
G1.0.4.5	Patient Washroom	3	4.5	13.5	**G**	Accessible; 2-piece washrooms; Anti-ligature; 1 specimen collection washroom in close proximity to an Exam/Treatment room	

G1.0.4.6	Large Group Therapy Room	2	30.0	60.0	**D**	Accommodates 12-15 people; tables, chairs; conference phone; Anti-ligature; millwork to store equipment	Viewing screens + speakers for education camera system (Type 6 room); Microphones so that occupants in Observation Room can listen in on therapy sessions; refer to the Appendix 1A; Appendix IJ(V) and SoR
G1.0.4.7	Observation Room	1	20.0	20.0	**C**	One way mirror between large group therapy spaces; direct viewing through glazing; need to be able to cover mirrors (with blinds) from each side; Thin Client; voip phone; will have two functions: as an observation room or Consultation/Therapy Room; millwork desk on three sides.	Two way audio; Infrastructure needs to support: Screens for viewing from education camera system. Speakers + headphones allowing up to two teams to listen in on simultaneous therapy sessions in adjacent spaces. Type 6 room; Not used for video-conferencing; refer to the Appendix 1A; Appendix IJ(V) and SoR
G1.0.4.8	Conference Room/Team Room	1	33.0	33.0	**C**	Accommodates 15-18 people; chairs, tables, conference phone	Type 2 room; Screens + Speakers for viewing education camera system (Type 6 room); refer to the Appendix 1A; Appendix IJ(V) and SoR

G1.0.4.9	Print/Copy Alcove	1	6.5	6.5	**C**	Floor model MFD, paper supply; lockable door	
	Sub-total (CNSM)			**484.0**			
G1.0.5	**PTOP Clinic Space**						
G1.0.5.1	Clinician Workspace	1	22.5	22.5	**C**	5 Thin Client sit down workstations in one workspace with room for receptionist and clinic staff; 3 voip phones; desk top MFD; whiteboard	
G1.0.5.2	Office, Coordinator	1	9.5	9.5	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; extra ports for 2nd workspace (4 data drops)	
G1.0.5.3	Consultation / Therapy Room	1	9.5	9.5	**D**	Accommodates 4 tub chairs and coffee table; desk; voip phone; Anti-ligature; Thin Client; hardwired with panic/duress buttons	Virtual Care (Telehealth) capable (Type 5a room); refer to the Appendix 1A; Appendix IJ(V) and SoR
G1.0.5.4	Patient Observation Lounge (PTOP)	1	17.0	17.0	**E**	6 people; up to 6 hour stays; Microwave; Fridge; Anti-ligature. Includes Nourishment Centre with utility sink and drinking fountain with bottlefillers; hand hygiene sink; adjacent to clinician workspace; space doubles as PTOP waiting room; TV; analog phone on wall; WiFi for public	
G1.0.5.5	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving, secure; automated drug dispenser; locked cupboard for medications; hand hygiene sink; PC; voip phone; Adjacent to	

						PTOP and metabolic monitoring	
G1.0.5.6	Pneumatic Tube Station	1	2.0	2.0	**C**	Within PTOP clinic area	
	Sub-total (CNSM)			**70.0**			
G1.0.6	**SUPPLIES/EQUIPMENT/ENVIRONMENTAL**						
G1.0.6.1	Central Equipment Room	1	25.0	25.0	**C**	Open area with some shelving, electrical and charging considerations; Place near ECT Suite to accommodate 8 IV pumps, portable Patient lift, etc.; need four data drops	
G1.0.6.2	Housekeeping Closet	1	7.5	7.5	**C**	Accommodates housekeeping cart, mop sink, shelving; no data drops	
G1.0.6.3	Soiled Utility	1	8.0	8.0	**C**	Millwork with utility sink, storage, hand hygiene sink, floor drain; no data drops	
G1.0.6.4	Soiled Holding	1	18.0	18.0	**C**	For recycling, garbage and soiled linen holding; no data drops; hand hygiene sink	
G1.0.6.5	Electrical Room	1	12.0	12.0	**B**		
G1.0.6.6	Communications Room	1	17.9	17.9	**B**		
	Sub-total (CNSM)			**82.5**			
G1.0.7	**STAFF SUPPORT AREA**						
G1.0.7.1	Physician Lead Office	1	11.0	11.0	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; extra ports for 2nd workstation; 4 data drops	
G1.0.7.2	Staff Lounge	1	25.0	25.0	**C**	Soft seating; Kitchenette with fridge, microwave, dishwasher, PC, phone,	

						counter space, tables, chairs	
G1.0.7.3	Staff Washroom	1	6.0	6.0	**C**	3-piece; adjacent to staff lounge	
G1.0.7.4	Staff Lockers	50	0.5	25.0	**C**	May disperse throughout touchdown workstation area instead of in one location	
G1.0.7.5	Manager Office (1 for inpt; 1 for outpt)	2	9.5	19.0	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; extra ports for 2nd workstation	
G1.0.7.6	Administrative Assistant for Director, Managers, Physicians)	1	9.5	9.5	**C**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; extra ports for 2nd workstation	
G1.0.7.7	Not Used					deleted coordinator office	
G1.0.7.8	Clinician Workstation	12	4.5	54.0	**C**	Chair, workspace with 12 sit down workstation, 8 PC's; 4 Thin Clients, data connection, 2 voip phones, small desktop MFP. Consider 2 shared offices within this space	
G1.0.7.9	Psychology Workspace	6	4.5	27.0	**C**	Enclosed workspace with 6 sit down workstations with 2 PC's and 4 Thin Clients, 2 voip phones	
G1.0.7.10	Staff Washroom	2	4.5	9.0	**C**	Accessible; 2-piece washroom (toilet/sink)	
	Sub-total (CNSM)			**185.5**			
G1.0.8	**NEUROSTIMULATION CLINIC**					Site lines are very important in this area from treatment to recovery for staff with Patient privacy respected	

G1.0.8.1	Reception/Registration Desk	1	4.5	4.5	**H**	Sit down workstation, PC, phones (1 analog; 1 voip), clerical storage; consider wheelchair accessible interviews; mobile chart rack. Adjacent to General Waiting Room, ECT/TMS.	
G1.0.8.2	Wheelchair Alcove	4	2.0	8	**C**	Space for up to 4 wheelchairs	
G1.0.8.3	General Waiting Room, ECT/TMS	1	20.0	20.0	**E**	For 8-10 people; consideration of separation for smaller seating pods	
G1.0.8.4	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom; Anti-ligature	
G1.0.8.5	In-patient Stretcher Waiting Area	1	7.5	7.5	**E**	For inpatient Patients on stretchers to wait; adjacent to elevators	
G1.0.8.6	Pt Change Room	1	20.0	20.0	**G**	2 dressing cubicles, 20 half-lockers; 3 piece washroom; Anti-ligature (toilet, sink, shower). Adjacent to waiting room.	
G1.0.8.7	Pre-Treatment Gowned Waiting Area	1	8.0	8.0	**D**	4 lounge chairs for gowned Patients to wait prior to treatment; No crossing of hallways from Waiting Room to Treatment Room to Recovery Room	
G1.0.8.8	Exam / Treatment Room	1	11.0	11.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button. Locate adjacent to ECT treatment rooms	

						2 stretchers divided glass partition; 1 blanket warmer, and each room with: hand hygiene sink, 2 Thin Clients, 2 portable Thin Clients (?WOW's), anaesthesia machine, scavenging; anaesthesia cart, ECT machine, omnicell; stock cart, Crash Cart with data drop, storage area, cupboards, suction, medical air and oxygen; refrigerator; supply cart/closet; voip wall phone; direct connection to recovery room with site lines respecting Patient privacy; doors between Treatment and Recovery need to open quickly in emergency situations.	
G1.0.8.9	ECT Treatment Room	1	30.0	30.0	**D**		
G1.0.8.10	TMS Room	1	15.0	15.0	**D**	Dental chair; workstation; closer to General Waiting Room; PC; voip phone	
G1.0.8.11	Recovery Room	1	50.0	50.0	**D**	6 stretchers with cardiac monitors, medication cupboard (omnicell); divided by curtains, music system, medical air, oxygen and suction; 1 PC and 3 Thin Client workstations; voip phone; small dictation cubicle with voip phone and PC; adjacent to ECT Treatment Room	
G1.0.8.12	Blanket Warmer Alcove	1	1.0	1.0	**C**		
G1.0.8.13	Post-Recovery Room	1	20.0	20.0	**D**	Small table with 4 recliner chairs, small refreshment area (refrigerator, microwave, toaster),	

						utility sink, hand hygiene sink, music system; Thin Client workstation for nurse; voip phone; adjacent to locker room and general waiting area	
G1.0.8.14	Clean Supply Room	1	11.0	11.0	**C**	Wire Racks; Accommodates two-bin system (24" W shelves with 30" clear for circulation)	
G1.0.8.15	Soiled Utility	1	8.0	8.0	**C**	Millwork with utility sink, storage, hand hygiene sink, floor drain; no data drops	
G1.0.8.16	Staff Washroom	1	4.5	4.5	**C**	Accessible; 2-piece washroom (toilet/sink)	
	Sub-total (CNSM)			**223.0**			
	Total MHSU Outpatient (CNSM)			**1,698.4**			

Part 3. MENTAL HEALTH AND SUBSTANCE USE CLINICAL EDUCATION AND APPLIED RESEARCH PROGRAM

This Specification outlines the functional, operational and physical requirements for the Clinical Education and Applied Research Services Program.

3.1 Guiding Design Principles

3.1.1 The following design principles will be applied to the Clinical Education and Applied Research program:

3.1.1.1 To ensure functionality of the rooms with the technology enabled infrastructure, the design will be developed to support the following:

3.1.1.1(1) Rooms will be sized adequately with an appropriate geometry and proportions between the length and width of the rooms; so that the participants are able to see, hear and speak to other participants regardless of where the participants are located;

3.1.1.1(2) No projections or appurtenances will be allowed within the room that can impede visual overview of the entire room and voice audio coverage and connectivity between the devices;

3.1.1.1(3) Acoustical treatments, type of finishes, wall and floor colours, lighting, environmental infrastructure (e.g. cooling systems) will be conducive to support the video-conference functions of the rooms.

3.1.1.2 Public spaces will be clustered together and separated from the staff/student only spaces.

3.1.1.3 Research Testing Area program will be clustered along a public, Patient Corridors for streamlined and easy Patient access. Adjacent waiting area will be provided along the Patient corridors.

3.1.1.4 Clinical Trials spaces will be co-located. Entire area will be secured and will have controlled access. Access to medical records will be restricted to the Clinical Trials staff only.

3.2 Clinical Education and Applied Research Design Program Priorities

3.2.1 The design will achieve the following priorities:

3.2.1.1 As a Mental Health and Substance Use volumes are expected to increase by over 50% in the next two decades, the teaching and research program spaces must increase to support this volume. The spaces will provide optimal conditions to support the clinical education program, psychiatric training and research;

3.2.1.2 Use of technology for psychiatric training and therapy; and

3.2.1.3 Enhanced multidisciplinary training environment with a research focus.

3.3 Functional Description

3.3.1 The Mental Health and Substance Use Clinical Education and Applied Research Program will allow students and residents to practice performing clinical procedures within a safe learning environment. Technology is used to support the delivery of clinical skills education by enhancing access to materials that students can utilize. The primary objective and focus is on the student's interaction with the Patient, building communication skills, rapport, learning new skills and refining approach to clinical encounters.

3.3.2 Research development has been a key driver in the Fraser Health in improving health care quality and outcomes and reducing inequalities; decreasing the knowledge to practice gap.

3.4 Statement of Purpose

3.4.1 Philosophy

3.4.1.1 The Existing Hospital has a strategic role to provide teaching and training opportunities, education, drive innovation and support clinical specialty development.

3.4.1.2 The Existing Hospital delivers Mental Health training, education and research for Fraser Health. As an Education Centre for the Psychiatry Residency Program, Fraser Health and its partners can be viewed as becoming national leaders in integrated community and acute MHSU service and treatment models.

3.5 Guiding Principles

3.5.1 The Clinical Education and Applied Research Program will provide space for applied learning, teaching and knowledge exchange to support the MHSU educational vision and help Fraser Health and its partners achieve their goal of becoming national leaders in integrated community/acute MHSU service approaches. The new space with its state of the art audio visual and communications capacity will be a significant benefit to all learners in Fraser Health, including:

3.5.1.1 Participants in formal training;

3.5.1.2 Attendees at seminars and educational sessions;

3.5.1.3 Staff and clinicians attending planned rounds;

3.5.1.4 Activities to incorporate research and findings into better practice.

3.5.2 Scope of Services

3.5.2.1 Scope of Education Functions

3.5.2.1(1) The Building will provide Large Multipurpose Room with seating for 120 people, teaching space and new technologies. This will further strengthen Fraser Health's partnership with UBC and advance The Existing Hospital's role as the hub for Fraser Health's Mental Health and Substance Use Clinical Education program. The centre will play an important role in the education and training of physicians, nurses, pharmacists and other non-physician health care providers. This will help recruitment needs by introducing the next generation of mental health professionals to Fraser Health and Patients.

3.5.2.1(2) The Existing Hospital has a rich tradition of teaching that is run by residents and faculty. There are formal department rounds that occur regularly as well as more targeted resident centered teaching sessions. Below are some of the teaching activities that occur:

3.5.2.1(2)(a) Psychotherapy Rounds (monthly): Different modalities of psychotherapy are discussed with experts in the field. As an example, our early psychosis psychologist gave a presentation on doing Cognitive Behavioral Therapy (CBT) for psychosis.

3.5.2.1(2)(b) Concepts of Cognitive Behavioral Therapy (CBT), Dialectical Behavioral Therapy (DBT) Rounds (monthly): CBT and DBT are discussed. Sometimes residents bring in their own clinical examples and other times videos of certain techniques are discussed.

3.5.2.1(2)(c) Psychodynamic Therapy Rounds: Concepts of psychodynamic therapy are discussed. Generally, readings of certain concepts are given prior then a discussion about the content of the readings will follow. The group is run by a staff psychiatrist and psychologists whom have psychodynamic training.

3.5.2.1(2)(d) Psychiatry Grand Rounds (monthly): Grand rounds on variety of psychiatry related topics. It is given by faculty, residents or visiting experts.

3.5.2.1(2)(e) Subspecialty rounds – Reproductive Psychiatry / Consultation Liaison / Geriatric Psychiatry (monthly rotation of each subspecialty): Rounds delivered by subspecialty staff in each field. It is an excellent opportunity to discuss unique cases and topics relevant to each of the subspecialty fields of psychiatry.

3.5.2.1(2)(f) Objective Structured Clinical Examination (OSCE) Rounds (weekly): A case is given similar to the format of the OSCE exam of the Royal College exam. One resident volunteer will go through the station then feedback will be given and the topic of the case will be discussed in further detail.

3.5.2.1(2)(g) Observed STACER Interview (monthly): A full diagnostic interview conducted by a resident will be observed by a faculty staff and then the resident will be given probing questions by the staff similar to STACER exam format of the royal college exam. This is excellent practice for residents in preparation for the two STACER exams they have to do before sitting the royal college written and OSCE exams.

3.5.2.1(2)(h) DSM rounds (weekly): Case based and resident-led rounds that focus on reviewing DSM 5 criteria under supervision of staff psychiatrist

3.5.2.2 Scope of Research Functions

3.5.2.2(1) The Building will lead efforts to identify best practices, influence policies and introduce prevention measures in a culturally diverse region. This integration means the research conducted at the centre will have a more immediate impact on Patient care, as findings will be disseminated more quickly and efficiently among clinicians. This will lead to a more sustainable health care system, contribute to improved health-related quality of life for individual Patients and contribute to new practices. Research will also bolster the ability to attract top talent, allowing Patients to be served by some of the best and brightest.

3.5.2.2(2) The goal is to integrate a sustainable research strategy into the delivery of health care; research evidence that informs policy and best practices for standards of care as well as an organizational culture that actively supports research and ensures that clinical staff are upholding their professional responsibility to evaluate evidence and incorporate it into their everyday practice.

3.5.2.2(3) Create an environment whereby Patients are given an opportunity to participate in research development that may have benefits to society at large.

3.5.2.2(4) The Building will offer space for medical students, residents and Fellows, as well as allied health trainees from a variety of post-secondary institutions. The space will be created to support an inter-professional approach to training with group based learning (e.g. seminar rooms with video Virtual Care capabilities) and individual case based learning.

3.5.2.3 Operable Windows

3.5.2.3(1) No exterior windows, will have the ability to be opened, anywhere on the Clinical Education and Applied Research Program spaces.

3.5.2.4 Natural and Artificial Light

3.5.2.4(1) There will be a variety of lighting options in the Clinical Education and Applied Research program spaces, each suited to the functions accommodated in a specified space.

3.5.2.4(2) Video Conference Room, Multipurpose Room and Seminar/Small Group Therapy Room will not be required to have access to natural light. If access to direct natural light is provided, room environment will be adjusted to provide optimal viewing conditions (e.g. black-out blinds). Refer to 1J(II) [Clinical Education and Applied Research Infrastructure Specifications].

3.5.2.4(3) Artificial lighting in the administrative, clinical spaces and staff support areas will be variable to accommodate different levels of ambient lighting depending on the functions performed at any one time in the space. Individual workstations will have dedicated and integrated task lighting.

3.5.2.5 Anticipated Trends in Service Delivery:

3.5.2.5(1) The spaces provided will be adaptable and effective collaborative hubs that support growing academic programs by:

3.5.2.5(1)(a) Planning creative spaces that bolster learners' confidence and motivation, practice and activities during learning processes;

3.5.2.5(1)(b) Allow for socially supported interactions; and

3.5.2.5(1)(c) Create a flow in a physical environment that enhance an innovation process

3.5.2.5(2) The focus will remain on psychiatric training and research.

3.6 Operating Principles

3.6.1 Hours of Operation:

Hours of operation is Monday – Friday 06:30 – 22:00

3.6.2 People Management System

3.6.2.1 Patients arrive to the Building for a scheduled visit; enter through the Building's Main Lobby; register at the main reception or at a self-serve kiosk. Once registered they will be granted access and will proceed to the appropriate space;

3.6.2.2 Staff, students, fellows and health care professionals arrive to the Building's Main Lobby to enter designated Large Multipurpose Room spaces and clinical education and research spaces.

3.6.3 Material Management System

3.6.3.1 The design of the programmed spaces will minimize the need for support and maintenance staff to access Patient and teaching areas. The flow of support services and Patients and clinical and education staff will be separated to the greatest extent possible.

3.6.3.2 The following rooms will be able to deliver/retrieve supplies or perform work without directly interacting with Patients and staff: Housekeeping Closet, Soiled Holding Room, Soiled Utility Rooms, Telecom Rooms, Electrical Riser Room and Electrical Closets.

3.6.3.3 Spaces will have adequate safety and security to ensure Patients cannot access harmful materials or objects.

3.6.4 Consumable Supplies

3.6.4.1 Supplies will come from the Existing Hospital supply chain; a two bin system will be used to store supplies.

3.6.5 Linen

3.6.5.1 Soiled linen will be taken to the Soiled Holding Room on the floor and placed into linen carts. These carts will be picked up by linen services staff and taken to a larger Soiled Holding Room near the Bridge/Corridor connection to Level 0 of the Existing Hospital. Tow motors will be used to move the full linen carts (with soiled items) from MHSU building to the Existing Hospital.

3.6.5.2 Clean linen will be delivered to the Research Testing area.

3.6.5.3 The clean supplies will be inaccessible to Patients and public and will have controlled access.

3.6.6 Pharmaceutical Products

3.6.6.1 Medications will not be distributed in the Clinical Education and Applied Research Program spaces.

3.6.7 Food Services

3.6.7.1 Food services will not be distributed in the Clinical Education and Applied Research Program spaces.

3.6.8 Waste Management Systems

3.6.8.1 The majority of waste products will be soiled linen, garbage and recyclables. Other waste products will be managed within the Soiled Holding Room located in the common support area. There will be one Soiled Holding Room on the floor and it will be shared with the Outpatient Program spaces.

3.6.8.2 Segregation of wastes will accommodate the following categories of products:

3.6.8.2(1) General garbage;

3.6.8.2(2) Sharps (including potentially bio hazardous items);

3.6.8.2(3) Infectious or contaminated waste (excluding sharps);

3.6.8.2(4) Confidential paper;

3.6.8.2(5) Confidential non paper products (e.g. Patient ID, dose strip, multimedia recycling/disposal consoles);

3.6.8.2(6) Mixed media for confidential plastics from Automated Unit Dose (AUD);

3.6.8.2(7) Clean paper and cardboard;

3.6.8.2(8) Clean metal (tin and aluminum);

3.6.8.2(9) Clean recyclable plastics; and

3.6.8.2(10) Compostable materials.

3.6.9 Information Management Systems

3.6.9.1 Videoconference Facilities

3.6.9.1(1) For the rooms that will have videoconference capabilities and details on the technical requirements refer to 1J(II) [Clinical Education and Applied Research Infrastructure Specifications].

3.7 Design Criteria

3.7.1 Clinical and Academic Requirements

3.7.1.1 The following list specifies the minimum set of requirements that will be accommodated within the MHSU Clinical Education and Applied Research program:

3.7.1.1(1) Clinical Skills Rooms will be used by learners to practice performing clinical procedures within safe learning environment.

3.7.1.1(2) In the Clinical Skills Rooms (Consult/Exam Room, Exam/Procedure Room, Testing Rooms) participants will be able to:

3.7.1.1(2)(a) Interact with a volunteer or a standardized Patient as they would in a real medical environment;

3.7.1.1(2)(b) Display electronic material either via personal laptop or a room based computer and access internet from both;

3.7.1.1(2)(c) Record their interactions with each other and other Patients;

3.7.1.1(2)(d) Play back interactions recordings immediately;

3.7.1.1(2)(e) Have provisions for infrastructure to support audio visual requirements, high definition displays, speakers, microphones and recording cameras; and

3.7.1.1(2)(f) Spaces will have ability to be used 24 hours/7days a week. These spaces will, however, be used during regular business hours but can be used at any time.

3.7.1.1(3) Small Videoconference Rooms will be teaching and learning spaces and will accommodate between 4 and 20 local participants. Rooms will be used by students, instructors, medical staff, management staff.

3.7.1.1(4) Small Video Conference Rooms (Video Conference Room, Multipurpose Room, Seminar/Small Group Therapy Room) will enable:

3.7.1.1(4)(a) The participants to be connected with other groups in other Video Conference (VC) enabled spaces;

3.7.1.1(4)(b) All participants, both in the same physical space as well as the ones in the remote locations, with an equivalent ability to interact with each other;

3.7.1.1(4)(c) The participants will be able to use them 24 hours/7days a week.

3.7.2 Standardization

3.7.2.1 Each room that serves the same function, where applicable, will be designed, configured, equipped and furnished to a common standard and design.

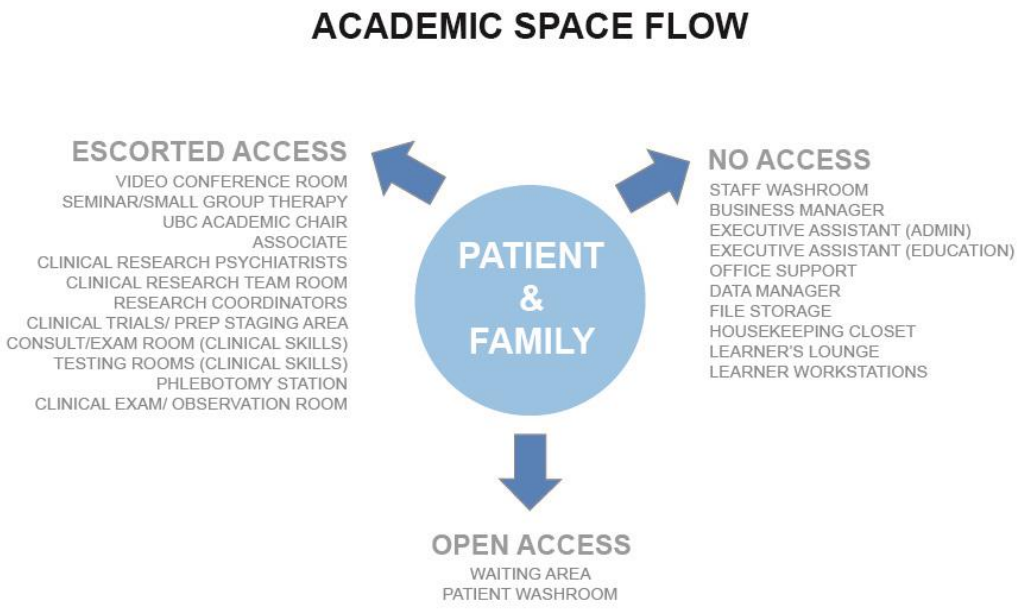
3.7.3 Proximity Relationships

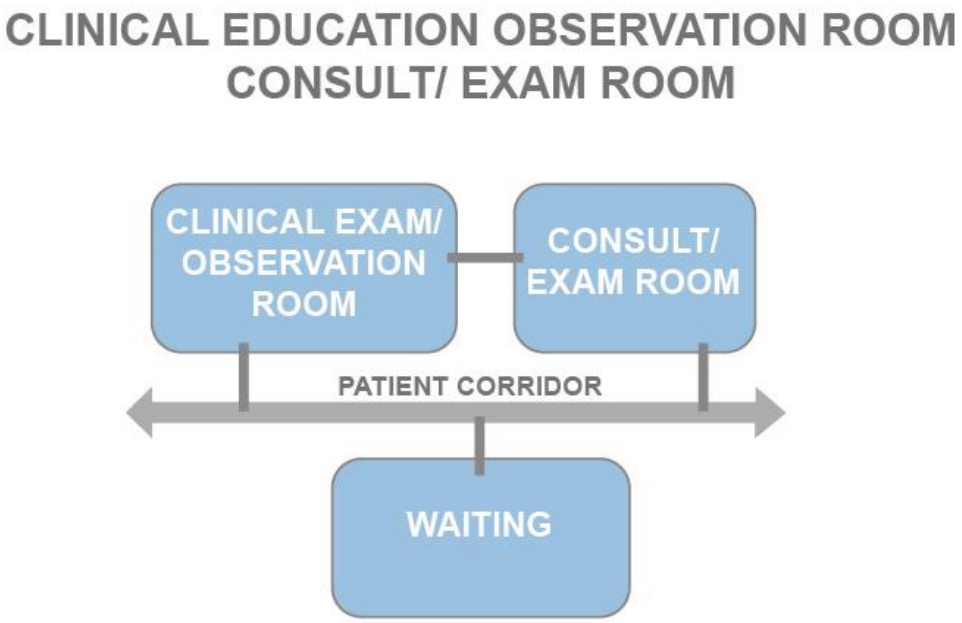
3.7.3.1 Line of Sight and Space Adjacencies

3.7.3.1(1) Clinical Skills Rooms will have adjacency requirements as follows:

3.7.3.1(1)(a) Consult/Exam Room will be directly adjacent to the Clinical Exam/Observation Room; there will be one-way mirror/glass for an observation;

3.7.3.1(1)(b) Learner Workstations will be directly adjacent to the Learner's Lounge





3.7.4 Specific Design Requirements

3.7.4.1 The following will describe in detail specific design requirements that will be applicable to MHSU Clinical Education and Applied Research program.

3.7.4.2 Internal Design Criteria

3.7.4.2(1) General Internal Layout

3.7.4.2(1)(a) Ongoing development of clinical education within psychiatry requires incorporation of designated space as follows:

(a).1 Office space for clinical teaching;

(a).2 Dedicated research space; and

(a).3 Video conference rooms with capacity for networked communication with distant sites.

3.7.4.2(2) Unit Organization

3.7.4.2(2)(a) There will be clear separation between clinical and educational spaces from public and Patient spaces;

3.7.4.2(2)(b) Unit will be organized as one contiguous space with main access and control points; and

3.7.4.2(2)(c) Patient corridors and wayfinding will be easy and intuitive.

3.7.4.2(3) Safety and Security

3.7.4.2(3)(a) All MHSU Clinical Education and Applied Research spaces will have controlled access.

3.7.5 Specific Room Types

3.7.5.1 Clinical Skills Consult/ Exam Room

3.7.5.1(1) This room will closely model typical Patient examination room (e.g. sink, soap and paper towel dispensing, cleaning materials etc).

3.7.5.1(2) The Consult/Exam Room will have controlled access with a key override.

3.7.5.1(3) The Consult/Exam Room will have designated space for a whiteboard and a large flat panel display.

3.7.5.1(4) Cabinetry with shelving will be provided for storing of small items used in clinical procedures (e.g. hospital linens, hospital gowns, gloves otoscope tips etc). Cabinetry will not be placed directly below flat panel display.

3.7.5.1(5) One wall in the Consult/Exam Room will be dedicated as a “headwall” with a diagnostic set and an examination table. Ample maneuver area around the examination table will be provided. No fixtures or fittings will impede this area.

3.7.5.1(6) Consult/Exam Room does not require direct natural light. If exterior windows are provided, the room will have adequate window treatment will be provided (e.g. black out blinds).

3.7.5.1(7) Observation window to an adjacent Observation Room will be provided, with one-way glazing between the Observation Room and Consult/Exam Room.

3.7.5.1(8) The observation window will be 2400mm wide by 1220mm high and will be positioned 760mm from the finished floor. The observation window will have retractable integrated blinds on both sides of the window, for Patient confidentiality.

3.8 Space Table

G1.1	**MENTAL HEALTH and SUBSTANCE USE CLINICAL EDUCATION AND APPLIED RESEARCH PROGRAM**					Details in SOR Appendix 1J.	
	Description	**Unit**	**Unit/NSM**	**Total NSM**	**Safety/Risk Category**	**Comments**	**Multimedia Category**
G1.1.1	**Meeting Spaces**						
G1.1.1.1	Video conference Room	1	50.0	50.0	**C**	Seats 20 for VC or up to 40.	Refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] - Videoconference Rooms. Type 3
G1.1.1.2	Multipurpose Room	1	50.0	50.0	**C**	Seats 20 for VC or up to 40.	Refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] - Videoconference Rooms. Type 3
G1.1.1.3	Seminar/ Small Group Therapy	1	26.0	26.0	**D**	Seats 8 for VC or up to 20.	Refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications] - Videoconference

							Rooms. Infrastructure only.
G1.1.1.4	Staff Washroom	1	4.5	4.5	**C**	Accessible; 2 piece washroom (toilet/sink)	
G1.1.1.5	Not Used					Deleted video Conference Operator Room	
G1.1.1.6	Not Used					Deleted Central AV Storage Room	
G1.1.2	**Departmental Offices**						
G1.1.2.1	Department Head	1	11.0	11.0	**C**	Private office; extra ports for 2nd workstation. Accommodate small groups up to four people	
G1.1.2.2	Associate	1	11.0	11.0	**C**	Private office with desk, chair, PC, voip phone; extra ports for 2nd workstation. Accommodate small groups up to four people	
G1.1.2.3	Business Manager	1	9.5	9.5	**C**	Private office with desk, chair, PC, voip phone; extra ports for 2nd workstation.	
G1.1.2.4	Executive Assistant (Admin)	1	6.5	6.5	**C**	Private office with desk, chair, PC, voip phone,; extra ports for 2nd workstation.	
G1.1.2.5	Executive Assistant (Education)	1	6.5	6.5	**C**	Private office with desk, chair, PC, voip phone, extra ports for 2nd workstation.	
G1.1.2.6	Office support (copier, supplies)	1	11.0	11.0	**C**	Floor model MFD, small colour printer, paper supply; lockable door	
G1.1.2.7	Learners' Lounge	1	25.0	25.0	**C**	Include student 1/2 lockers;	Use specifications for lounge.

						kitchenette; utility sink; hand hygiene sink; 2 sit down workstations with PC's; 1 voip phone; Adjacent to Learner Workstations	
G1.1.3	**Researchers**						
G1.1.3.1	Clinical Research Psychiatrist	3	9.5	28.5	**C**	Private office with desk, chair, PC, voip phone; extra ports for 2nd workstation. Each room paired with Team Room	
G1.1.3.2	Clinical Research Team Room (2 people)	3	11.0	33.0	**C**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones; shared office for Residents and Fellows	
G1.1.3.3	Learner Workstations	9	4.5	40.5	**C**	9 sit down workstations with PC's; 9 chairs, 2 voip phones	
G1.1.4	**Clinical Trials Area**						
G1.1.4.1	Admin Assistant	1	4.5	4.5	**C**	Entire Clinical Trials area must be secured for medical record access; Each sit down workstation has PC, voip phone, chair	
G1.1.4.2	Data Manager	2	4.5	9.0	**C**		
G1.1.4.3	Research Coordinators	2	4.5	9.0	**C**		
G1.1.4.4	File Storage	1	20.0	20.0	**C**		
G1.1.4.5	Clinical trials prep/staging area	1	11.0	11.0	**C**		
G1.1.4.6	Not Used					Deleted Monitor Room	
G1.1.5	**Research Testing Area**						
G1.1.5.1	Clinical Exam/ Observation Room	1	13.5	13.5	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-	Use specifications for CSR. One way communication specifications with infrastructure for 2 way communication between this and

						barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button. 1 way mirror/glass with two-sided blinds between this room and Consult/Exam Room.	Consult/Exam Room. Type 3
G1.1.5.2	Consult / Exam Room (Clinical Skills)	1	13.5	13.5	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-ligature; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button; adjacent to Clinical Exam/Observation Room	Use specifications for CSR. Two way communication between this and Clinical Exam/Observation Room. Video Monitor. Type 3
G1.1.5.3	Exam / Procedure Room (Clinical Skills)	1	18.0	18.0	**D**	Sample processing and storage; to accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone;	Use specifications for CSR. Type 3

						panic/duress button	
G1.1.5.4	Testing Rooms (Clinical Skills)	2	13.5	27.0	**D**	Primarily for cognitive testing; need to be quiet to accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; panic/duress button; Anti-barricade; 2 PC's with server to support computerized testing; voip phone	Use specifications for CSR. Type 3
G1.1.5.5	Phlebotomy Station	1	4.5	4.5	**D**	Hand hygiene sink, -20C Freezer + refrigerator. Low speed centrifuge, lab type table top. Panic/duress Button; Anti-ligature; Anti-barricade	
G1.1.5.6	Waiting Area	1	15.0	15.0	**E**	5 people	
G1.1.5.7	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom; Anti-ligature	
G1.1.6	**Other**						
G1.1.6.1	Server Telecommunications	1	n/a	1.0	**B**	Dedicated; Included in floor building gross	
G1.1.6.2	Housekeeping Closet	1	7.5	7.5	**C**	Accommodates housekeeping cart, mop sink, shelving	
	Total (CNSM)			**471.0**			

Part 4. INPATIENT MENTAL HEALTH AND SUBSTANCE USE SERVICES PROGRAM

This specification outlines the functional, operational and physical requirements for the Inpatient Mental Health Services Program component of the Building.

4.1 Guiding Design Principles

4.1.1 The following design principles will be on all Inpatient Units:

4.1.1.1 Common Patient spaces will have views to the landscape and will be as follows:

4.1.1.1(1) Spaces used by Patients most frequently during the day, such as Dining Room/Lounge including Nourishment Station, Lounge (Quiet), Consultation/Therapy Room, Comfort Room, Secure Room will be given the priority views to the nature, river and landscaped areas.

4.1.1.1(2) Spaces used by Patients less frequently, or at night, such as Patient Bedroom or Large Group Therapy Room, Exercise/Wellness Room, will be given second priority to the views of nature, river and landscaped areas.

4.1.1.2 Spaces used by staff such as Staff Lounge will have daylight and will be given second priority to the views of nature, river or landscaped areas.

4.1.1.3 Care Team Bases will have Direct Line of Sight to the following areas:

4.1.1.3(1) Patient Bedroom wings and in particular doors leading to Patient Bedrooms and Patient Corridors;

4.1.1.3(2) The Design will allow observation and Direct Line of Sight to all the Patient Bedroom doors and Patient Corridors from the Care Team Base;

4.1.1.3(3) The head of each Patient bed needs to be visible to caregivers from the hallway outside of the room. Small vision panels in doors are required;

4.1.1.3(4) Dining Room/Lounge;

4.1.1.3(5) Large Group Therapy Room(s);

4.1.1.3(6) Lounge (Quiet);

4.1.1.3(7) Secure Rooms;

4.1.1.3(8) Patient Bedroom Bariatric Contact Isolation Room;

4.1.1.3(9) Patient Bedroom with Contact Isolation Ante Rooms(s);

4.1.1.3(10) Medication Room(s); and

4.1.1.3(11) Secure Outdoor Space(s).

4.1.1.4 Flexibility and Adaptability is important. Inpatient Units will be designed as interchangeable as possible to best accommodate future changes in Patient types and care delivery methods, while at the same time keeping in mind that some Patient populations will have unique differences that will be acknowledged in the design.

4.1.1.5 Entrances and exits to Inpatient Units will be reduced to help prevent elopement. All areas that could allow for Patient exit or entrance will be monitored by the Security Office located in the Building's Main Lobby.

4.1.1.6 All Secure Rooms, Secure Room Ante Rooms will be identical in layout for ease of use by staff and predictable work patterns due to the high acuity of Patients utilizing those spaces.

4.1.1.7 In order to reduce infection and disease transmission Patient Bedrooms with Patient Bedroom Contact Isolation Ante Rooms will be located in close proximity to the Care Team Base and will be pressure neutral.

4.1.1.8 Accommodation of Bariatric Patients

4.1.1.8(1) The number of bariatric Patients admitted to the Building is projected to increase. Managing these Patients will require features for both Patients and staff. Doorways and circulation spaces will be sufficiently wide to accommodate large people, many of whom will be relying on mobility assistance including motorized chairs and scooters. The reference to circulation spaces applies especially in confined rooms like water closets.

4.1.1.8(2) Not all Inpatient Units will have accommodation for the Bariatric Patients. Designated Patient Bedroom Bariatric Contact Isolation Rooms with Ante Rooms will serve this function, for the noted Inpatient Units. The schedule is as follows:

4.1.1.8(2)(a) Only one of the three 15 Bed Inpatient Units will have one Patient Bedroom for accommodation of the Bariatric Patients; and

4.1.1.8(2)(b) Older Adult Inpatient Unit will have one Patient Bedroom for accommodation of the Bariatric Patients.

4.1.1.8(3) The size of these rooms as well as the corresponding Ensuites will be adequate and will have a ceiling mounted recessed single track ceiling lift with lockable motor mechanism. The patient lift will be a monorail type positioned over the Patient bed and will extend from the Patient Bedroom and into the Ensuite for dual Patient assist over the toilet. Patient lift will be centred over the Patient bed and toilet. When not in use, Patient lift motor will be stored in an enclosed lockable unit within the Patient

Bedroom. Location of the unit will be determined during the design process to the satisfaction of the Authority.

4.1.1.8(4) In addition to the Bariatric Patient Bedrooms, the following rooms will have Patient lifts of the same type:

4.1.1.8(4)(a) Patient Bedroom adjacent to Patient Bedroom Contact Isolation Ante Room, total of two, one on each of the two other Inpatient Units; and

4.1.1.8(4)(b) Tub Room on the Older Adult Inpatient Unit.

4.1.1.8(5) There will be no ceiling lifts on the Psychiatric High Acuity Unit.

4.1.1.8(6) In addition, there will be one mobile Patient lift per Inpatient Unit. When not in use, this mobile unit will be kept locked in the Central Storage Room.

4.1.1.9 Use interior glazing on Inpatient Units to increase staff visual connection to Patient daytime activity spaces and allow for maximum Patient choice while providing a safe and secure environment.

4.1.1.10 Each Inpatient Unit will have Staff Support spaces with work spaces for clinical staff and clinical support functions.

4.1.1.11 Inducements for Patient Ambulation

4.1.1.11(1) Activity spaces on the Inpatient Unit, including designated therapy spaces, activity rooms and general Dining Room/Lounge, will be inviting with natural light, views to the landscape and opportunities for light recreation and entertainment such as gaming consoles with TVs which have exercise programs and various games.

4.2 Inpatient Unit Design Priorities

4.2.1 The Unit design will achieve the following priorities:

4.2.1.1 Patient Centred Care - bringing services to the Patient;

4.2.1.2 Design of flexible multi use spaces to the greatest extent possible;

4.2.1.3 Principle of open ergonomically designed workstations within Inpatient Units; taking into account safety and security of Patients and staff;

4.2.1.4 Line of sight from the Inpatient Unit's Care Team Base is required for observation and safety as outlined in 4.1.1.3 of this Appendix.

4.2.1.5 Efficient corridor circulations system and efficient travel distances for key travel paths for staff, Patients and visitors.

4.2.1.6 Bed Types

4.2.1.6(1) The Building will use psychiatric medical, bariatric, and residential clinical beds. These beds may be interchangeable at any time depending upon Patient needs but the medical beds will primarily be used on the Older Adult Psychiatric Inpatient Unit. Design all Patient Bedrooms across the Building to accommodate the use any of the above bed types (refer to the Equipment List for bed models and sizes). The exception to the bed interchangeability is the Bariatric medical bed. A Bariatric sized bed will be used only in Patient Bedrooms designated for accommodation of the Bariatric Patients.

4.2.1.6(2) All Secure Rooms within the Building will use specialty Psychiatric mattresses on the floor.

4.2.1.7 Bed Movement

4.2.1.7(1) All Patient Bedrooms will be designed to allow for three-sided access to the Patient bed. The bed is permitted to be placed against the wall. The room design will allow the bed to occasionally be moved out from the wall for a number of reasons (i.e. to make the bed, to assist in lifting a Patient, or in crisis scenario). Allow for minimum 600mm clearance between the wall and bed head and the wall and bed foot in circumstances when the bed is moved out from the wall.

4.2.1.7(2) The nightstand is a weighted piece of furniture. The design and placement of the nightstand will allow for the above-mentioned movement with the largest bed specified for use in the Building. For the size of the nightstand refer to Appendix 1P [Equipment List].

4.3 Functional Description

4.3.1 The Authority's objective with this Building is to decrease risk, to provide a therapeutic environment and improve Patient outcomes. The MHSU Building will improve operational efficiencies and capacity utilization by meeting the needs of the MHSU network of services. The development of this state of the art environment for the MHSU program, incorporating best practice, and ensuring there is enough space to provide care, will provide the optimal environment for improved Patient outcomes.

4.4 Statement of Purpose

4.4.1 Philosophy

4.4.1.1 Inpatient Mental Health Services provide short term assessment, diagnosis and treatment for adults with a primary mental health diagnosis who are in the acute phase of their illness requiring a safe and therapeutic environment on a 24/7 basis; thereby allowing them to be re-integrated as contributing members of the community.

4.4.1.2 The dedicated Older Adult Mental Health Inpatient Unit will be the first specialized secondary acute care program provided within the Authority; catering to the specific needs of an elderly population. Royal Columbian Hospital has been designated as the regional site for this population.

4.4.1.3 The Inpatient Mental Health Services program is based on the belief in an individualized holistic approach to a comprehensive range of Patient needs. Patients are entitled to be treated with dignity and respect and without prejudice through a multidisciplinary approach to service delivery.

4.4.1.4 The focus of the service is to ensure a safe and therapeutic environment for the Patient. It is the Authority's belief that a positive relationship with the community will be created. It is the right of all Patients to have access to dynamic psychiatric rehabilitation with discharge planning from time of admission.

4.4.1.5 The intent is to provide as home-like an atmosphere as possible, with attention given to providing the necessary services in as unobtrusive way as possible.

4.5 Guiding Principles

4.5.1 The following are the guiding principles:

4.5.1.1 Stabilize the Patient's psychiatric condition such that the symptoms are reduced or better managed. Develop and deliver Patient centred individualized multidisciplinary treatment plans based on assessed needs.

4.5.1.2 Provide a welcoming, safe and secure environment for Patients.

4.5.1.3 Develop and maintain effective programs that will provide Patients' families with support and education. Promote community awareness and involvement.

4.5.1.4 Create and maintain a safe and positive environment conducive to the professional growth of all staff.

4.5.2 Scope of Services

4.5.2.1 Functional Content

4.5.2.1(1) Functionally, this component has three distinct Inpatient Mental Health and Substance Use Unit types:

4.5.2.1(1)(a) General Inpatient Psychiatry Unit (Inpatient Units); there will be 3 Units; each Unit will have 15 beds;

4.5.2.1(1)(b) Psychiatric High Acuity Unit (PHAU); there will be one Unit with 10 beds; and

4.5.2.1(1)(c) Older Adult Psychiatric Unit; there will be one Unit with 20 beds.

4.5.2.1(2) Inpatient Mental Health and Substance Use Units will be designed to maintain separation between Patients in different age groups (e.g., Adult, Older Adult population).

4.5.2.1(3) There will be groupings of 6 or 8 bedrooms, with adjacent Patient activity spaces.

4.5.2.1(4) Living areas within each Inpatient Unit may be divided into smaller clusters for daytime activities.

4.5.2.2 The following list specifies the minimum set of functions that will be accommodated within the Inpatient Units' spaces:

4.5.2.2(1) The design will promote a safe and secure environment;

4.5.2.2(2) The design will create a welcoming Patient and family-centred healing environment;

4.5.2.2(3) The design will support the model of care;

4.5.2.2(4) The design will minimize staff travel distances;

4.5.2.2(5) The design will provide respite and relaxation opportunities for both Patients and their visitors on each of the Inpatient Units through the installation of built-in benches along Patient Corridors;

4.5.2.2(6) The design will provide multiple opportunities for Patients to experience the outdoors via Secure Outdoor Spaces, and through natural light and views;

4.5.2.2(7) The design will optimize workflows to maintain separation of Patients, staff and visitors from distribution routes and areas used for supplies, storage and waste management;

4.5.2.2(8) The design of the Inpatient Units will minimize the need for support and maintenance staff to access Patient areas; and

4.5.2.2(9) The flow of support services and Patients and clinical staff will be separated to the greatest extent possible.

4.5.2.3 Scope of Education Functions

4.5.2.3(1) Medical, nursing and the Allied Health students from technical colleges and universities will receive practical skills training. All teaching and supervision functions will be accommodated in the clinical and work areas and multi-use, multi-function spaces, and will not require specialized or dedicated facilities. Those specialized spaces will be accommodated within Clinical Education Component of

the program. All students will be able to have access to the facilities in the clinical education space, such as Video-Conferencing and Observation rooms (one-way mirrored rooms).

4.5.2.4 Scope of Applied Research Functions

4.5.2.4(1) Staff and students working in the Inpatient Units will, from time-to-time, be engaged in research. The nature and extent of research functions will be accommodated on the Inpatient Units or in the Outpatient Clinical Education areas.

4.5.2.5 Operable Windows

4.5.2.5(1) Each Patient Bedroom will have windows that provide access to exterior views, and views of predominantly the landscape. At least a portion of each window will have the ability to open. The openings will be limited to prevent transfer of contraband. Ensure that the windows are lockable by staff such that Patients are prevented from opening windows unless unauthorized.

4.5.2.5(2) Secure Room windows will not be operable.

4.5.2.5(3) Window sills will be at a maximum height of 400mm from the finished floor. Windows will be large to provide a connection with outside grounds and to avoid perceptions of a “closed in” and confined environment. The minimum parallel distance of any exterior wall to any Patient Bedroom window will not be less than 17 metres.

4.5.2.5(4) Windows of individual Patient Bedrooms that are located immediately adjacent to walls that are at an angle of less than 120 degrees to each other shall provide devices or strategies for privacy so that the view from one Patient Bedroom into another room is prevented.

4.5.2.6 Natural and Artificial Light

4.5.2.6(1) There will be a variety of lighting options in the Inpatient Units, each suited to the functions accommodated in a specified space. Each Patient Bedroom will have access to natural light and views to the landscape.

4.5.2.6(2) Artificial lighting throughout the Inpatient Units will follow a general standard of providing indirect lighting. This specification implies fixtures that reflect light upwards, away from direct eye contact, and especially in those areas where Patients will be either in bed or transported on stretchers.

4.5.2.6(3) Lighting in each Patient Bedroom will provide different levels of lighting for different purposes:

4.5.2.6(3)(a) A Patient overhead reading light, will allow Patients to read while in their bed. The Patient will have control of the reading light. The control will be at bed head side;

4.5.2.6(3)(b) An overhead observation night light will enable Clinical staff to monitor Patients during the night without entering the Patient Bedroom. A control for this light will be in the corridor outside of each Patient Bedroom and will be manually controlled by the Clinical Staff;

4.5.2.6(3)(c) Patient desk area lighting with a control at the desk;

4.5.2.6(3)(d) A low-level night light in each Patient Bedroom to guide Patients during the night to the Ensuite. The Night Light will direct light towards the floor. This light will be turned on automatically. The Patient will have control of the night light. The control will be at bed head side; and

4.5.2.6(3)(e) A low level night light in each Ensuite.

4.5.2.6(4) Surfaces, including walls and floors, throughout the Inpatient Units will avoid the use of highly reflective materials. Reflected light will be muted.

4.5.2.7 Anticipated Trends in Service Delivery

4.5.2.7(1) The following lists trends expected within the planning horizon of this Project, and that are expected to affect the nature and/or extent of functions accommodated within this component. Effects of these trends will be reflected in the component's design:

4.5.2.7(1)(a) Increasing numbers of Patients with treatable substance use and mental disorders;

4.5.2.7(1)(b) Increasing numbers of elderly Patients with substance use and mental disorders;

4.5.2.7(1)(c) Increasing Patient acuity and complexity and potential for aggression (e.g. brain injured younger people from trauma or substance abuse);

4.5.2.7(1)(d) Increasing numbers of Bariatric Patients admitted to the Building;

4.5.2.7(1)(e) Increasing mean age of staff working on the Inpatient Units;

4.5.2.7(1)(f) Increasing shortages of key staff positions, including physicians and staff in the highly trained, specialized professions;

4.5.2.7(1)(g) Continuing need to focus on infection control is predicted to remain an ongoing challenge in all areas of the Building;

4.5.2.7(1)(h) Increasing recognition of need for informed care; and

4.5.2.7(1)(i) Increased need for spaces being built for maximum flexibility as the delivery of care continues to change.

4.5.2.7(2) Service delivery model will be sensitive to the needs of a variety of cultures.

4.6 Operating Principles

4.6.1 Hours of Operation:

4.6.1.1 The Inpatient Mental Health and Substance Use Services will be staffed and in operation:

24 hours-a-day, 7 days-a-week

4.6.1.2 The Inpatient Units will have no fixed visiting hours: They will be contingent on clinical considerations.

4.6.2 People Management System

4.6.2.1 There are several ways Patients will be admitted to the Mental Health and Substance Use Inpatient Units of the Building:

4.6.2.1(1) Emergent admissions:

4.6.2.1(1)(a) Unscheduled Patients who arrive at the Emergency Department, located in the Existing Hospital, will be medically assessed and cleared prior to being transferred to the appropriate Inpatient Unit in the Building. Patient transfers to the Inpatient Units will occur through a dedicated Bridge/Corridor connection between the Building and the Existing Hospital.

4.6.2.1(2) Non emergent admissions:

4.6.2.1(2)(a) As this is a regional program many Patients admitted to the Inpatient Units will arrive from a referring institution or from an Inpatient Medical or Surgical Unit in the Existing Hospital. The typical Patient will be ambulatory, and will be escorted by caregivers or, in extreme cases, by police or security staff.

4.6.2.1(2)(b) Non-emergent Patients may arrive from a referring institution and will generally be scheduled. Arrival will be through a discrete Sally-Port. The Sally-Port will be located in a level of the Facility that is easily accessible from the street (e.g., top parking level, grade level, main level). Both Public/Patient Transfer Elevators will have openings on both sides, at this level, with one side opening into the Secure Vestibule, for

secure and private Patient transfer. The Secure Vestibule will be directly connected to the Sally-Port. The Public/Patient Transfer Elevator will be lockable from the Inpatient Unit. Once a call is received from the Sally-Port, the Public/Patient Transfer Elevator will be accessible via controlled access, from the Secure Vestibule. The Sally-Port will be sufficient in size to accommodate a car, van or ambulance vehicle allowing adequate manoeuvring space for staff assisting in Patient transfer. The Sally-Port will have cameras from all angles (full length and width of the Sally-Port); a phone to call the Inpatient Unit, hardwired Panic/Duress button. The Secure Vestibule, and other lobbies which must accommodate Patient transfers, will be sufficient in size to accommodate a bariatric stretcher in the horizontal position and a minimum of four (4) people and allow the efficient transfer of the stretcher and staff in and out of the elevator(s). Staff and Patient Arrival sequence will be as follows:

(b).1 A Transfer vehicle / Ambulance arrives, accesses the Sally-Port via a controlled access;

(b).2 The Transfer attendant places a call to the appropriate Inpatient Unit;

(b).3 A Staff or security member isolates the elevator and meets the Transfer attendant and the Patient at the Inpatient Unit entry. In some instances, it may be necessary, for the staff or security member, to come to the Sally-Port and helps to escort the Patient to the appropriate Inpatient Unit;

(b).4 The Patient exits the elevator and enters the Secure Vestibule of the Inpatient Unit. The Patient will be permitted to enter the Unit from the Vestibule by the Inpatient staff;

(b).5 The Patient is taken to their room. Patient belongings will be reviewed and logged at this time. Items not required or not permitted in the Patient Bedroom will be transferred to the Central Storage Room within the Inpatient Unit. The Patient's small items that are used on a regular basis will be kept at the Care Team Base in locked cabinets with charging capacity (e.g. storing cell phones); or in a Safebox in the Patient millwork wardrobe in the Patient Bedroom. The Safebox will have code lock with a key override.

4.6.2.1(3) Patients who have been absent without leave (AWOL) may be escorted by police. Admission process via Sally-Port will be utilized.

4.6.2.1(4) Unscheduled Patients arrive to the Emergency Department and complete triage and registration. The Patient is medically cleared by Emergency Department physician and then taken to the Mental Health and Substance Use (MHSU) zone of the Emergency Department. The Patient is assessed and receives appropriate treatment. Appropriate disposition is determined and the Patient is either admitted to an Patient Bedroom of the MHSU Inpatient Unit, transferred to an appropriate Building, or discharged with appropriate Outpatient follow-up. If admitted, the Patient will be escorted to the appropriate Inpatient Unit by a staff and security.

4.6.2.1(5) A Patient can also be scheduled for a planned admission. This Patient would be arriving from home, a clinic, a physician office, or a transfer from another hospital.

4.6.2.1(6) From the Psychiatric Inpatient Unit, Patients can be repatriated (transferred) back to their site of origin, discharged and/or referred to community services or the Existing Hospital Outpatient programs.

4.6.2.1(7) Upon initial arrival to the Inpatient Unit, Patients will be shown to their bedroom to participate in an admission assessment. Patients require an initial assessment to identify accommodation requirements and the review and revision of their current care plan.

4.6.2.2 The Main Lobby door and Main Lobby of the Building will not be primarily used for Patient admissions and/or transfers. The Main Lobby door will be utilized by Outpatients as described in Part 2, and by staff and visitors.

4.6.2.3 All visitors to the Inpatient Units will have access through the Building main lobby and move through general circulation (vertical and horizontal) to the Inpatient Unit entry doors.

4.6.2.4 At the unit entry Secure Vestibule, a visual and audio control system will allow visitors to contact the reception station of the desired unit to request admission to the unit. Staff of that unit will be able to electronically open the unit door from the Reception as well as physically move to the visitor to greet them depending upon the situation. The reception will have direct view of the Inpatient Unit entry and Elevator Lobby.

4.6.3 Material Management Systems

4.6.3.1 The design of the Inpatient Unit will minimize the need for support and maintenance staff to access Patient areas. The flow of support services and Patients and clinical staff will be separated to the greatest extent possible.

4.6.3.2 The following rooms will be able to deliver/retrieve supplies or perform work without directly interacting with Patients and staff on the Inpatient Unit: Housekeeping Closet, Soiled Holding Room, Soiled Utility Rooms, Clean Supply Room, Food Cart Closet, Telecom Rooms, Electrical Riser Room and Electrical Closets.

4.6.3.3 Spaces will have adequate safety and security to ensure Patients cannot access harmful materials or objects.

4.6.4 Consumable Supplies

4.6.4.1 Supplies come from the Existing Hospital supply chain. Two bin system will be used to store supplies in the Clean Supply Room.

4.6.5 Linen

4.6.5.1 Each Inpatient Unit has one Patient Laundry Room consisting of a washer and dryer to use for personal clothing. Patients will wash and dry their own personal clothing. Assistance will be provided if the Patient requires it.

4.6.5.2 The Health Authority from the Existing Hospital provides hospital linen services.

4.6.5.3 Inventories will be managed on a daily basis. Clean linen carts will be delivered via service elevator to each Inpatient Unit, and clean linen supplies will be distributed by service staff to the enclosed linen closets within Inpatient Units and the Tub Room (where applicable). Linen closet doors will have controlled access by the clinical staff only. One linen closet per 5 Patient Bedrooms in the Patient corridors will be provided.

4.6.5.4 Space for linen carts at the “back of the house” near the service elevator will be provided.

4.6.5.5 Soiled linens will be temporarily staged and collected from Soiled Holding Rooms on the Inpatients Units. Soiled linen carts would go to the large Soiled Holding Room near the Bridge/Corridor connection to level 0 of the Existing Hospital prior to removal to the main Laundry Services area located in the Existing Hospital.

4.6.6 Pharmaceutical Products

4.6.6.1 Medication is distributed to each Inpatient Unit from the Existing Hospital pharmacy. It is assumed that automation will be used in the inventory management and dispensing of Patient medications. The design will accommodate the use of Automated Drug Dispensing Systems (ADDS).

4.6.6.2 Pharmacy staff will manage the inventory. Clinical staff will deliver medications from the Medication Room to the Patient.

4.6.6.3 Infrastructure will be provided to accommodate future Bedside Medication Verification cart system.

4.6.7 Food Services

4.6.7.1 Food service will be provided to Patients in the Dining Room/Lounge, typical on all Inpatient Units. This area will be located centrally within the Unit and will allow for Patients to socialize.

4.6.7.2 Food will be prepared in a central kitchen located in the Existing Hospital and transported to the Inpatient Units via a Bridge/Corridor connected to the Existing Hospital (Level 0). A Food Cart Closet will have two sided access: one on the service side and one on the clinical side for ease of access and to segregate service and clinical flow. Food delivery to the Inpatient Units will be provided by service staff. Service staff will place a closed cart in a designated enclosed Food Cart Closet, from the service side. Clinical staff will distribute meal trays from the food cart to the Patients in the Dining Room/Lounge.

4.6.7.3 Dishwashing will not occur in the Inpatient Units. Dirty meal trays with dishes will be placed on a food cart by clinical staff, and removed from the Food Cart Closet by service staff.

4.6.8 Waste Management

4.6.8.1 This service will be provided by the Existing Hospital environmental service; including organic waste and recycling programs established as per the Authority.

4.6.8.2 Waste products will consist of soiled linen, garbage and recyclables. These will be managed within the Soiled Holding Rooms located in the common support area of each Inpatient Unit. Service staff will have access from general Patient areas as well as from the service side.

4.6.8.3 Space for regular waste, an organics bin and a recycling bins will be located in the dining areas on each Inpatient Unit. One bin for each waste type will be provided.

4.6.8.4 Segregation of waste will accommodate the following categories of products:

4.6.8.4(1) General garbage;

4.6.8.4(2) Sharps (including potentially bio hazardous items);

4.6.8.4(3) Infectious or contaminated waste (excluding sharps);

4.6.8.4(4) Confidential paper;

4.6.8.4(5) Confidential non paper products (e.g. Patient ID, dose strip, multimedia recycling/disposal consoles);

4.6.8.4(6) Mixed media for confidential plastics from Automated Unit Dose (AUD);

4.6.8.4(7) Clean paper and cardboard;

4.6.8.4(8) Clean metal (tin and aluminum);

4.6.8.4(9) Clean recyclable plastics; and

4.6.8.4(10) Compostable materials.

4.6.8.5 A secure Soiled Holding Room, for waste, biomedical, soiled linen carts, recycling will be required on the Inpatient Units. The secure Soiled Holding Room will be accessible by staff only. There will be one Soiled Holding Room per floor. If there are two Inpatient Units on the same floor, one Soiled Holding Room will be shared between them.

4.6.8.6 A Soiled Utility Room, will be provided for the rinsing of soiled items, containment of biohazard materials, Bedpan Sanitizers and sharps. There will be one Soiled Utility Room per floor. If there are two Inpatient Units on the same floor, one Soiled Utility Room will be shared between them.

4.6.9 Information Management Systems

4.6.9.1 All Patient related information will be maintained on the electronic medical record (EMR) system. Wireless technology will enable data entry using a combination of fixed terminals, at staff workstations in the Care Team Base and the Team Conference Room and mobile computer on wheels or tablets. These rooms will be designed to allow sufficient space for storing and charging of mobile carts. Access to the EMR will be controlled electronically with varying levels of security clearance determining a person's access to different sections and their ability to enter/edit data.

4.6.9.2 To meet requirements of the Mental Health Act; each Patient will also be required to have a paper based health record. Storage for these records will be provided within the Inpatient Unit, in the secure portion of the Care Team Base. Sufficient space will be provided for storing of these records.

4.6.9.3 Ergonomically designed clinical and Patient care spaces will optimize care delivery through the design and building of facilities and work spaces which emphasize the blend of workflow, care processes, automation of practice, and interoperability between medical and business technologies in support of the Authority's strategic investment in clinical and business systems.

4.6.9.4 The space will accommodate the technology devices and medical equipment required to deliver care in an automated environment including mounting, storage, charging, electrical, and space requirements of:

4.6.9.4(1) Integrated Medication Carts;

4.6.9.4(2) Automated Medication Dispensing Cabinets (ADC);

4.6.9.4(3) Automated Unit Dose (AUD);

4.6.9.4(4) Mobile and Fixed Computer Devices – Desktop and Wall mount;

4.6.9.4(5) Mobile and Fixed Label Printers;

4.6.9.4(6) Mobile and Fixed Barcode Scanners;

4.6.9.4(7) Handheld Computer Devices;

4.6.9.4(8) Glucometres with Docking Stations;

4.6.9.4(9) Smart Pumps;

4.6.9.4(10) Digital Signage;

4.6.9.4(11) Location Awareness;

4.6.9.4(12) Device Connectivity;

4.6.9.4(13) Multifunction Communication Devices with integration to systems;

4.6.9.4(14) Virtual Care and Virtual Team Capabilities;

4.6.9.4(15) Real Time Location System; and

4.6.9.4(16) Staff Safety and Duress.

4.6.9.5 Virtual Care Facilities

4.6.9.5(1) Virtual Care offers live videoconferencing services for clinical consultations, professional development, and administrative collaboration.

4.6.9.5(2) The Building will include rooms designed for video conferencing to support Virtual Care procedures.

4.6.9.5(3) The Design-Builder will design and construct the following rooms to support Virtual Care. These rooms are specific to the Inpatient Mental Health and Substance Use Program:

4.6.9.5(3)(a) Multipurpose Room will be Type 2 (AV and Videoconference) This room type will be used by both Inpatient and Outpatient program.

4.6.9.5(3)(b) Large Group Therapy Room will be Type 5B Virtual Care (Telehealth) equipped.

4.6.9.5(3)(c) Typically, in the Inpatient areas, each Large Consultation/Therapy Room will be Type 5a Virtual Care (Telehealth) ready; (infrastructure only). In addition, one of the rooms on each unit will be equipped with

screens and speakers for viewing the Clinical Education and Observation Camera System and will be Type 6 (Interview) in addition to the Type 5a capability. The exception being that the Large Consultation/ Therapy Room in the Outpatient area will be equipped for Virtual Care (Telehealth) as a Type 5b room.

4.6.9.5(3)(d) Staff Conference Rooms will be Type 2 (AV and Video Conference) equipped.

4.6.9.5(3)(e) Individual Consult Therapy Room will be Type 5a Virtual Care (Telehealth) ready; infrastructure only. Also equipped as Type 6 (Interview) with Clinical Education and Observation Camera System.

4.6.9.5(4) Rooms used for Virtual Care will have:

4.6.9.5(4)(a) Roller blinds on all windows (where applicable); and

4.6.9.5(4)(b) A computer that will be wall mounted below one of the monitors, equipped with a wireless keyboard and mouse, and directly wired into one of the Virtual Care monitors and/or the projector.

4.6.9.5(5) Placement of lights, switches, data ports in the room, power receptacles, blinds and possible paint colour/finish and specification for the vendor/model of Virtual Care equipment to conform to the Authority's standard will be provided by the Design-Builder and reviewed in further consultation with the Authority.

4.6.9.5(6) For details and technical requirements for each Multimedia Room type refer to the Schedule 1[Statement of Requirements].

4.7 Design Criteria

4.7.1 Clinical Requirements:

4.7.1.1 Achieve and maintain the benchmark average length of stay to 14 days. For Older Adult Psychiatric Inpatient Unit this will be 29 days. This is expected to be achieved by:

4.7.1.1(1) Maintaining the current record of no incidence of Clostridium Difficile Infection and Norovirus;

4.7.1.1(2) Co-locating of specialized Patient groups to enhance programming (20 bed Older Adult Psychiatric unit, 10 bed Adult Psychiatry High Acuity unit, and 45 beds are designed into 15 bed units);

4.7.1.1(3) Eliminating of corridor care for Patients which interrupts care pathways and extends length of stay; and

4.7.1.1(4) Providing of an enhanced therapeutic environment.

4.7.1.2 Reduce Patient elopements by 50%. This will be achieved by:

4.7.1.2(1) Providing of a Secure Outdoor Space off unit area;

4.7.1.2(2) Ability to provide secure unit when necessary; and

4.7.1.2(3) Improving observation and monitoring systems.

4.7.1.3 Reduce infection control unit closures to new admissions by 75%. This will be achieved by:

4.7.1.3(1) Providing single room occupancy with Ensuites;

4.7.1.3(2) Providing improved bathing facilities;

4.7.1.3(3) Providing ongoing education on hand washing to both staff and Patients; and

4.7.1.3(4) Increasing the number of hand hygiene sinks in general care areas.

4.7.1.4 Reduce rates of seclusion by 10%. This will be achieved by:

4.7.1.4(1) Providing improved physical layout which includes wandering loops and private rooms;

4.7.1.4(2) Improving security systems for staff and Patients to enhance observation levels and provide restricted egress when required;

4.7.1.4(3) Providing Comfort Rooms;

4.7.1.4(4) Reducing the use of physical and chemical restraints; and

4.7.1.4(5) Including spaces designed for Persons with Disabilities and that promote interactions between staff and Patients.

4.7.1.5 Reduction in 30-day post discharge readmission rate by 10%. This will be achieved by:

4.7.1.5(1) Improving synergies between Inpatient and Outpatient services within one consolidated building and services; and

4.7.1.5(2) Improving therapeutic relationships and insight, resulting in more successful treatment outcomes. Factors enabling therapeutic alliances include:

4.7.1.5(2)(a) Private interview spaces;

4.7.1.5(2)(b) More access to group therapy space;

4.7.1.5(2)(c) Access to outdoor spaces on unit;

4.7.1.5(2)(d) Less crowded conditions and less stress enabling staff to focus on each Patient rather than trying to de-escalate unit;

4.7.1.5(2)(e) Patients can focus on healing and insight rather than trying to find a quiet space;

4.7.1.5(2)(f) Less elopements which leads to increased re-admissions when Patients return;

4.7.1.5(2)(g) An environment that adds to self-esteem and normalized mental health rather than demoralizing;

4.7.1.5(2)(h) Decrease the falls rates on the adult units by 30%; Reduce incidents of violence towards other Patients and staff by 20%; Reduce sentinel events of self-harm and suicide attempts by 20%; and

4.7.1.5(2)(i) Increase the level of Patient satisfaction with physical environment by 50%.

4.7.2 Standardization of Patient Bedrooms

4.7.2.1 Each Patient Bedroom will be designed, configured, equipped and furnished to a common standard and design. The intent of this requirement is to facilitate staff moving from room-to-room without having to reorient themselves with respect to frequently accessed key features like Patient bed; desk; wardrobe; call annunciator, and cancel buttons.

4.7.2.2 All Patient Bedrooms are to have a standard orientation; the configuration and layout within each Patient Bedroom will be standardized to facilitate immediate orientation for staff. A standard room orientation will be accommodated via a “like-handed” design – or in “mirrored” design.

4.7.3 Proximity Relationships

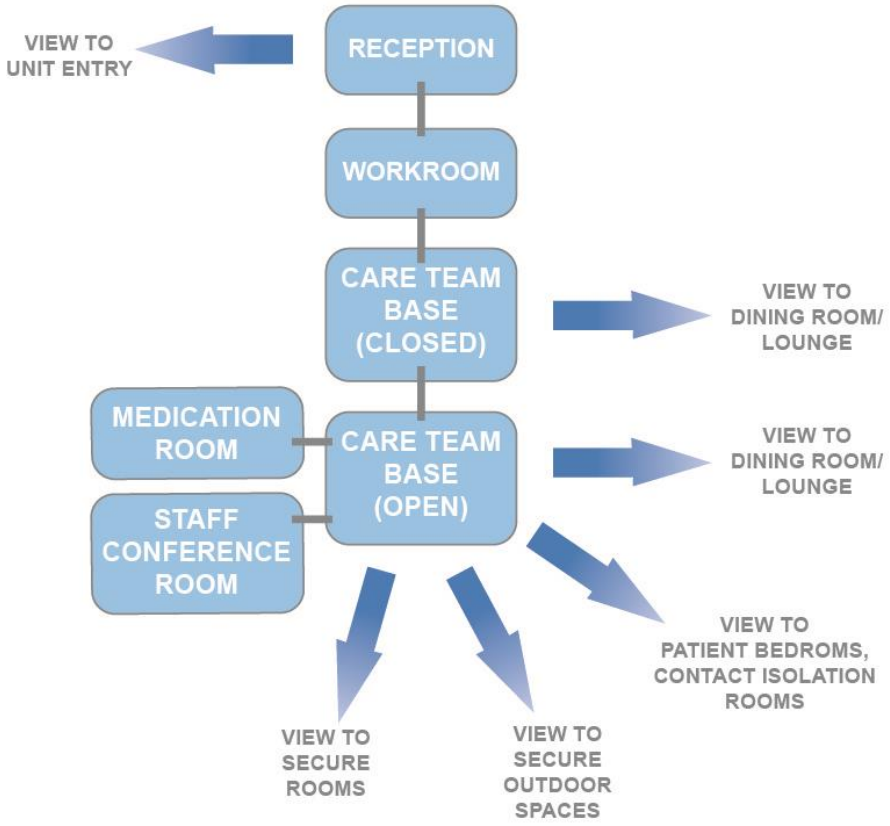
4.7.3.1 Staff Line of Sight and Space Adjacencies

4.7.3.1(1) Direct Line of Sight to the Elevator Vestibule and staff presence at the Reception and Inpatient Unit entrance and the Secure Vestibule will be provided for monitoring people movement, as well as to meet and greet families and visitors.

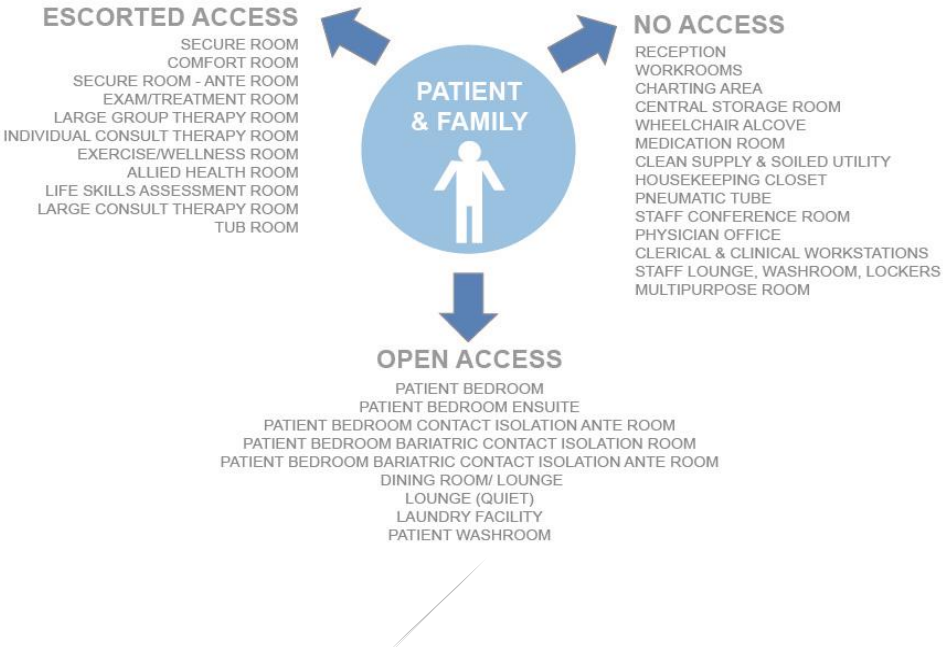
4.7.3.1(2) Patients are encouraged to participate and engage in social and group activities during the day. Maximize direct staff observation and Direct Line of Sight from the Care Team Base to the program areas that will be in direct adjacency.

4.7.3.1(3) The Secure Rooms will have a direct adjacency to the Care Team Base.

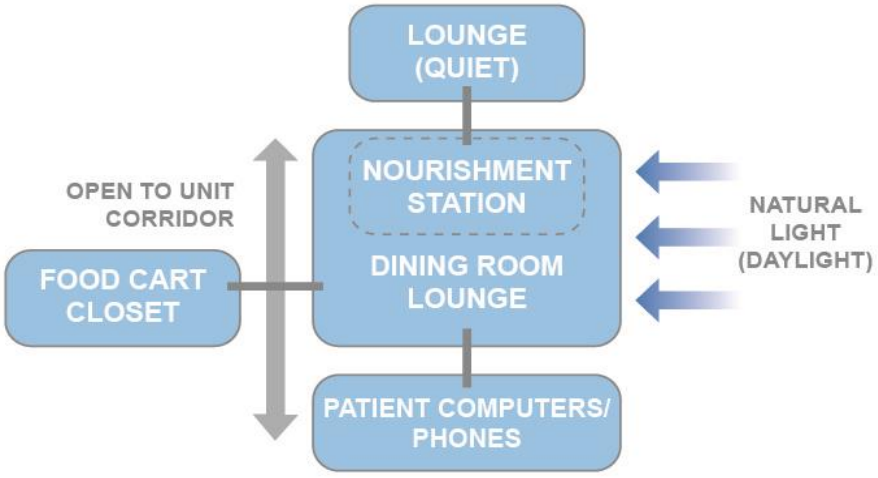
CARE TEAM BASE, RECEPTION, STAFF CONFERENCE ROOM, MEDICATION ROOM

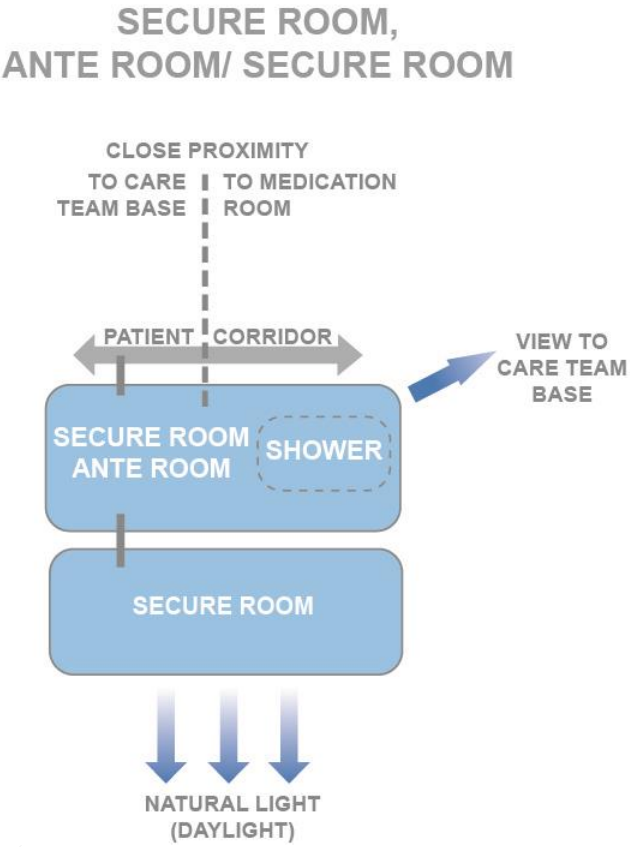


INPATIENT FLOW



DINING ROOM/ LOUNGE, NOURISHMENT





4.7.3.1(4) The decision-making during the Design process regarding adjacencies to and Lines of Sight from the Care Team Base will be based on the following matrix (listed in the highest priority to the lowest):

4.7.3.1(4)(a) Dining Room/Lounge, Direct Line of Sight from the Care Team Base; Dining Room/Lounge will have Direct Line of Sight to the Secure Outdoor Space;

4.7.3.1(4)(b) Elevator Vestibule, visual overview;

4.7.3.1(4)(c) Secure Rooms, physical adjacency with short travel distance;

4.7.3.1(4)(d) Patient Bedrooms and Patient/Public Washroom, visual overview; sightline for the full length of the Patient Bedroom interior from the Care Team Base is not required;

4.7.3.1(4)(e) Secure Outdoor Space, visual overview from the Care Team Base.

4.7.3.1(5) Efficient Workflow

4.7.3.1(5)(a) The layout of the Patient Bedrooms within the Inpatient Unit will provide the shortest possible travel distance between the two Patient Bedrooms that are the furthest apart. This travel distance will not exceed 65 metres from door to door.

4.7.3.1(5)(b) The layout of the Inpatient Units will allow the Units to be partially secured restricting the areas of Patient access during night shifts to the Patient Bedrooms, Care Team Base and parts of the social/living areas. A walking loop that is accessible to Patients when the Unit is partially secured will be provided.

4.7.3.1(6) Building

4.7.3.1(6)(a) Empowering Patients to Foster Independence

(a).1 The overall Design for a healing environment will be to promote Patient independence by providing optional activity areas to foster Patients' individual decision making;

(a).2 Patient access to operable windows, room temperature control and use of private, individual Ensuites all afford Patients' sense of independence; and

(a).3 Provide options/choices for Patients' participation in variety of activities on the Inpatient Units in areas such as offices and outdoor spaces on each floor.

4.7.3.1(6)(b) Promoting positive Patient staff interactions

(b).1 The Design will optimize opportunities to provide calm, bright and uplifting spaces for staff and Patients to interact informally in corridors as well as in therapeutic treatment areas; and

(b).2 The Design will minimize perceived barriers between staff and Patient daily engagement and interaction.

4.7.3.1(6)(c) Calming therapeutic spaces, promoting wellness

(c).1 Provide ample natural light, direct visual and physical access to secured landscaped outdoor spaces, as well as the use of interior finishes, texture and colours to reinforce a wellness; focused, non-institutional healing environment;

(c).2 Provide a separate private bedroom zone from more public zones of therapy and social programs on the Inpatient Units; and

(c).3 Minimize ambient noise through appropriate acoustic separation, and dispersed locations of larger areas of Patient congregation on the Inpatient Units.

4.7.3.1(7) Provide access by general circulation to the Dining Room/Lounge for movement of Patients, visitors and staff.

4.7.3.1(8) Provide access for each Inpatient unit by general circulation to major public and non-public circulation. Staff, Patients, visitors and supplies will move frequently to/from the Inpatient Units and other components in the Building.

4.7.3.1(9) Provide access by general circulation to Patient belongings in Central Storage Room(s) for ease of staff travel distances within the Inpatient Units.

4.7.4 Specific Design Requirements

4.7.4.1 The following will describe in detail specific design requirements that will be applicable to all Inpatient Units. Requirements that are unique to certain units will be clearly noted or described separately.

4.7.4.2 Internal Design Criteria

4.7.4.2(1) General Internal Layout

4.7.4.2(1)(a) There will be groupings of 6 or 8 bedrooms, excluding Patient Bedroom Bariatric Contact Isolation Rooms; with an adjacent daytime social space.

4.7.4.2(1)(b) The maximum allowable distance from the centre point of the last Patient Bedroom door to the edge of the central millwork Care Team Base (Open portion) is 25m, except in the Older Adult Unit, where, if the proposed Design of such unit includes more than two wings of Patient Bedrooms, one of the wings of Patient Bedrooms is permitted to have a maximum allowable distance from the centre point of the last Patient Bedroom door to the edge of the central millwork Care Team Base (Open portion) of 35m.

4.7.4.2(1)(c) The Inpatient Unit will be organized into 3 major areas as follows:

(c).1 Patient Bedroom clusters/wings,
(c).2 Patient activity spaces and therapy rooms,
(c).3 Care Team Base and unit support spaces. The Care Team Base will be able to view all three areas from one central “awareness point”.

4.7.4.2(1)(d) All Patient Bedrooms will have Ensuites.

4.7.4.2(1)(e) Unit support spaces such as Soiled Utility, Clean Supplies, Housekeeping Closet and Storage Room will allow for ease of entrance

and stocking by staff without entering the Patient zone of the unit. This can be achieved in a number of ways for example (each room having dual entrance from public corridor and the care unit or a secondary staff entrance to the unit that allows for all rooms to be off that staff only "back of house" corridor).

4.7.4.2(1)(f) The ambulation ("wandering") loop, will be visible to staff and able to be monitored. It will not 'encourage' access to Patient Bedrooms, storage areas (linen), Soiled Utility Rooms, Clean Supplies or treatment rooms.

4.7.4.3 Unit Organization

4.7.4.3(1) All Patient Bedrooms will be designed to recognize the environmental risk factors for the Patient population. Design requirements will accommodate a range of acuity levels for the particular population but will be designed for the highest acuity Patients.

4.7.4.3(2) All Patient Bedrooms and Ensuites will be designed with anti-ligature and tamper resistant finishes, fixtures, equipment and furniture. All Patient Bedroom doors will be lockable from the exterior; interior by the Patients with staff override capability. Patient Bedroom doors in the Psychiatric High Acuity Unit will not be lockable from the interior. Patient Bedroom doors will have the ability to be left open. All Patient Bedroom doors will have anti barricade features.

4.7.4.3(3) Doors to the Ensuites will be lockable from the outside but not lockable from the inside.

4.7.4.3(4) All Patient Bedrooms will be able to accommodate a psychiatric, medical or residential clinical bed, depending on its clinical population. Patient Bedrooms will also accommodate a millwork desk, weighted night table, a side chair with sled based legs and a millwork wardrobe with fixed shelving and a secured safe with a keypad lock and a key override.

4.7.4.3(5) Patients on the Inpatient Units will have the capability for dining on each of the individual Inpatient Units. Patients enjoy interacting and socializing with other Patients. The design will promote a normalizing hospital experience.

4.7.4.3(6) The Nourishment Station will be located in the Dining/Lounge Room on each of the Inpatient Units. It will enable Patients to prepare hot or cold beverages, provided Patient profile allows for it. It will have a counter space with utility sink and upper and lower cabinetry. This space can be left open or completely locked off depending upon staff preference and activity on the unit.

4.7.4.3(7) Each unit will have a large area programmed for the Dining Room/Lounge. It will be open to the corridor and provide a welcoming living room feel. It will be equipped with a TV and entertainment centre, in a secure lockable enclosure.

4.7.4.3(8) Patient access to a telephone will be adjacent to the Dining Room/Lounge. This space will be visible by staff and provided in a location easily accessible by all Patients. The space will provide access for Persons with Disabilities, phones will have cords that are no greater than 15 cm in length. There will be two spaces for computer use and two spaces for telephone use (the telephone will be brought in to the space by staff for Patients to use). Computers, monitors and keyboards will be housed in a secure lockable enclosure.

4.7.4.3(9) The Lounge (Quiet) will be an enclosed room to allow for acoustic separation for quiet activities. The Lounge (Quiet) will accommodate an electric fireplace. These areas require Direct Line of Sight from the Care Team Base. Creating this line of sight with an interior glazing is acceptable.

4.7.4.3(10) The Staff Conference Room will act as the Inpatient Unit's communication centre. It will be utilized for staff meetings and will require direct access from a general circulation corridor within the Inpatient Unit as well as from the staff only corridor. Patient charts may be stored in this space for ease of use and discussion. Two staff computer workstations will be provided in this space. The Staff Conference Room will have a direct connection to the Care Team Base for ease of staff movement. The Staff Conference room will be used for:

- 4.7.4.3(10)(a) Conducting shift reports and participating in interdisciplinary team meetings;
- 4.7.4.3(10)(b) Providing on-unit space for nursing management activities and transfer of control conferences at shift change;
- 4.7.4.3(10)(c) Accommodation of teaching and collaboration space; and
- 4.7.4.3(10)(d) Dictating and reviewing charts, diagnostic images and test results.

4.7.4.3(11) Only the Older Adult Psychiatric Inpatient Unit will have a Tub Room. The Tub Room will be located in a central location on the Inpatient Unit but provide discrete access for Patients.

4.7.4.3(12) The Tub room will have a ceiling mounted Patient lift rated for Bariatric Patients. The Tub Room will have a tub positioned in the middle of the room to allow for a three sided access and to enable staff to assist Patients in bathing who have mobility challenges. The tub will be of walk-in type. There will be a shelf and/or a recessed wall for toiletries and clothes. The Tub room will have a toilet and a sink.

There will be a Staff Assist (nurse call) button and a code blue near the tub and a bench. The Tub Room will be accessible by a wheelchair or walker.

4.7.4.3(13) A centrally located Central Storage Room for Patient's personal belongings will be provided on each Inpatient Unit for Patient belongings not required by Patients on a regular basis. The Central Storage Room will be accessible only by staff and will have appropriate ventilation and be equipped with shelving for storage of Rubbermaid type bins. The secured Central Storage room will be located off a general circulation corridor; Patients and visitors will not have access to this room.

4.7.4.4 Staff Safety

4.7.4.4(1) The Care Team Base as well as Reception, which controls access to the Inpatient Unit, will be provided with visibility to the Unit's Secure Vestibule and entrance. The Care Team Base will have two means of egress to prevent entrapment of staff. Glass partitions will promote openness and connection to the Patients, while maintaining staff safety.

4.7.4.4(2) The care desk will be open concept but will have features such as deep counter depths and heights to deter jumping/reaching and damaging of equipment and or injuring staff. The design will provide a transaction counter at a Persons with Disabilities height for an Older Adult Inpatient Unit only.

4.7.4.4(3) There will be a single Patient/public entrance to the Inpatient Unit. A secondary staff and supply entrance is imperative. Entrances/exits to the unit will be limited to prevent elopement. All entrances and exits to the Inpatient Units will have secure vestibules (e.g. interlocking door capability).

4.7.4.4(4) The Charting/Reception/Unit clerk will be designed as a secure area and will include interior glazing to support visibility to the unit.

4.7.4.4(5) "Staff only" rooms will have windows incorporated into doors enabling staff to assess the area outside of the room for traffic and security issues. Allow for a space to where staff can retreat when their safety is at risk.

4.7.4.4(6) A staff lounge will be provided and will be located in close proximity to the Care Team Base and Staff Conference Room. A staff washroom and lockers will be provided adjacent to the staff lounge; the washroom will not open directly into the staff lounge.

4.7.4.5 Inpatient Unit Security

4.7.4.5(1) Access to the Inpatient Units will be controllable at all times.

4.7.4.5(2) The Inpatient Units will be accessible to authorized personnel 24 hours-a-day, 7 days-a-week.

4.7.4.5(3) All lockable Patient areas will be serviced by non-accessible audio-video surveillance and monitoring equipment. Monitoring stations will be located at the Care Team Base and at the Security Operations and Control located at the Security Office in the Building's Main Lobby.

4.7.4.5(4) The design will provide adequate lighting throughout to protect staff, Patients and visitors from unexpected violence. Work areas will not place staff in isolation, and staff will have the capability of summoning help.

4.7.4.5(5) Areas subject to limited visual access will be video monitored enabling staff to view the area prior to entry. There will be no "blind spots" within the Inpatient Units where Patients can hide.

4.7.4.5(6) Storage Rooms, Clean Supply Room, Soiled Utility and Medications Rooms will be secure from Patient access and include lockable cupboards for supplies and or medications.

4.7.5 Specific Room Type

4.7.5.1 Reception

4.7.5.1(1) The Inpatient Unit Secure Vestibule design will provide a welcoming experience for Patients and visitors. Interior glazing, natural light and views are required.

4.7.5.1(2) Reception will have Direct Line of Sight to the Elevator Vestibule.

4.7.5.1(3) Reception will provide the initial point of contact for visitors, Patient management flow, Allied Health workers and physicians entering the Inpatient Unit.

4.7.5.1(4) Reception will have door video intercom system to control access to the Unit. A master video Intercom station will be located either on a work surface or wall mounted. There will be a two-way communication system provided. Clinical monitors will be provided at the Reception desk.

4.7.5.1(5) Reception will have borrowed natural light from Patient social spaces (e.g. Dining Room/Lounge) to enhance the indoor environmental quality and create positive distraction for occupants.

4.7.5.1(6) Reception will be an enclosed space contiguous with the Care Team Base. It will accommodate workspace for the Unit Clerk who will have Direct Line of Sight to Patient daytime areas. It will have a glass partition which will be able to be opened or closed depending upon the clinical staffs' preference.

4.7.5.1(7) The transaction counter height design at the Reception will provide a welcoming atmosphere for visitors while maintaining appropriate level for staff security.

4.7.5.1(8) Workspaces at the Reception space may be systems furniture with the exception of the transaction counter, which will be millwork.

4.7.5.1(9) Interior spaces will maintain non-institutional character. Refer to Space Table in this Appendix for security risk classification categories.

4.7.5.2 Care Team Base

4.7.5.2(1) The Care Team Base will act as the Inpatient Unit's communication centre. It will support the interdisciplinary collaboration between all caregivers, including clinical staff, physicians and Allied Health personnel. There will be visibility at all times from the Care Team Base to the Patient areas on the Inpatient Unit. There will be provision for a closed, acoustically private area in the Care Team Base for clinical staff to undertake confidential and frequent highly sensitive discussions including:

4.7.5.2(1)(a) Conducting private telephone conversations; and

4.7.5.2(1)(b) Providing access to computer workstations and business equipment and business supplies for the Inpatient Unit.

4.7.5.2(2) The closed portion of the Care Team Base will be enclosed in a fixed glass partition.

4.7.5.2(3) The closed portion of the Care Team Base will have both sit down and stand up millwork workstations, while the open portion of the Care Team Base will have stand up workstations only.

4.7.5.2(4) The open portion of the Care Team Base will have all dimensions of counters and desks designed in a way to act as a barrier and provide adequate protection from violent or threatening behavior. The design of this open portion will also allow for the future possibility of full enclosure (e.g., the entire Care Team Base could be an enclosed space) without the need to change or modify the Care Team Base other than by the addition of the new enclosure.

4.7.5.2(5) The Care Team Base will include the following areas:

4.7.5.2(5)(a) The Care Team Base along with Reception will act as the control and awareness point for the Inpatient Unit;

4.7.5.2(5)(b) The Charting area will be located in close proximity to the Care Team Base/Unit Clerk desk while providing the appropriate segregation of business equipment for staff safety and noise reduction within the Care Team Base;

4.7.5.2(5)(c) The Care Team Base will accommodate 8 front-line staff and the integrated care team. There will be 2 staff accommodated in the open area and 6 staff in the enclosed space. There will be combination of standing and seating stations. The final number of standing and seating stations will be determined in consultation with the Authority at the mock up review of the Care Team Base;

4.7.5.2(5)(d) Direct adjacency between the Care Team Base, the Medication Room, Charting, Workroom and Staff Conference Room is required; and

4.7.5.2(5)(e) Nurse Leader Office, Social Worker Office will be in close proximity, across the corridor, from the Care Team Base.

4.7.5.3 Medication Room

4.7.5.3(1) The design of the Medication Room will allow for the flexibility to dispense medication in a number of ways to allow for future flexibility.

4.7.5.3(2) The design will accommodate the use of Automated Drug Dispensing Systems (ADDS). The medication Room will accommodate refrigeration, medication carts, secured storage for narcotics and a window providing visual connection to the corridor. Space will be needed for confidential mixed media plastic with Patient names, along with a regular console for confidential paper and adequate counter space for a clinical pharmacist.

4.7.5.3(3) A wall mounted hand hygiene sink will be provided on the wall adjacent to the door and away from medication preparation area.

4.7.5.3(4) The medication room will be fully enclosed and secured with access restricted to clinical and pharmacy staff only; and consistent with the best practice of the Canada Accreditation Standards.

4.7.5.3(5) The Medication Room will be adjacent and have direct access to the Care Team Base for ease of dispensing medications to Patients in crisis and for ease of use and control of medications. Access to a Medication Room will be from a secured staff corridor only (controlled access to enter and motion sensor to exit).

4.7.5.3(6) All Medication Rooms will have one entry door only. All Medication Room doors will have Direct Line of Sight from the Care Team Base.

4.7.5.3(7) All Medication Rooms will have no less than 2800mm in countertop length for a clinical pharmacist. All rooms will have a touchdown workstation.

4.7.5.3(8) Space for at least two under-counter medication refrigerators, an Omnicell system will be provided.

4.7.5.4 Consult Therapy Rooms:

4.7.5.4(1) Consult Therapy Rooms will be primarily used for conducting private interviews in a space separate from the Patients' bedrooms. These rooms will be used for admissions interviews and psychological testing. Physicians discussing reports with students; psychologists conducting Patient assessments; consultations with Allied Health professionals, as well as various teaching functions will also use these rooms.

4.7.5.4(2) Each Consult Therapy Room will have two means of egress from the room for staff safety.

4.7.5.4(3) The Large Consult Therapy Room will be large enough to accommodate up to 10 people at any given time.

4.7.5.4(4) The Individual Consult Therapy Room will be large enough to accommodate up to 4 people at any given time.

4.7.5.4(5) Consult Therapy Rooms will have access to natural light and views.

4.7.5.5 Secure Rooms

4.7.5.5(1) Secure Rooms will be designed and constructed in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act.

4.7.5.5(2) Secure Rooms are used for Patients in crisis that are at risk of harming themselves or others. Staff is required to observe Patients on a continuous basis with direct visualization at all times;

4.7.5.5(3) The Secure Room suite consists of one Secure Room and one Secure Room Anteroom and one shower with curtain as part of the Ante Room space. The Psychiatric High Acuity Unit will have two Secure Rooms and one shared Secure Ante Room with shower with curtain as part of the Ante Room space.

4.7.5.5(4) The Secure Room space will be located away from Patient Bedrooms.

4.7.5.5(5) The Secure Room will have close proximity to the Medication Room to allow for quick transfer of medications as well as close proximity to the Care Team Base for ease of staff back up and assistance. The maximum allowable distance from the Care Team Base will be 15 metres.

4.7.5.5(6) Secure Room will have direct access from the corridor through the Ante Room. The Secure Room Ante Room is for calming the Patient and staff observation. The Secure Room Ante Room will have two means of egress for staff safety. Patients

will not have access to the Secure Room Ante Room on their own. Entry door of the Secure Room Ante Room will be aligned to the entry door of the Secure Room.

4.7.5.5(7) Staff will have Direct Line of Sight to the Secure Rooms from one single location within the Secure Room Ante Room.

4.7.5.5(8) Staff will have Direct Line of Sight to the Patients from the Ante Room in both Secure Rooms and the shower at the same time without the ability of a Patient in one room to see Patient in a second room.

4.7.5.5(9) The Secure Room design will not have any interior ledges, window sills, corners or sharp edges.

4.7.5.5(10) The Secure Room Ante Room will have a closed circuit television, light controls to the Secure Room and two-way communication system. All controls will be located on the opening side of the door leading to the Secure Room. The Secure Room Ante Room will accommodate a hand hygiene sink.

4.7.5.5(11) There will be a Secure Room Shower space within the Secure Room Ante Room, with a breakaway safety curtain.

4.7.5.5(12) A two-way communication system will be provided between:

4.7.5.5(12)(a) Care Team Base and Secure Room Ante Room;

4.7.5.5(12)(b) Care Team Base and Secure Room; and

4.7.5.5(12)(c) Secure Room Ante Room and Secure Room.

4.7.5.5(13) The Secure Room space will be acoustically treated and rated to provide acoustical separation from the remainder of the Inpatient Unit, as outlined in Schedule 1 – [Statement of Requirements].

4.7.5.5(14) All of the Secure Rooms will provide safety padding on all walls, doors, door frames and floors in accordance with the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in designated Mental Health Facilities under the BC Mental Health Act.

4.7.5.5(15) The Secure Room doors will each have a small vision window. An observation window between the Secure Room and Secure Room Ante Room will allow full visibility of the Secure Room.

4.7.5.5(16) The Secure Room will have a Patient mattress laid on the floor. It will be sufficient in size to allow for 3-sided access to the Patient mattress by the clinical staff.

4.7.5.5(17) Secure Room will be adequate in height to prevent the Patient from reaching the ceiling when climbed on fixtures within the room.

4.7.5.5(18) Secure Rooms will have an exterior window which will provide natural light and views to the exterior.

4.7.5.6 Comfort Rooms

4.7.5.6(1) Comfort Rooms will:

4.7.5.6(1)(a) provide sensory interventions;

4.7.5.6(1)(b) have natural daylight;

4.7.5.6(1)(c) have a media wall;

4.7.5.6(1)(d) be located away from Secure Rooms and high activity areas;

4.7.5.6(1)(e) have the ability to dim the lights easily; and

4.7.5.6(1)(f) have a sidelight for clinical staff to be able to observe the entire room prior to entering.

4.7.5.7 Secure Outdoor Spaces

4.7.5.7(1) Each Inpatient Unit will have dedicated Secure Outdoor Space. Access and exit to/from the Secure Outdoor Space will be through two separate doors. Patients will be able to access area freely.

4.7.5.7(2) Each Inpatient Care Unit will have a direct horizontal (i.e. at the same level) connection with a secured outdoor space. The location must provide privacy from other Building areas and from visitors.

4.7.5.7(3) The Secure Outdoor Space will be visible to staff without any corners and blind spots. Video monitoring of the secured outdoor space will also be provided.

4.7.5.7(4) These spaces will be designed for therapeutic functions and will include features that provide a variety of calming stimulations. It will be a healing garden. The outdoor space will have areas that are covered from the elements for shade and protection from the rain.

4.7.5.7(5) Selection of outdoor plantings and ground covers will be safe for psychiatric Patients. Sharp, poisonous, climbable or otherwise dangerous plantings are not permitted.

4.7.5.7(6) The outdoor space will have fencing in accordance with the requirements in Schedule 1 [Statement of Requirements].

4.7.5.7(7) Secure Outdoor spaces for each Inpatient Unit will be sized to accommodate all Patients from the Inpatient Unit and all staff from the Inpatient Unit at one time.

4.7.5.7(8) Secure Outdoor Spaces will allow access for Persons with Disabilities and be designed to allow Patients to experience the weather and also be protected by security screens.

4.7.5.7(9) Secure Outdoor Spaces will be located to maximize visual access to these outdoor spaces from other areas on the floor.

4.7.5.7(10) The Design-Builder will design Secure Outdoor Spaces that will achieve the following functions:

4.7.5.7(10)(a) Seating will be provided for total Patient population of each Inpatient Unit plus five (5) staff plus five (5) visitors. Fixed table and chair seating will be provided for half of the Patient population of each of the Inpatient Units, remainder can be other type of seating (e.g. bench). Minimum eight (8) seats will be protected from the weather;

4.7.5.7(10)(b) Raised garden planters in the Older Adult Psychiatric Patient Unit;

4.7.5.7(10)(c) All other Inpatient Units will have plantings such as flower beds at ground surface level;

4.7.5.7(10)(d) The minimum outdoor space size will be 8.5 square metres/Patient. For example, on a 20 bed unit the minimum outdoor space area to be provided will be 8.5 square metres multiplied by 20 Patients, for a minimum area of 170 square metres);

4.7.5.7(10)(e) Provided the functional requirements are met, the minimum total area per Secure Outdoor Space may be provided in one location or split into two locations;

4.7.5.7(10)(f) The entire Secure Outdoor Space(s) must be visible from one of the following spaces with a full height window wall to the outdoor space:

(f).1 The Care Team Base;
(f).2 the Dining Room/Lounge, and/or
(f).3 Group Therapy Room.

4.7.5.7(10)(g) A roof cover will extend a minimum of 3.0m from the face of the façade for the full length or width of the outdoor space;

4.7.5.7(10)(h) Furniture placement will prevent climbing onto the Security Screens;

4.7.5.7(10)(i) The Secure Outdoor Space(s) will not have any horizontal dimension less than 8 metres. The minimum area of any separate roof garden space will be 100 square metres;

4.7.5.7(10)(j) Trees will be provided in the outdoor spaces. However, they must be placed in locations where they cannot be used to facilitate elopement (e.g. they may not be placed next to the enclosure or next to the building walls nor the Security Screens);

4.7.5.7(10)(k) Security Screens – refer to Schedule 1 [Statement of Requirements];

4.7.5.7(10)(l) The aesthetic of the Security Screens will be unobtrusive and blend into the landscape and architecture as much as possible to create a normalized environment;

4.7.5.7(10)(m) Staff Assist (nurse call) and Panic/Duress Button, hardwired, will be provided in the Patient Secure Outdoor Spaces;

4.7.5.7(10)(n) All common entrance/ exit doors to the Building will be secured and monitored by the Security Office;

4.7.5.7(10)(o) All entrances/exits within the individual Inpatient Units will be monitored by the Care Team Base; and

4.7.5.7(10)(p) Outdoor lighting will be designed in a manner to prevent shadows and to be activated immediately when entering the outdoor space. Refer to Schedule 1 [Statement of Requirements].

4.7.5.7(11) Each of the Secure Outdoor Spaces will provide for the following program activities:

4.7.5.7(11)(a) An accessible looped walking path;

4.7.5.7(11)(b) Areas for passive seating;

4.7.5.7(11)(c) Recreation therapy such as yoga or stretching. There will not be any recreational equipment such as a basketball hoop; and

4.7.5.7(11)(d) Garden Therapy programs include areas for planting.

4.8 **Space Table**

G2.0	**Inpatient Mental Health Services: Unit 1 & 2- each 15 Bed IPUs**			

	Description	Unit	Unit/ NSM	Total NSM	Safety/ Risk Category	Comments	Multimedia Category
	UNIT 1						
G2.0.1.0	**FAMILY SUPPORT AREAS**						
G2.0.1.1	Patient/Public Washroom	1	4.5	4.5	**G**	Wheelchair Accessible; 2-piece washroom (toilet/sink); Anti-ligature	
G2.0.1.2	Visitor Lounge	1	12.0	12.0	**D/E**	Includes tables, chairs, shelving, display, couches	
	Sub-total (CNSM)			**16.5**			
G2.0.2.0	**STAFF SUPPORT AREAS**						
G2.0.2.1	Reception	1	6.0	6.0	**H**	Unit clerk; 2 sit down workstations with PC's, phones (1 back up analog; each workstation 1 voip), desks, chairs; clerical storage; security monitors on counter; contiguous with Care Team Base; mobile chart rack; consider wheelchair accessible interviews.	
G2.0.2.2	Care Team Base	8	4.5	36.0	**H**	Partially open workspaces and partially enclosed. 8 Chairs, 8 workspaces (3 stand up in enclosed portion; 3 sit down in enclosed portion; 2 stand up in open portion) with 2 PC's and 6 Thin Clients, lab printer, lab labeler, 4 voip phones; anti-barricade; hand hygiene sink in enclosed portion.	

G2.0.2.3	Pneumatic Tube Station	1	2.0	2.0	**C**		
G2.0.2.4	Work Room	1	11.0	11.0	**C**	Floor model MFD; paper supply; integral to Care Team Base	
G2.0.2.5	Staff Washroom	1	4.5	4.5	**C**	2-piece washroom (toilet, sink); locate adjacent to care team base	
G2.0.2.6	Staff Conference Room	1	25.0	25.0	**C**	Lightweight and moveable tables and chairs. Accommodates 12-15 people; conference phone	Type 2 room
G2.0.2.7	Nursing Leader Office	1	15.0	15.0	**C/D**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones, cabinets, visitor chairs; Adjacent to Care Team Base	
G2.0.2.8	Social Work Office	1	9.5	9.5	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs; adjacent to Patient area; not within Care Team Base	
	Sub-total (CNSM)			**109.0**			
G2.0.3.0	**CLINIC SUPPORT AREAS**						
G2.0.3.1	Central Storage Room	1	25.0	25.0	**C**	Open area with some wire racks, electrical and charging considerations; Patient storage bins; portable Patient lift; 4 data ports for equipment	
G2.0.3.2	Crash Cart Closet	1	5.9	5.9	**C**	Crash Cart; with doors; lockable; close to med room; data drop	
G2.0.3.3	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving; secure; automated drug dispenser; locked cupboard for	

						medications; hand hygiene sink; PC; voip phone; adjacent to Care Team Base	
G2.0.3.4	Wheelchair/Stretcher Alcove	1	4.5	4.5	**C**	Space for three items per floor at 1.5 NSM	
	Sub-total (CNSM)			**44.9**			
G2.0.4.0	**PATIENT BEDROOMS**						
G2.0.4.1	Patient Bedroom	15	14.0	210.0	**G**	Design similar to bachelor apartment; Anti-ligature; residential type bed; slider chair; desk; wardrobe; ceiling lift with locking mechanism for 1 Inpatient Contact Isolation Room; 1 hand hygiene sink mid-way down Patient corridor	
G2.0.4.2	Patient Bedroom Contact Isolation Ante Room	1	4.5	4.5	**J**	Anti-ligature; hand hygiene sink.	
G2.0.4.3	Not used						
G2.0.4.4	Ensuite	15	6.0	90.0	**G**	1 x 3 piece Ensuite per inpatient room, Anti-ligature	
	Sub-total (CNSM)			**304.5**			
G2.0.5.0	**PATIENT SUPPORT ZONE**						
G2.0.5.1	Comfort Room	1	14.0	14.0	**G**	Multisensory Room to decrease anxiety; away from the secure room and high traffic areas; natural light; carpet; infrastructure for media wall; sound and light control; ceiling speakers	
G2.0.5.2	Dining Room/Lounge	1	56.0	56.0	**E**	Large dining to accommodate 18 seats; Nourishment Station with utility sink and drinking fountain with bottlefillers; hand	

						hygiene sink; Lounge activities; adjacent to outdoor space; Anti-ligature; TV; 2 analog phones/2 PC access for Patients; ceiling speakers	
G2.0.5.3	Hamper Alcove	3	1.0	3.0	**C**	3 per unit	
G2.0.5.4	Laundry Facility	1	10.0	10.0	**F**	Accommodates 1 washer and 1 dryer; Anti-ligature	
G2.0.5.5	Linen Closet	1	2.0	2.0	**C**	Secure; Anti-ligature; with doors	
G2.0.5.6	Lounge (Quiet)	1	16.0	16.0	**F**	Small lounge to accommodate 8 seats; Anti-ligature; outside Dining room/Lounge; infrastructure for TV; electric fireplace	
G2.0.5.7	Food Cart Closet	1	2.0	2.0	**C**	To house cart: 64“ L x 32“ W x 60“ H; secure; Anti-ligature; with doors	
G2.0.5.8	Secure Room	1	14.0	14.0	**J**	Secure room; single Patient space; 4 hard-walls; CCTV; Anti-ligature; toilet; sink with water fountain; ability to shut off at room; window; 1 per 15 beds; not near bedrooms; site line from Care Team Base	
G2.0.5.9	Secure Room Ante Room	1	5.5	5.5	**J**	Hand hygiene sink; Anti-ligature; shower with curtain; intercom; CCTV	
G2.0.5.10	Secure Outdoor Space	1	258.0	258.0	**E**		
	Sub-total (CNSM)			**380.5**			
G2.0.6.0	**THERAPY ZONE**						
G2.0.6.1	Exam/Treatment Room	1	14.0	14.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked	

						cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button	
G2.0.6.2	Exercise/Wellness Room	1	18.0	18.0	**D**	Accommodates 2 stationary bikes, exercise area; adjacent to large group therapy space; data; glass wall; full length mirrors; ceiling speakers	
G2.0.6.3	Individual Consult Therapy Room	1	11.0	11.0	**D**	Anti-ligature; desk/table; 4 chairs; PC; voip phone; data drops; hard-wired panic/duress button; double egress	Virtual Care (Telehealth) capable - wiring R/I (Type 5a room). Also equipped as a (Type 6 room) Education Camera system source (interview) room
G2.0.6.4	Large Consult Therapy Room	3	15.0	45.0	**D**	Table, chairs, accommodates 10 people; adjacent to Care Team Base; Anti-ligature; CCTV for clinical teaching; double egress; conference phone	All rooms Virtual Care (Telehealth) capable - wiring R/I only (Type 5a room); One equipped with Screens + Speakers for viewing Education Camera System (Type 6 room) and one equipped as a (Type 6 room) Education Camera System source (interview) room
G2.0.6.5	Large Group Therapy Room	1	30.0	30.0	**D**	Anti-ligature; CCTV for clinical teaching; conference phone;	Virtual Care (Telehealth) fit

						millwork to store equipment	out (Type 5b room)
	Sub-total (CNSM)			**118.0**			
	Total Unit 1 (CNSM)			**973.40**			
	UNIT 2						
G2.1.1.0	**FAMILY SUPPORT AREAS**						
G2.1.1.1	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom (toilet/sink); Anti-ligature	
G2.1.1.2	Visitor Lounge	1	12.0	12.0	**D/E**	Includes tables, chairs, shelving, display, couches	
	Sub-total (CNSM)			**16.5**			
G2.1.2.0	**STAFF SUPPORT AREAS**						
G2.1.2.1	Reception	1	6.0	6.0	**H**	Unit clerk; 2 sit down workstations with PC's, phones (1 back up analog; each workstation 1 voip), desks, chairs; clerical storage; security monitors on counter; contiguous with Care Team Base; mobile chart rack; consider wheelchair accessible interviews	
G2.1.2.2	Care Team Base	8	4.5	36.0	**H**	Partially open workspaces and partially enclosed. 8 Chairs, 8 workspaces (3 stand up in enclosed portion; 3 sit down in enclosed portion; 2 stand up in open portion) with 2 PC's and 6 Thin Clients, lab printer, lab labeler, 4 voip phones; Anti-barricade; hand hygiene sink in enclosed portion	
G2.1.2.3	Pneumatic Tube Station	1	2.0	2.0	**C**		
G2.1.2.4	Work Room	1	11.0	11.0	**C**	Floor model MFD; paper supply;	

						integral to Care Team Base	
G2.1.2.5	Staff Washroom	1	4.5	4.5	**C**	2-piece washroom (toilet, sink); locate adjacent to Care Team Base	
G2.1.2.6	Staff Conference Room	1	25.0	25.0	**C**	Lightweight and moveable tables and chairs; accommodates 12-15 people; conference phone	Type 2 room
G2.1.2.7	Nursing Leader Office	1	15.0	15.0	**C/D**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones, cabinets, visitor chairs; adjacent to Care Team Base	
G2.1.2.8	Social Work Office	1	9.5	9.5	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs; adjacent to Patient area; not within Care Team Base	
	Sub-total (CNSM)			**109.0**			
G2.1.3.0	**CLINIC SUPPORT AREAS**						
G2.1.3.1	Central Storage Room	1	25.0	25.0	**C**	Open area with some wire racks, electrical and charging considerations; Patient storage bins; portable Patient lift; 4 data ports for equipment	
G2.1.3.2	Crash Cart Closet	1	5.9	5.9	**C**	Crash Cart; with doors; lockable; close to med room; data drop	
G2.1.3.3	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving, secure; automated drug dispenser; locked cupboard for medications; hand hygiene sink; PC; voip	

						phone; adjacent to Care Team Base	
G2.1.3.4	Wheelchair/Stretcher Alcove	1	4.5	4.5	**C**	Space for three items per floor at 1.5 NSM	
	Sub-total (CNSM)			**44.9**			
G2.1.4.0	**PATIENT BEDROOMS**						
G2.1.4.1	Patient Bedroom	15	14.0	210.0	**G**	Design similar to bachelor apartment; Anti-ligature; residential type bed; slider chair; desk; wardrobe; ceiling lift with locking mechanism for 1 Inpatient Contact Isolation Room; 1 hand hygiene sink mid-way down Patient corridor	
G2.1.4.2	Patient Bedroom Contact Isolation Ante Room	1	4.5	4.5	**J**	Anti-ligature; hand hygiene sink	
G2.1.4.3	Not used						
G2.1.4.4	Ensuite	15	6.0	90.0	**G**	1 x 3 piece Ensuite per inpatient room; Anti-ligature	
	Sub-total (CNSM)			**304.5**			
G2.1.5.0	**PATIENT SUPPORT ZONE**						
G2.1.5.1	Comfort Room	1	14.0	14.0	**G**	Multisensory Room to decrease anxiety; away from the secure room and high traffic areas; natural light; carpet; infrastructure for media wall; sound and light control; ceiling speakers	
G2.1.5.2	Dining Room/Lounge	1	56.0	56.0	**E**	Large dining to accommodate 18 seats; Nourishment Station with utility sink and drinking fountain with bottlefillers; hand hygiene sink; Lounge activities; adjacent to outdoor space; Anti-	

						ligature; TV; 2 analog phones/2 PC access for Patients; ceiling speakers	
G2.1.5.3	Hamper Alcove	3	1.0	3.0	**C**	3 per unit	
G2.1.5.4	Laundry Facility	1	10.0	10.0	**F**	Accommodates 1 washer and 1 dryer; Anti-ligature	
G2.1.5.5	Linen Closet	1	2.0	2.0	**C**	Secure; Anti-ligature; with doors	
G2.1.5.6	Lounge (Quiet)	1	16.0	16.0	**F**	Small lounge to accommodate 8 seats; Anti-ligature; outside Dining room/Lounge; infrastructure for TV; electric fireplace	
G2.1.5.7	Food Cart Closet	1	2.0	2.0	**C**	To house cart: 64“ L x 32“ W x 60“ H; secure; Anti-ligature; with doors	
G2.1.5.8	Secure Room	1	14.0	14.0	**J**	Secure room; single Patient space; 4 hard-walls; CCTV; Anti-ligature; toilet; sink with water fountain; ability to shut off at room; window; 1 per 15 beds; not near bedrooms; site line from Care Team Base	
G2.1.5.9	Secure Room Ante Room	1	5.5	5.5	**J**	Hand hygiene sink; Anti-ligature; shower with curtain; intercom; CCTV	
G2.1.5.10	Secure Outdoor Space	1	258.0	258.0	**E**		
	Sub-total (CNSM)			**380.5**			
G2.1.6.0	**THERAPY ZONE**						
G2.1.6.1	Exam/Treatment Room	1	14.0	14.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic	

						panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button	
G2.1.6.2	Exercise/Wellness Room	1	18.0	18.0	**D**	Accommodates 2 stationary bikes, exercise area; adjacent to large group therapy space; data; glass wall; full length mirrors ; ceiling speakers	
G2.1.6.3	Individual Consult Therapy Room	1	11.0	11.0	**D**	Anti-ligature; desk/table; 4 chairs; PC; voip phone; data drops; hard-wired panic/duress button; double egress	Virtual Care (Telehealth) capable - wiring R/I (Type 5a room). Also equipped as a (Type 6 room) Education Camera system source (interview) room
G2.1.6.4	Large Consult Therapy Room	3	15.0	45.0	**D**	Table, chairs, accommodates 10 people; adjacent to Care Team Base; Anti-ligature; CCTV for clinical teaching; double egress; conference phone	All rooms Virtual Care (Telehealth) capable - wiring R/I only (Type 5a room); One equipped with Screens + Speakers for viewing Education Camera System (Type 6 room) and one equipped as a (Type 6 room) Education Camera System source (interview) room
G2.1.6.5	Large Group Therapy Room	1	30.0	30.0	**D**	Anti-ligature; CCTV for clinical teaching; conference phone; millwork to store equipment	Virtual Care (Telehealth) fit out (Type 5b room)

	Sub-total (CNSM)			**118.0**			
	Total Unit 2 (CNSM)			**973.40**			
	UNIT 1 AND 2						
G2.2	**SHARED AREAS PER FLOOR**						
G.2.2.1.1	Allied Health Room	1	20.0	20.0	**D**	With 2 PC sit down workstations and 1 voip phone incorporated in room; special equipment storage; double egress	
G.2.2.1.2	Clean Supply Room	1	11.0	11.0	**C**	Wire Racks; accommodates two-bin system (24"W shelves with 30" clear space for circulation); no data drops	
G.2.2.1.3	Housekeeping Closet	1	7.5	7.5	**C**	Accommodates housekeeping cart, mop sink, shelving; no data drops	
G.2.2.1.4	Life Skills Assessment Room	1	20.0	20.0	**D**	Anti-ligature; 1 per floor; kitchen (mimic homelike kitchen); island; table/chairs for 6 people; PC; voip phone	
G.2.2.1.5	Soiled Utility Room	1	8.0	8.0	**C**	Millwork with utility sink; storage; hand hygiene sink; floor drain; no data drops; bed pan sanitizer	
G.2.2.1.6	Soiled Holding Room	1	18.0	18.0	**C**	For recycling, garbage and soiled linen holding; hand hygiene sink; no data drops	
G.2.2.1.7	Staff Lockers	80	0.5	40.0	**C**	1/2 lockers adjacent to Staff Lounge	Adjacent
G.2.2.1.8	Staff Lounge	1	35.0	35.0	**C**	Soft seating; Kitchenette with utility sink; hand hygiene sink; fridge, microwave, counter space, tables, chair,	

						dishwasher; PC; voip phone	
G.2.2.1.9	Staff Washroom	2	6.5	13.0	C	3-piece washroom (toilet, sink, shower); locate adjacent to lounge	
G.2.2.1.10	Electrical Room	1	12	12.0	B		
G.2.2.1.11	Communications Room	1	17.9	17.9	B		
G.2.2.1.12	Elevator Vestibule	1	30.5	30.5	A		
G.2.2.1.13	Secure Vestibule	1	34	34.0	C		
	Total Shared Areas (CNSM)			**261.7**			

G3.0	**Inpatient Mental Health Services: Unit 3 - 15 Bed IPU**						
	Description	**Unit**	**Unit/ NSM**	**Total NSM**	**Safety/ Risk Category**	**Comments**	**Multimedia Category**
G3.0.1	**FAMILY SUPPORT AREAS**						
G3.0.1.1	Patient/Public Washroom	1	4.5	4.5	G	Accessible; 2-piece washroom (toilet/sink); Anti-ligature	
G3.0.1.2	Visitor Lounge	1	12.0	12	D/E	Includes tables, chairs, shelving, display, couches	
	Sub-total (CNSM)			**16.5**			
G3.0.2	**STAFF SUPPORT AREAS**						
G3.0.2.1	Reception	1	6.0	6.0	H	Unit clerk; 2 sit down workstations with PC's, phones (1 back up analog; each workstation 1 voip), desks, chairs; clerical storage; security monitors on counter; contiguous with Care Team Base; mobile chart rack; consider wheelchair accessible interviews	

G3.0.2.2	Care Team Base	8	4.5	36.0	**H**	Partially open workspaces and partially enclosed. 8 Chairs, 8 workspaces (3 stand up in enclosed portion; 3 sit down in enclosed portion; 2 stand up in open portion) with 2 PC's and 6 Thin Clients, lab printer, lab labeler, 4 voip phones; Anti-barricade; hand hygiene sink in enclosed portion	
G3.0.2.3	Pneumatic Tube Station	1	2.0	2.0	**C**	1 per unit	
G3.0.2.4	Work Room	1	11.0	11.0	**C**	Floor model MFD; paper supply; integral to Care Team Base	
G3.0.2.5	Staff Washroom	1	4.5	4.5	**C**	2-piece washroom (toilet, sink); locate adjacent to Care Team Base	
G3.0.2.6	Staff Conference Room	1	25.0	25.0	**C**	Lightweight and moveable tables and chairs; accommodates 12-15 people; conference phone	Type 2 room
G3.0.2.7	Nursing Leader Office	1	15.0	15.0	**C**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones, cabinets, visitor chairs; adjacent to Care Team Base	
G3.0.2.8	Social Work Office	1	9.5	9.5	**C**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs; adjacent to Patient area; not within Care Team Base	
	Sub-total (CNSM)			**109.0**			
G3.0.3	**CLINIC SUPPORT AREAS**						

G3.0.3.1	Central Storage Room	1	25.0	25.0	**C**	Open area with some wire racks, electrical and charging considerations; Patient storage bins; portable Patient lift; 4 data ports for equipment	
G3.0.3.2	Crash Cart Closet	1	5.9	5.9	**C**	Crash Cart; with doors; lockable; close to med room; data drop	
G3.0.3.3	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving, secure; automated drug dispenser; locked cupboard for medications; hand hygiene sink; PC; voip phone; adjacent to Care Team Base; locked cupboard for medications	
G3.0.3.4	Wheelchair/Stretcher Alcove	1	4.5	4.5	**C**	Space for three items per floor at 1.5 NSM	
	Sub-total (CNSM)			**44.9**			
G3.0.4	**PATIENT BEDROOMS**						
G3.0.4.1	Patient Bedroom	14	14.0	196.0	**G**	Design similar to bachelor apartment; Anti-ligature; residential type bed; slider chair; desk; wardrobe; 1 hand hygiene sink mid-way down Patient corridor	
G3.0.4.2	Ensuite	14	6.0	84.0	**G**	1 x 3 piece Ensuite per inpatient room, Anti-ligature	
G3.0.4.3	Patient Bedroom Bariatric Contact Isolation Room	1	25.0	25.0	**G**	Design similar to bachelor apartment; Anti-ligature; bariatric capacity; ceiling lift with locking mechanism; medical bed; slider chair; desk; wardrobe	

G3.0.4.4	Patient Bedroom Bariatric Contact Isolation Ensuite	1	7.5	7.5	**G**	3 piece Ensuite, Anti-ligature	
G3.0.4.5	Patient Bedroom Bariatric Contact Isolation Ante Room	1	4.5	4.5	**J**	Anti-ligature; hand hygiene sink	
	Sub-total (CNSM)			**317.0**			
G3.0.5	**PATIENT SUPPORT ZONE**						
G3.0.5.1	Comfort Room	1	14.0	14.0	**G**	Multisensory Room to decrease anxiety; away from the secure room and high traffic areas; natural light; carpet; infrastructure for media wall; sound and light control; ceiling speakers	
G3.0.5.2	Dining Room/Lounge	1	56.0	56.0	**E**	Large dining to accommodate 18 seats; Nourishment Station with utility sink and drinking fountain with bottlefillers; hand hygiene sink; Lounge activities; adjacent to outdoor space; Anti-ligature; TV; 2 analog phones/2 PC's access for Patients; ceiling speakers	
G3.0.5.3	Hamper Alcove	3	1.0	3.0	**C**	1 per 5 beds	
G3.0.5.4	Laundry Facility	1	10.0	10.0	**F**	Accommodates 1 washer and 1 dryer; Anti-ligature	
G3.0.5.5	Linen Closet	1	2.0	2.0	**C**	Secure; Anti-ligature; with doors	
G3.0.5.6	Lounge (Quiet)	1	16.0	16.0	**F**	Small lounge to accommodate 8 seats; Anti-ligature; outside Dining room/Lounge; Infrastructure for TV; electric fireplace	
G3.0.5.7	Food Cart Closet	1	2.0	2.0	**C**	To house cart: 64“ L x 32“ W x 60“ H; secure; Anti-ligature; with doors; outside Dining room/Lounge	

G3.0.5.8	Secure Room	1	14.0	14.0	**J**	Secure Room; single Patient space; 4 hard-walls; CCTV; Anti-ligature; toilet; sink with water fountain; ability to shut off at room; window; 1 per 15 beds; not near bedrooms; site line from Care Team Base	
G3.0.5.9	Secure Room Ante Room	1	5.5	5.5	**J**	Hand hygiene sink; Anti-ligature; shower with curtain; intercom; CCTV	
G3.0.5.10	Secure Outdoor Space	1	151.0	151.0	**E**		
	Sub-total (CNSM)			**273.5**			
G3.0.6	**THERAPY ZONE**						
G3.0.6.1	Allied Health Room	1	20.0	20.0	**D**	With 2 PC sit down workstations and 1 voip phone incorporated in room; special equipment storage; double egress	
G3.0.6.2	Exam/Treatment Room	1	14.0	14.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button	
G3.0.6.3	Exercise/Wellness Room	1	18.0	18.0	**D**	Accommodates 2 stationary bikes, exercise area; adjacent to large group therapy space; data; glass wall; full length mirrors; ceiling speakers	

G3.0.6.4	Individual Consult Therapy Room	1	11.0	11.0	**D**	Anti-ligature; desk/table; 4 chairs; PC; voip phone; data drops; hard-wired panic/duress button; double egress	Virtual Care (Telehealth) capable - wiring R/I (Type 5a room). Also equipped as a (Type 6 room) Education Camera system source (interview) room;
G3.0.6.5	Large Consult Therapy Room	3	15.0	45.0	**D**	Table, chairs, accommodates 10 people; adjacent to Care Team Base; Anti-ligature; CCTV for clinical teaching; double egress; conference phone	Audio-Visual/Video-conferencing capability; All rooms Virtual Care (Telehealth) capable - wiring R/I only (Type 5a room); One equipped with Screens + Speakers for viewing Education Camera System (Type 6 room) and one equipped as a (Type 6 room) Education Camera System source (interview) room
G3.0.6.6	Large Group Therapy Room	1	30.0	30.0	**D**	Anti-ligature; CCTV for clinical teaching; conference phone; millwork to store equipment	Virtual Care (Telehealth) fit out (Type 5b room)
	Sub-total (CNSM)			**138.0**			
	Total Unit 3 (CNSM)			**898.90**			
G3.1	**Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU**						
	Description	**Unit**	**Unit/ NSM**	**Total NSM**		**Comments**	**Multimedia Category**

G3.1.1	**FAMILY SUPPORT AREAS**						
G3.1.1.1	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom (toilet/sink); Anti-ligature	
G3.1.1.2	Visitor Lounge	1	12.0	12	**D/E**	Includes tables, chairs, shelving, display, couches	
	Sub-total (CNSM)			**16.5**			
G3.1.2	**STAFF SUPPORT AREAS**						
G3.1.2.1	Reception	1	6.0	6.0	**H**	Unit clerk; 2 sit down workstations with PC's, phones (1 back up analog; each workstation 1 voip), desks, chairs; clerical storage; security monitors on counter; contiguous with Care Team Base; mobile chart rack; consider wheelchair accessible interviews	
G3.1.2.2	Care Team Base	8	4.5	36.0	**H**	Partially open workspaces and partially enclosed. 8 Chairs, 8 workspaces (3 stand up in enclosed portion; 3 sit down in enclosed portion; 2 stand up in open portion) with 2 PC's and 6 Thin Clients, lab printer, lab labeler, 4 voip phones; Anti-barricade; hand hygiene sink in enclosed portion	
G3.1.2.3	Pneumatic Tube Station	1	2.0	2.0	**C**	1 per unit	
G3.1.2.4	Work Room	1	11.0	11.0	**C**	Floor model MFD; paper supply; integral to Care Team Base	
G3.1.2.5	Staff Washroom	1	4.5	4.5	**C**	2-piece washroom (toilet, sink); locate adjacent to Care Team Base	

G3.1.2.6	Staff Conference Room	1	25.0	25.0	**C**	Lightweight and moveable tables and chairs; accommodates 12-15 people; conference phone	Type 2 room
G3.1.2.7	Nursing Leader Office	1	15.0	15.0	**C/D**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones, cabinets, visitor chairs; adjacent to Care Team Base	
G3.1.2.8	CNE Office	1	9.5	9.5	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs; adjacent to Patient area; not within Care Team Base	
	Sub-total (CNSM)			**109.0**			
G3.1.3	**CLINIC SUPPORT AREAS**						
G3.1.3.1	Central Storage Room	1	25.0	25.0	**C**	Open area with some wire racks, electrical and charging considerations; Patient storage bins; portable Patient lift; 4 data ports for equipment	
G3.1.3.2	Crash Cart Closet	1	5.9	5.9	**C**	Crash Cart; with doors; lockable; close to med room; data drop	
G3.1.3.3	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving; secure; automated drug dispenser; locked cupboard for medications; hand hygiene sink; PC; voip phone; adjacent to Care Team Base; locked cupboard for medications	
G3.1.3.4	Wheelchair/Stretcher Alcove	1	4.5	4.5	**C**	Space for three items per floor at 1.5 NSM	
	Sub-total (CNSM)			**44.9**			

G3.1.4	**PATIENT BEDROOMS**						
G3.1.4.1	Patient Bedroom	10	14.0	140.0	**G**	Design similar to bachelor apartment; Anti-ligature; CCTV; residential type bed; slider chair; desk; wardrobe; 1 hand hygiene sink mid-way down Patient corridor	
G3.1.4.2	Patient Bedroom Contact Isolation Room Ante Room	1	4.5	4.5	**J**	Anti-ligature; hand hygiene sink	
G3.1.4.3	Ensuite	10	6.0	60.0	**G**	1 x 3 piece Ensuite per inpatient room Anti-ligature	
	Sub-total (CNSM)			**204.5**			
G3.1.5	**PATIENT SUPPORT ZONE**						
G3.1.5.1	Comfort Room	1	14.0	14.0	**G**	Multisensory Room to decrease anxiety; away from the secure room and high traffic areas; natural light; carpet; infrastructure for media wall; sound and light control; ceiling speakers	
G3.1.5.2	Dining Room/Lounge	1	38.0	38.0	**E**	Large dining to accommodate 15 seats; Nourishment Station with utility sink and drinking fountain with bottlefillers; hand hygiene sink; Lounge activities; adjacent to outdoor space; Anti-ligature; TV; 2 analog phones/2 PC access for Patients; ceiling speakers	
G3.1.5.3	Hamper Alcove	2	1.0	2.0	**C**	1 per 5 beds	
G3.1.5.4	Laundry Facility	1	10.0	10.0	**F**	Accommodates 1 washer and 1 dryer; Anti-ligature	
G3.1.5.5	Linen Closet	1	2.0	2.0	**C**	Secure; Anti-ligature; with doors	

G3.1.5.6	Lounge (Quiet)	1	16.0	16.0	**F**	Small lounge to accommodate 8 seats; Anti-ligature; outside Dining room/Lounge; infrastructure for TV; electric fireplace	
G3.1.5.7	Food Cart Closet	1	2.0	2.0	**C**	To house cart: 64" L x 32" W x 60" H; secure; Anti-ligature; with doors; outside Dining room/Lounge	
G3.1.5.8	Secure Room	2	14.0	28.0	**J**	Secure Room; single Patient space; 4 hard-walls; CCTV; Anti-ligature; toilet; sink with water fountain; ability to shut off at room; window; 1 per 15 beds; not near bedrooms; site line from Care Team Base; Secure Rooms side by side	
G3.1.5.9	Secure Room Ante Room	1	11.0	11.0	**J**	Hand hygiene sink; Anti-ligature; shower with curtain; intercom; CCTV; one ante room for the two Secure Rooms	
G3.1.5.10	Secure Outdoor Space	1	156.0	156.0	**E**		
	Sub-total (CNSM)			**279.0**			
G3.1.6	**THERAPY ZONE**						
G3.1.6.1	Allied Health Room	1	20.0	20.0	**D**	With 2 PC sit down workstations and 1 voip phone incorporated in room; special equipment storage; double egress	
G3.1.6.2	Exam/Treatment Room	1	14.0	14.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-	

						barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button.	
G3.1.6.3	Exercise/Wellness Room	1	18.0	18.0	**D**	Accommodates 2 stationary bikes, exercise area; adjacent to large group therapy space; data; glass wall; full length mirrors; ceiling speakers	
G3.1.6.4	Individual Consult Therapy Room	1	11.0	11.0	**D**	Anti-ligature; desk/table; 4 chairs; PC; voip phone; data drops; hard-wired panic/duress button; double egress	Virtual Care (Telehealth) capable - wiring R/I (Type 5a room). Also equipped as a (Type 6 room) Education Camera system source (interview) room
G3.1.6.5	Large Consult Therapy Room	3	15.0	45.0	**D**	Table, chairs, accommodates 10 people; adjacent to Care Team Base; Anti-ligature; CCTV for clinical teaching; double egress; conference phone	All rooms Virtual Care (Telehealth) capable - wiring R/I only (Type 5a room); One equipped with Screens + Speakers for viewing Education Camera System (Type 6 room) and one equipped as a (Type 6 room) Education Camera System source (interview) room
G3.1.6.6	Large Group Therapy Room	1	30.0	30.0	**D**	Anti-ligature; CCTV for clinical teaching; conference phone; millwork to store equipment	Virtual Care (Telehealth) fit out (Type 5b room)

	Sub-total (CNSM)			**138.0**			
	Total Unit 4 (CNSM)			**791.90**			
G3.2.1	**SHARED AREAS PER FLOOR**						
G3.2.1.1	Clean Supply Room	1	11.0	11.0	**C**	Wire Racks; accommodates two-bin system (24" shelves with 30" clear space for circulation); no data drops	
G3.2.1.2	Housekeeping Closet	1	7.5	7.5	**C**	Accommodates housekeeping cart, mop sink, shelving; no data drops	
G3.2.1.3	Life Skills Assessment Room	1	20.0	20.0	**D**	Anti-ligature; 1 per floor; kitchen (mimic homelike kitchen); island; table/chairs for 6 people; PC; voip phone	
G3.2.1.4	Soiled Utility Room	1	8.0	8.0	**C**	Millwork with utility sink; storage; hand hygiene sink; floor drain; no data drops; bed pan sanitizer	
G3.2.1.5	Soiled Holding Room	1	18.0	18.0	**C**	For recycling, garbage and soiled linen holding; hand hygiene sink; no data drops	
G3.2.1.6	Staff Lockers	65	0.5	32.5	**C**	1/2 lockers; 40 with washroom closest to IPU and 25 with washroom closest to PHAU; adjacent to Staff Lounge	
G3.2.1.7	Staff Lounge	1	35.0	35.0	**C**	Soft seating for up to 20 people; Kitchenette with utility sink; hand hygiene sink; fridge, microwave, counter space, tables, chair, dishwasher; PC; voip phone	
G3.2.1.8	Staff Washroom	2	6.5	13.0	**C**	3-piece washroom (toilet, sink, shower);	

						locate adjacent to lounge; one closer to IPU and 1 closer to PHAU	
G3.2.1.9	Electrical Room	1	12	12.0	**B**		
G3.2.1.10	Communications Room	1	17.9	17.9	**B**		
G3.2.1.11	Elevator Vestibule	1	30.5	30.5	**A**		
G3.2.1.12	Secure Vestibule	1	34.0	34.0	**D**		
	Total Shared Areas (CNSM)			**234.2**			

G4.0	**Inpatient Mental Health Services: Unit 5 - 20 Bed Older Adult Unit**						
	Description	**Unit**	**Unit/ NSM**	**Total NSM**	**Safety/ Risk Category**	**Comments**	**Multimedia Category**
G4.0.1	**FAMILY SUPPORT AREAS**						
G4.0.1.1	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom (toilet/sink); Anti-ligature	
G4.0.1.2	Visitor Lounge	1	16.0	16.0	**D/E**	Includes tables, chairs, shelving, display, couches; for 8-10 people	
	Sub-total (CNSM)			**20.5**			
G4.0.2	**STAFF SUPPORT AREAS**						
G4.0.2.1	Reception	1	6.0	6.0	**H**	Unit clerk; 2 sit down workstations with PC's, phones (1 back up analog; each workstation 1 voip), desks, chairs; clerical storage; security monitors on counter; contiguous with Care Team Base; mobile chart rack; consider wheelchair accessible interviews	

G4.0.2.2	Care Team Base	8	4.5	36.0	**H**	Partially open workspaces and partially enclosed. 8 Chairs, 8 workspaces (3 stand up in enclosed portion; 3 sit down in enclosed portion; 2 stand up in open portion) with 2 PC's and 6 Thin Clients, lab printer, lab labeler, 4 voip phones; Anti-barricade; hand hygiene sink in enclosed portion	
G4.0.2.3	Pneumatic Tube Station	1	2.0	2.0	**C**	1 per unit	
G4.0.2.4	Work Room	1	11.0	11.0	**C**	Floor model MFD; paper supply; integral to Care Team Base	
G4.0.2.5	Staff Washroom	1	4.5	4.5	**C**	2-piece washroom (toilet, sink); locate adjacent to Care Team Base	
G4.0.2.6	Staff Conference Room	1	25.0	25.0	**C**	Lightweight and moveable tables and chairs; accommodates 12-15 people; conference phone	Type 2 room
G4.0.2.7	Physician Lead Office	1	11.0	11.0	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs and small table; extra ports for 2nd workstation; 4 data drops	
G4.0.2.8	Nursing Leader Office (PCC, CNE)	1	15.0	15.0	**C/D**	Private office with 2 workstations; 2 PC's; 2 chairs, 2 voip phones, cabinets, visitor chairs; adjacent to Care Team Base	

G4.0.2.9	Social Work Office	1	9.5	9.5	**C/D**	Private office with desk, chair, PC, voip phone, cabinets, visitor chairs; adjacent to Patient area; not within Care Team Base	
G4.0.2.10	Staff Lounge	1	25.0	25.0	**C**	Soft seating for 12 people; Kitchenette with utility sink; hand hygiene sink, fridge, microwave, counter space, tables, chair dishwasher; PC; voip phone	
G4.0.2.11	Staff Lockers	40	0.5	20.0	**C**	1/2 lockers; adjacent to Staff Lounge and Staff Washroom	
G4.0.2.12	Staff Washroom	1	6.5	6.5	**C**	3-piece washroom (toilet, sink, shower); locate adjacent to Lounge	
G4.0.2.13	Multi-Purpose Room	1	50.0	50.0	**C**	To be shared amongst all units; can be dividable into two rooms; Anti-ligature; light not imperative; access from elevators without going through unit; Thin Client; conference phone; seats 25-40 people	Type 2 room
G4.0.2.14	Staff Outdoor Space	1	286.0	286.0	**C**		
	Sub-total (CNSM)			**507.5**			
G4.0.3	**CLINIC SUPPORT AREAS**						
G4.0.3.1	Central Storage Room	1	30.0	30.0	**C**	Open area with some wire racks, electrical and charging considerations; Patient storage bins; portable Patient lift; 4 data ports for equipment	

G4.0.3.2	Clean Supply Room	1	11.0	11.0	**C**	Wire Racks; accommodates two-bin system (24"W shelves with 30" clear space for circulation); no data drops	
G4.0.3.3	Crash Cart Closet	1	5.9	5.9	**C**	Crash Cart; with doors; lockable; close to med room; data drop	
G4.0.3.4	Housekeeping Closet	1	7.5	7.5	**C**	Accommodates housekeeping cart, mop sink, shelving; no data drops	
G4.0.3.5	Medication Room	1	9.5	9.5	**C**	Counter space; fridge; shelving, secure; automated drug dispenser; locked cupboard for medications; hand hygiene sink; PC; phone; adjacent to Care Team Base; locked cupboard for medications	
G4.0.3.6	Soiled Utility Room	1	8.0	8.0	**C**	Millwork with utility sink, storage, hand hygiene sink, floor drain; no data drops; bed pan sanitizer	
G4.0.3.7	Soiled Holding Room	1	18.0	18.0	**C**	For recycling, garbage and soiled linen holding; hand hygiene sink; no data drops	
G4.0.3.8	Wheelchair/Stretcher Alcove	1	5.0	5.0	**C**	Space for three items at 1.5 NSM per chair and 2.0 NSM per stretcher	
G4.0.3.9	Electrical Room	1	12.0	12.0	**B**		
G4.0.3.10	Communications Room	1	17.9	17.9	**B**		
G4.0.3.11	Elevator Vestibule	1	30.5	30.5	**A**		
G4.0.3.12	Secure Vestibule	1	34.0	34.0	**D**		
	Sub-total (CNSM)			**184.1**			
G4.0.4	**SERVICE DELIVERY SPACE**						

G4.0.4.1	Clean Holding Room	1	22	22.0	**C**	with doors	
G4.0.4.2	Food Services Holding Room	1	18	18.0	**C**	with doors	
G4.0.4.3	Soiled Holding Room	1	25	25.0	**C**	with doors	
G4.0.4.4	Tow motor parking	1	42	42.0	**C**	This area does not include circulation of required corridors adjacent or around it	
	Sub-total (CNSM)			**107.0**			
G4.0.5	**PATIENT BEDROOMS**						
G4.0.5.1	Patient Bedroom	19	18.0	342.0	**G**	Design similar to bachelor apartment; Anti-ligature; medical bed; slider chair; desk; wardrobe; 1 hand hygiene sink mid-way down Patient corridor	
G4.0.5.2	Ensuite	19	6.0	114.0	**G**	1 x 3 piece Ensuite per inpatient room, Anti-ligature	
G4.0.5.3	Patient Bedroom Bariatric Contact Isolation Room	1	25.0	25.0	**G**	Design similar to bachelor apartment; Anti-ligature; bariatric capacity; ceiling lift with locking mechanism; medical bed; slider chair; desk; wardrobe	
G4.0.5.4	Patient Bedroom Bariatric Contact Isolation Ensuite	1	7.5	7.5	**G**	3 piece Ensuite Anti-ligature	
G4.0.5.5	Patient Bedroom Bariatric Contact Isolation Ante Room	1	4.5	4.5	**J**	Anti-ligature; hand hygiene sink	
	Sub-total (CNSM)			**493.0**			
G4.0.6	**PATIENT SUPPORT ZONE**						
G4.0.6.1	Comfort Room	1	14.0	14.0	**G**	Multisensory Room to decrease anxiety; away from the secure room and high traffic areas; natural light; carpet; infrastructure for media wall; sound	

						and light control; ceiling speakers	
G4.0.6.2	Dining Room/Lounge	1	75.0	75.0	**E**	Large dining to accommodate 24 seats; Nourishment Station with utility sink and drinking fountain and bottlefillers; hand hygiene sink; Lounge activities; adjacent to outdoor space; Anti-ligature; TV; 2 phones/2 computer access for Patient; ceiling speakers	
G4.0.6.3	Hamper Alcove	4	1.0	4.0	**C**	1 per 5 beds	
G4.0.6.4	Linen Closet	1	2.0	2.0	**C**	Secure; Anti-ligature; with doors	
G4.0.6.5	Lounge (Quiet)	1	16.0	16.0	**F**	Small lounge to accommodate 8 seats; Anti-ligature; outside of Dining room/Lounge; infrastructure for TV; electric fireplace	
G4.0.6.6	Laundry Facility	1	10.0	10.0	**F**	Accommodates 1 washer and 1 dryer; Anti-ligature	
G4.0.6.7	Life Skills Assessment Room	1	20.0	20.0	**D**	Anti-ligature; 1 per floor; kitchen (mimic homelike kitchen); island; table/chairs for 6 people; PC; voip phone	
G4.0.6.8	Food Cart Closet	1	2.0	2.0	**C**	To house cart: 64“ L x 32“ W x 60“ H; secure; Anti-ligature; with doors; outside Dining room/Lounge	
G4.0.6.9	Secure Room	1	14.0	14.0	**J**	Secure room; single Patient space; 4 hard-walls; CCTV; Anti-ligature; toilet; sink with water fountain; ability to	

						shut off at room; window; 1 per 15 beds; not near bedrooms; site line from Care Team Base	
G4.0.6.10	Secure Room Ante Room	1	5.5	5.5	**J**	Hand hygiene sink; Anti-ligature; shower with curtain; intercom; CCTV	
G4.0.6.11	Tub Room	1	14.0	14.0	**D**	walk-in tub; storage cupboards; Anti-ligature; toilet; ceiling lift with locking mechanism	
G4.0.6.12	Secure Outdoor Space (East)	1	83.0	83.0	**E**		
G4.0.6.13	Secure Outdoor Space (West)	1	196.0	196.0	**E**		
	Sub-total (CNSM)			**455.5**			
G4.0.7	**THERAPY ZONE**						
G4.0.7.1	Allied Health Room	1	20.0	20.0	**D**	With 2 PC sit down workstations and 1 voip phone incorporated in room; special equipment storage; double egress	
G4.0.7.2	Exam/Treatment Room	1	16.0	16.0	**D**	To accommodate a height adjustable Exam Table; hand hygiene sink, countertop; locked cupboard for supplies; Anti-barricade; diagnostic panel (opthalmoscope, otoscope, etc); Thin Client; voip phone; panic/duress button	
G4.0.7.3	Exercise/Wellness Room	1	18.0	18.0	**D**	Accommodates 2 stationary bikes, exercise area; adjacent to large group therapy space; data; glass wall; full length	

						mirrors; ceiling speakers	
G4.0.7.4	Individual Consult Therapy Room	1	11.0	11.0	**D**	Anti-ligature; desk/table; 4 chairs; PC; voip phone; data drops; hard-wired panic/duress button; double egress	Virtual Care (Telehealth) capable - wiring R/I (Type 5a room). Also equipped as a (Type 6 room) Education Camera system source (interview) room
G4.0.7.5	Large Consult Therapy Room	3	15.0	45.0	**D**	Table, chairs, accommodates 10 people; adjacent to Care Team Base; Anti-ligature; CCTV for clinical teaching; double egress; conference phone	All rooms Virtual Care (Telehealth) capable - wiring R/I only (Type 5a room); One equipped with Screens + Speakers for viewing Education Camera System (Type 6 room) and one equipped as a (Type 6 room) Education Camera System source (interview) room
G4.0.7.6	Large Group Therapy Room	1	36.0	36.0	**D**	Anti-ligature; CCTV for clinical teaching; conference phone; millwork to store equipment	Virtual Care (Telehealth) fit out (Type 5b room)
G4.0.7.7	Patient/Public Washroom	1	4.5	4.5	**G**	Accessible; 2-piece washroom; Anti-ligature	
	Sub-total (CNSM)			**150.5**			
	Total Unit 5 (CNSM)			**1,918.10**			

4.9 Space Table – Parking/Sally-Port

G0.1	Description	Unit	Unit/ NSM	Total NSM	Safety/ Risk Category	Comments
G0.1.1	Sally-Port	**1**	78.5	78.5	**G**	To accommodate Patient transfer; 2 voip phones wall mounted
G0.1.2	Sally-Port Secure Vestibule	**1**	46.7	46.7	**G**	Minimum width in the shortest dimension shall be 2400mm clear.
G0.1.3	Electrical Room	1	21.0	21.0	**B**	
G0.1.4	Public Elevator Lobby	1	35.5	35.5	**A**	
	Parking stalls					Refer to SOR
	Sub-total (CNSM)			**181.7**		

Appendix 1B(I)

Energy Centre Technical Specifications

HHAngus

MASTER PROJECT SPECIFICATIONS
DIVISION 20 MECHANICAL

Royal Columbian Hospital Redevelopment
Appendix 1B(i) Energy Centre Technical Specifications
Design-Build Agreement

HHA #2151229-02

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SECTION NO. SECTION TITLE

DIVISION 20

DIVISION 22

DIVISION 23

MECHANICAL GENERAL REQUIREMENTS
20 01 01

1 GENERAL

1.1 General Contract Documents

.1 Comply with General Conditions of Contract, Supplementary Conditions and Division 1 - General Requirements.

1.2 Work Included

.1 Work to be done under Divisions 20, 22 and 23 to include furnishing of labour, materials and equipment required for installation, testing and putting into proper operation complete mechanical systems as shown, as specified, as intended, and as otherwise required. Complete systems to be left ready for continuous and efficient satisfactory operation.

1.3 Document Organization

.1 Applicable Divisions for Mechanical Work:

.1 Division 20 - Common Work for Mechanical

.2 Division 22 - Plumbing and Drainage

.3 Division 23 - Heating, Ventilation and Air Conditioning (HVAC)

.2 For clarity, any reference in the Contract Documents to Division 20 includes Divisions 21, 22 and 23.

.3 The Specifications for these Divisions are arranged in Sections for convenience. It is not intended to recognize, set or define limits to any subcontract or to restrict Contractor in letting subcontracts.

.4 Contractor is responsible for completion of work whether or not portions are sublet.

1.4 Division 20, as it applies to Divisions 22 and 23

.1 Articles that are of a general nature, applicable to each Section of these Divisions.

.2 Articles specifying materials, equipment, installation techniques and workmanship that are applicable to more than one Section of these Divisions.

.3 Articles that are to be read in context with and form part of relevant Sections of these Divisions.

1.5 Definitions

.1 The words "indicated", "shown", "noted", "listed" or similar words or phrases used in this Specification, mean that material or item referred to is "indicated", "shown", "listed" or "noted" on Drawings or in Specification.

.2 The words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected", or similar words or phrases used in this Specification, mean that material or item referred to is to be "approved by", "satisfactory to", "as directed by", "submitted to", "permitted by", "inspected by", Consultant.

.3 Instructions using any form of word "provide" involves Contractor in furnishing labour, materials and services to supply and install referenced item.

1.6 Language

.1 The specification is written as a series of instructions addressed to the Contractor, and by implication to subcontractors and to suppliers. For clarity and brevity, use is made of numbered lists and bulleted lists. Where list follows a semi-colon (;) the punctuation is for clarity. Where a list follows a colon (:) the punctuation is to be read as a short-hand form of the verb “to be” or “to have” as context requires.

.2 It is not intended to debate with the Contractor the reasons for these instructions, and words associated with justification for an instruction or restatement of anticipated performance have been omitted to avoid possible ambiguities.

1.7 Examination

.1 Examine any existing buildings, local conditions, building site, Specifications, and Drawings and report any condition, defect or interference that would prevent execution of the work.

.2 No allowance will be made for any expense incurred through failure to make these examinations of the site and the documents prior to Tender or on account of any conditions on site or any growth or item existing there which was visible or known to exist at time of Tender.

.3 Examine work of other Divisions before commencing this work, and report any defect or interference.

1.8 Design Services

.1 Provide design services for elements of the Work where specified in other sections of Division 20, sealed by a professional engineer licensed in British Columbia.

1.9 Standard of Material and Equipment

.1 Materials and equipment:

.1 new and of uniform pattern throughout work,

.2 of Canadian manufacture where obtainable,

.3 standard products of approved manufacture.

.4 labeled or listed as required by Code and/or Inspection Authorities,

.5 registered in accordance with the requirements of BC Safety Authority for the Registration of Non-nuclear Fittings in the Province of British Columbia,

.6 in compliance with Standards and Regulations with respect to;

(a) chemical and physical properties of materials,
(b) design,
(c) performance characteristics, and
(d) methods of construction and installation.

.7 identical units of equipment to be of same manufacture.

.8 identical component parts of same manufacture in similar units of equipment, but various component parts of each unit need not be from one manufacturer.

.2 Materials and equipment are described to establish standards of construction and workmanship.

.1 Where manufacturers or manufacturer’s products are identified in lists with the phrase "Standard of Acceptance", these are manufacturers and/or products which meet required standards with regard to performance, quality of material and workmanship.

.2 Manufacturers and or products used are to be chosen from these lists.

.3 Select materials and equipment in accordance with manufacturer's recommendations and install in accordance with manufacturer's instructions.

.4 Materials and equipment not satisfying these selection criteria will be condemned.

.5 Remove condemned materials from job site and provide properly selected and approved materials.

1.10 Substitutions

.1 The use of a substitute article or material which the manufacturer represents to be of at least equal quality and of the required characteristics for the purpose intended may be permitted, subject to the following provisions:

.1 a substitution will not be considered for reasons of meeting the construction schedule unless the contractor can demonstrate to the satisfaction of the Consultant they made all reasonable efforts to procure the specified product or material in a timely fashion,

.2 the manufacturer must advise the Consultant of this intention to use an alternative article or material before doing so,

.3 the burden of proof as to the quality and suitability of alternatives to be upon the manufacturer and they shall supply all information necessary as required by the Consultant at no additional costs to the contract,

.4 the Consultant to be the sole judge as to the quality and suitability of alternative materials and their decision to be final,

.5 where use of an alternative material involves redesign or changes to other parts of the work, the costs and the time required to effect such redesign or changes will be considered in evaluating the suitability of the alternative materials,

.6 no test or action relating to the approval of substitute materials to be made until the request for substitution has been made in writing by the manufacturer and has been accompanied by complete data as to the quality of the materials proposed. Such request to be made in ample time to permit appropriate review without delaying the work, taking into consideration that such a substitution request may be rejected and require providing the product or material as originally specified,

.7 Whenever classification, listing, or other certification by a recognized standards body is a part of the specifications for any material, proposals for use of substitute materials to be accompanied by reports from the equivalent body indicating compliance with the requirements of the specifications,

.8 The costs of all testing required to prove equality of the material proposed to be borne by the manufacturer.

2 SUBMITTALS

2.1 Shop Drawings and Product Data Sheets

.1 Submit shop drawings, manufacturers and product data.

.1 Submit shop drawings in the same unit of measure as are used on the drawings. Both metric and imperial measures may be included.

.2 Shop drawings and product data to show;

(a) dimensioned outlines of equipment
(b) dimensioned details showing service connection points.
(c) elevations illustrating locations of visible equipment such as gauges, pilot lights, breakers and their trip settings, windows, meters, access doors.

(d) description of operation.
(e) single line diagrams.
(f) general routing of bus ducts and connecting services.
(g) mounting and fixing arrangements.
(h) operating and maintenance clearances, and
(i) access door swing spaces.

.3 Shop drawings and product data to be accompanied by;

(a) detailed drawings of bases, supports and anchor bolts,
(b) sound power data, where applicable, and
(c) performance curve for each piece of equipment marked with point of operation.

.4 Shop drawing and data sheet submission is taken as certification;

.1 that units are from Manufacturer's current production and

.2 in compliance with applicable Codes, Standards, and Regulations.

.5 Do not submit drawings showing internal construction details, component assemblies or interior piping and wiring diagrams. These may be necessary to understand correct functioning of equipment and should be submitted with operating and maintenance data.

.6 Check and stamp each shop drawing as being correct before submission. Shop drawings without such stamps will be rejected and returned.

.7 Keep one copy of each reviewed shop drawing and product data sheet on site available for reference purposes.

.8 Where equipment is delivered without reviewed shop drawing available on site, equipment will be condemned and is to be removed from site and replaced with new equipment after shop drawing has been submitted and reviewed.

2.2 Field, Fabrication, or Installation Drawings

.1 Contractor field, fabrication, installation, and/or sleeving drawings will not be reviewed as shop drawings. If submitted as a shop drawing, a transmittal only will be returned identifying the submitted drawings have not been reviewed.

.2 Maintain a copy on site of such drawings for reference by the Consultant.

.3 Provide a copy of such drawings to the Consultant for general information purpose only, upon request.

3 EQUIPMENT

3.1 Manufacturers Nameplates

.1 Metal nameplate with raised or recessed lettering, mounted on each piece of equipment.

.2 On insulated equipment, mechanically fasten plates on metal stand-off bracket arranged to clear insulation and mount Underwriters Laboratories and/or CSA registration plates on same stand-off brackets.

.3 Manufacturer's nameplate to indicate equipment size, capacity, model designation, manufacturer's name, serial number, voltage, cycle, phase and power rating of motors, and approval listings.

3.2 Factory Applied Finish Painting

.1 Apply prime and final paint coats to equipment and materials where specifically detailed in Sections of these Divisions.

.2 Apply prime and final paint coats factory to pumps, air moving units, un-insulated pressure vessels and bare metal equipment items in boiler, mechanical and fan rooms.

.3 Use heat resistant paint where conditions require.

.4 Protect factory finished equipment during construction, and clean at completion of work.

3.3 Factory Applied Prime Painting

.1 Have prime paint factory applied to other equipment fabricated from iron or steel including access doors, registers, grilles, diffusers, dampers, metal radiation enclosures and fire hose cabinets.

3.4 Field Painting

.1 After equipment has been installed and piping and insulation is completed, clean rust and oil from exposed iron and steel work provided under this Division, whether or not it has been factory prime painted.

.2 In "occupied" areas of building touch up any damage to prime coat resulting from shipping or installation and leave ready for final painting under Finishes, Division 9.

.3 In "un-occupied" areas of the building such as mechanical equipment rooms, boiler rooms, fan rooms, crawl spaces, pipe tunnels and penthouses:

.1 paint exposed galvanized metal surfaces with one coat of zinc dust galvanized primer and one coat of 100% Alkyd base enamel in an approved colour; and

.2 paint exposed iron or steel work with one coat of chrome oxide phenolic base primer and one coat of 100% Alkyd base enamel in an approved colour.

.4 In "Unoccupied " areas of the building such as mechanical equipment rooms, boiler rooms, fan rooms, crawl spaces, pipe tunnels and penthouses, touch up any damage to prime coat resulting from shipping or installation and leave ready for final painting by Owner's forces.

3.5 Provision for Future

.1 Where space is indicated as reserved for future equipment or for future extension to building, leave such space clear and install piping, raceways and equipment so that connections can be made to future apparatus or building.

.2 Identify provisions and service terminations for future on Record Drawings.

3.6 Maintenance of Bearings

.1 "Turn over" rotating equipment at least once a month from delivery to site until start-up.

.2 "Run-in" sleeve type bearings in accordance with manufacturer's written recommendation. After "run-in", drain, flush out and refill with new charge of oil or grease.

.3 Protect bearings, shafts and sheaves against damage, corrosion and dust accumulation during building construction.

3.7 Appliances and Tools

.1 Provide tools, equipment, scaffolding, extension cords, lamps and miscellaneous consumable materials, required to carry out work.

4 COORDINATION

4.1 General

.1 Lay out and coordinate Work to avoid conflict with work under other Divisions.

.2 Make good damage to Owner's property caused by inaccurate layout or careless performance of work of this Division.

.3 Install services and equipment which are to be concealed, close to building structure so that furring is kept to minimum dimensions.

4.2 Field, Fabrication, and Installation Drawings

.1 Prepare field, fabrication, and/or installation drawings to show location of equipment and relative position of services, and to demonstrate coordination with works of other trades.

.1 Drawing scale: minimum 1:50 (1/4"=1'-0")

.2 Use information from manufacturer's shop drawings for each trade and figured dimensions from latest Architectural and Structural Drawings.

.3 Layout equipment and services to provide access for repair and maintenance.

.4 Submit drawings to other trades involved in each area and include note in drawing title block as follows;

.1 “This drawing was prepared and circulated for review and mark-up to related subcontractors as noted and initialed in the table below. Corrections and concerns identified through this coordination process have been addressed on this drawing. Areas that incorporate significant changes from layouts shown on Contract Drawings have been circled for Consultants’ review”.

.5 Neatly cut or frill holes required in existing construction to accommodate cable, raceways, bus duct or cabletray.

5 WORK IN EXISTING BUILDING

5.1 General

.1 Work includes changes to existing building and changes at junction of old and new construction. Route pipes, ducts, conduits and other services to avoid interference with existing installation.

.2 Relocate existing pipes, ducts, conduits, bus ducts and any other equipment or services required for proper installation of new work, including as required for temporary removal and re-installation to suit new installation work.

.3 Remove existing plumbing fixtures, lighting fixtures, piping, ductwork, wiring, and equipment to suit new construction. Cut back and cap drain, vent and water outlets, conduits and electrical outlets, not being used.

.4 Plumbing fixtures, piping, ductwork, conduit and wiring shown to be removed and not shown relocated, to become property of Contractor and to be taken from site.

.5 On completion of relocations, confirm relocated equipment are in proper working order.

.6 Where Owner wishes to take over renovated areas ahead of project completion date and these areas are to be fed from new distribution systems, make temporary connections to existing services in these areas. Reconnect to permanent services, at later date, when new distribution systems are available.

5.2 Continuity of Services

.1 Make connections to existing systems at approved times. Obtain written approval recording times when connections can be made. Arrange work so that physical access to existing buildings is not unduly interrupted.

.2 Be responsible for and make good any damages caused to existing systems when making connections.

.3 Keep existing buildings in operation with minimum length of shutdown periods. Include overtime work to tie-in piping or wiring at night or on weekends.

6 FINAL CLEANING AND ADJUSTMENTS

6.1 General

.1 Conduct final cleaning.

.2 Thoroughly clean exterior surface of exposed piping, and vacuum external surfaces of exposed ducts and interior surfaces of air handling units. Clean strainers in piping systems and install clean filters in air handling systems.

.3 Remove tools and waste materials on completion of work and leave work in clean and perfect condition.

.4 Calibrate components and controls and check function and sequencing of systems under operating conditions.

.5 Supply lubricating oils and packing for proper operation of equipment and systems until work has been accepted.

7 RECORD DRAWINGS

7.1 Record drawings

.1 Provide record drawings in accordance with Section 01 78 39 and as specified herein.

.2 A set of design drawings in AutoCad on CD or DVD ROM will be provided by the Consultant. Make sets of white prints for each phase of Work, and as Work progresses and changes occur mark white prints in coloured inks to show revisions. Dimension locations of drains, pipes, ductwork, conduit, manholes, foundations and similar buried items within the building, with respect to building column centres. Mark level with respect to an elevation which will be provided.

.3 Survey information from excavation and backfill of site services to be held on site, after approval, and to be similarly transferred to white prints.

.4 Retain these drawings and make available to Consultant for periodic review.

.5 At 50%, 75% and 90% project completion, scan marked-up drawings to Adobe .pdf format and submit copy to the Consultant, or to the project on-line document service if one is used.

7.2 As-built drawings

.1 Prior to testing, balancing and adjusting, transfer site record drawing information to AutoCad (CAD) files, to record final as-built condition. Obtain a current set of CAD files from the Consultant.

.1 Drawings are to remain set to and follow Consultants AutoCad Standards. Do not alter drawing scales, X-refs, colours, layers or text styles.

.2 The Consultant's CAD files may not reflect all or any construction changes.

.2 Where items have been deleted, moved, renumbered or otherwise changed from contract drawings, revise the CAD files to record these changes. “Bubble” these revisions, and place these annotations on a separate and easily identified drawing layer.

.3 Show on mechanical as-built drawings final location of piping, ductwork, switches, starters, Motor Control Centres, thermostats, and equipment.

.4 Show on site services as-built drawings survey information provided by British Columbia Land Surveyor (OLS) monitoring services installation.

.5 Identify each drawing in lower right hand corner in letters at least 12 mm (½ in) high as follows "AS-BUILT DRAWINGS. This drawing has been revised to show systems as installed" (Signature of Contractor) (Date). The site services drawings are to include signature and stamp of OLS surveyor attached to note.

.6 Submit one (1) set of white prints of the draft as-built Cad files for Consultants’ review.

.7 Once “AS BUILT DRAWINGS” white prints are reviewed, transfer Consultant's comments to the CAD files. Return AutoCad drawings modified to “As Built” condition to Consultants on CD or DVD Rom.

.8 Submit three (3) sets of white prints and three (3) copies of CAD files with Operating and Maintenance Manuals.

7.3 OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Provide operation and maintenance data bound in 210 mm x 300 mm x 50mm thick (8½ in x 11 in x 2 in thick) size, vinyl covered, hard back, three-ring covers.

.1 Organize material in volumes generally grouped by Trade Section; Site services, Plumbing, Fire Protection, Heating and Cooling Plant and Distribution, Air Handling, and Controls and Instrumentation.

.2 Title sheet in each volume to be labeled "Operating and Maintenance Manual" and to bear Project Name, Project Number, Date, Trade Section, and List of Contents.

.2 In addition, provide Adobe PDF files for each document, produced from original direct-to-digital file creations.

.1 Organize documents into separate PDF files for each Trade Section identified above, and apply Adobe Bookmarks to create Table of Contents.

.3 Operating data to include;

.1 control schematics for each system,

.2 description of each system and associated control elements,

.3 control operating sequences at various load conditions, reset schedules and anticipated seasonal variances,

.4 operating instructions for each system and each component,

.5 description of actions to be taken in event of equipment failure,

.6 valves schedule and flow diagram,

.7 service piping identification charts.

.4 Maintenance data to include;

.1 manufacturer's literature covering, servicing, maintenance, operating and trouble-shooting instructions for each item of equipment,

.2 fault locating guide,

.3 manufacturer's parts list,

.4 reviewed shop drawings,

.5 equipment manufacturer's performance sheets,

.6 equipment performance verification test results,

.7 voltage and ampere rating for each item of electrical equipment,

.8 spare parts list and an itemized cost,

.9 name and telephone numbers of service organization and technical staff that will provide warranty service on the various items of equipment.

.5 Approval procedure

.1 Submit one set of first draft of Operating and Maintenance Manuals for approval.

.2 Make corrections and resubmit as directed.

.3 Review contents of Operating and Maintenance Manuals with Owner's operating staff or representative to ensure thorough understanding of each item of equipment and its operation.

.4 Hand-over two copies of Operating and Maintenance Manuals to Owner's operating staff and obtain written confirmation of delivery.

7.4 Operating and Maintenance Instructions

.1 Provide instructions to Owners operations staff to thoroughly explain operation and maintenance of each system, incorporating specialized instruction by manufacturers as described under other Sections in these Divisions. Include classroom instruction and hands-on instruction, delivered by competent instructors.

.2 Submit an outline of the training program for review, adjustment and approval by the Owner.

.3 Structure each session to start with the classroom instruction for the overall system, followed by hands-on instruction for each equipment, utilizing the services of the manufacturers' representative as required.

.4 Organize and schedule each training session to deliver the required instruction in an efficient and effective manner on a schedule agreed upon with the Owner. Allow for two (2) training sessions for each training session, separated by approximately one week each. Develop the proposed training plan and obtain approval from the Owner before commencing training.

.5 Complete the training as close to Substantial Performance as possible, so that the operations staff are prepared to operate the systems after Substantial Performance is certified.

.6 Organize each training sessions as follows:

.1 Plumbing – Division 22

.2 HVAC – Division 23

.3 Building Management System – Division 25

.7 Keep record of date and duration of each instruction period together with names of persons attending. Submit signed records at completion of instruction.

.8 For each training session, include the following topics:

.1 General purpose of system (design intent),

.2 Use of O&M manuals,

.3 Review of control drawings and schematics,

.4 Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, control set-up and programming troubleshooting, and alarms,

.5 Interaction with other systems,

.6 Adjustments and optimizing methods for energy conservation,

.7 Health and safety issues,

.8 Special maintenance and replacement sources,

.9 Occupancy interaction issues, and

.10 System response to different operating conditions.

.9 Develop and provide training material, including printed documents and electronic presentation aids (eg. MS Powerpoint) for each session. Submit three (3) copies of materials in both hardcopy and electronic format, in accordance with article on Operating and Maintenance Manuals.

.10 Sessions may be videotaped by the Owner as an aid to ongoing training of Owners staff.

8 START-UP AND TESTING

8.1 Care, Operation and Start-up

.1 Arrange and pay for services of manufacturer's factory service technician to supervise start-up of installation, check, adjust, balance and calibrate components.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with every aspect of the operation, care and maintenance thereof.

8.2 Testing - General

.1 Methods to comply with following references:

(a) BC Safety Authority
(b) CSA B149.1 Natural Gas and Propane Installation Code

.2 Conduct tests, during progress of Work and at its completion to show equipment and systems meet contract. Submit details of test methods in writing and obtain approval before commencing work.

.3 Supply test equipment, apparatus, gauges, meters and data recorders, together with skilled personnel to perform tests and log results.

.4 Submit written notice 24 hours in advance of each test series, setting out the time, place and nature of the tests, the Inspection Authority and personnel witnessing tests.

.5 Conduct tests before application of external insulation and before any portion of pipes, ducts or equipment is concealed.

.6 Do not subject expansion joints, flexible pipe connections, meters, control valves, convertors, and fixtures, to test pressures, greater than stated working pressure of equipment. Isolate or remove equipment or devices during tests when prescribed test pressure is greater than working pressure of any piece of equipment or device.

.7 Should section of pipe or duct fail under test, replace faulty fittings or duct with new fittings, pipe or duct, repair and retest. Do not repair screwed joints by caulking nor welded joints by peening. Repeat tests until results are satisfactory.

.8 Where it is necessary to test portions of duct or piping system before system is complete, overlap successive tests so that no joint or section of duct or pipe is missed in testing.

.9 Upon completion of work and testing of same, submit logs to demonstrate that tests have been carried out satisfactorily. Repeat any tests if requested.

8.3 Testing - Potable Water Piping

.1 Test potable water systems with water or air as required by The BC Building Code.

.2 For water service pipes 100mm (4") and larger, disinfect the pipe with chlorine from the street valve to the first shut-off valve inside the building. Provide testing laboratory certificate confirming water contaminates are below the threshold values in BC Reg.200/2003.

8.4 Testing - Other Piping

.1 Hydraulically test other water piping systems at 1½ times system design pressure (relief valve setting) or 1000 kPa (150 psi), whichever is greater, for 24 hours. Pressure must remain essentially constant throughout test period without pumping. Make allowance for correction of pressure readings for variations in ambient temperature between start and finish of test. Hammer test welded joints during hydrostatic test.

.2 Test natural gas system to CSA B149.1.

.3 Test fuel oil systems to CSA B139.

.4 Test drainage, waste and vent piping for tightness and grade as required by BC Building Code.

.5 Test special service piping as detailed.

.6 Test high pressure steam piping and compressed air piping in accordance with requirements of local and Provincial Authorities.

8.5 Testing - Ventilation

.1 Test ductwork in accordance with procedures detailed.

.2 Test low pressure ductwork with an air pressure of 1 Kpa (4 in wg for 10 minutes.

.3 Test medium pressure ductwork with an air pressure of 2 Kpa (8 in wg) for 10 minutes.

.4 Test high pressure ductwork with an air pressure of 3 Kpa (12 in wg) for 10 minutes.

.5 Examine construction joints for damage or weakening. Reduce pressure to maximum working pressure or 1 Kpa (4 in wg), whichever is larger, and check joints for audible leaks. Mark each leak and repair after pressure is released. Retest repaired section of duct.

8.6 Commissioning

.1 Participate in commissioning of equipment and systems.

9 TEMPORARY AND TRIAL USAGE

9.1 General

.1 Temporary and trial usage by Owner of any mechanical or electrical device, machinery, apparatus, equipment or any other work or materials before final completion and written acceptance is not to be construed as evidence of acceptance by Owner.

.2 Owner to have privilege of such temporary and trial usage, as soon as that said work is claimed to be completed and in accordance with Contract Documents, for such reasonable length of time as is sufficient for making complete and thorough test of same.

.3 No claims will be considered for damage to or failure of any parts of such work so used which may be discovered during temporary and trial usage, whether caused by weakness or inaccuracy of structural parts or by defective materials or workmanship of any kind whatsoever.

.4 Defects in workmanship and materials identified during temporary and trial usage are to be rectified under guarantee.

10 SPARE PARTS

10.1 General

.1 Furnish spare parts as follows

- .1 One set of packing for each pump gland.
- .2 One casing joint gasket for each size pump.
- .3 One head gasket for each heat exchanger.
- .4 One glass for each gauge glass.
- .5 One set of V-belts for each drive.
- .6 One filter cartridge or set of filter media for each filter or filter bank installed.

END OF SECTION

BASIC MATERIALS AND METHODS
20 05 01

1 GENERAL

1.1 Scope

.1 Articles that are of a general nature, applicable to each Section of Division 20, 22 and 23.

2 ACCESS DOORS

.1 Provide access doors to be installed at locations where equipment requiring inspection, service, maintenance or adjustment is "built-in" to work of other trades.

.2 Access is required at;

- .1 expansion joints,
- .2 dampers,
- .3 fire dampers,
- .4 air valves,
- .5 air terminal units,
- .6 isolation and control valves ,
- .7 pressure reducing valves,
- .8 heating or cooling coils,
- .9 control wiring junction boxes.

.3 Submit shop drawings showing access door size, type and location.

.4 Construction:

- .1 constructed of steel, prime coated,.
- .2 flush mounted with 180E opening door, round safety corners, concealed hinges, plaster lock and anchor straps
- .3 600 mm x 600 mm (24 in x 24 in) for personnel entry,
- .4 300 mm x 450 mm (12 in x 18 in) for hand entry, and
- .5 constructed of stainless steel in areas finished with tile or marble surfaces
- .6 constructed of stainless steel with neoprene gasketed door in damp and high humidity areas
- .7 generally fitted with screwdriver operated latches, except in areas subject to security risks (Public Corridors, Psychiatric Patient Areas, Public Washrooms). In these areas doors to be fitted with keyed cylinder locks with similar keys.

Standard of Acceptance

- Baird - ABCO
- Stelpro - Type 700
- Williams Brothers - GP
- LeHage
- Acudor Acorn
- Mifab

.5 Installation:

.1 Supply access doors and make arrangements and pay for installation by Division in whose work they occur.

.2 Size and locate access doors in applied tile, block or in glazed or unglazed structural tile to suit joint patterns.

.3 Access doors in ceilings, where acoustic tile is applied to plaster or gypsum board, to be dish type designed to receive tile insert.

.4 Access doors are not required in removable ceilings. Provide coloured marking devices after completion of ceilings, at four corners of each panel below point requiring access. Colour code markers to show service or device above.

.5 At time of instruction of owners operating staff, hand-over and obtain signed receipt for 4 sets of each type of key used to lock access doors in secure areas.

3 DRAIN VALVES

.1 Provide drain points for piping systems with drain valves at low points and at section isolating valves.

.2 Drain valves: minimum NPS 2 straight pattern bronze with hose end male thread, cap and chain.

4 V-BELT DRIVES

.1 Provide V-belt drive for each motor driven device which is not direct connected. Keep overhung loads on prime mover shafts within manufacturer's design guidelines.

.2 Sheaves for motors to 7.5 kW (10 hp) with not more than two belts:

.1 cast iron or steel secured to shafts with removable keys.

.2 adjustable pitch on motor, fixed pitch on driven device, giving plus or minus 10% speed range,

.3 selected to meet specified operating condition at mid position in pitch adjustment.

.3 Sheaves for motors over 7.5 kW (10 hp) or drives with three or more belts

.1 cast iron or steel with split tapered bushing and keyway.

.2 fixed pitch.

.4 Belts:

.1 matched sets of 'b' section, selected for service factor of 2.0 based on installed motor horsepower.

.2 capable of carrying load with one belt broken.

.5 Motor slide rails:

.1 adjustment plates for centre line alignment

.2 belt tension adjusting screws.

.6 Installation

.1 Tension belts to manufacturer's recommendations before start-up and after first 100 hr of operation using calibrated belt tensioning gauge.

.2 Provide replacement pulleys and belts during start-up and balancing to suit field operating conditions.

5 DRIVE AND COUPLING GUARDS

.1 Provide guards to protect belt drives, flywheels, rotating couplings on equipment and fan inlet and outlets.

.2 Guards:

.1 removable for servicing,

.2 arranged to permit lubrication with guards in place.

.3 Guards for belt drives:

.1 expanded metal screen welded to steel bar stock or angle frame,

.2 minimum 1.2 mm (18 ga) thick galvanized sheet metal tops and bottoms,

.3 40 mm (1-1/2") diameter holes at both shaft centres for insertion of tachometer.

.4 Flexible coupling and flywheel guards:

.1 Removable "U" shaped, minimum 1.6 mm (16 ga) thick galvanized mild steel or expanded metal mesh on substantial welded angle iron or round barstock frame.

.5 Guards on unprotected fan inlets and outlets:

.1 Minimum 20 mm (¾ in) galvanized wire mesh or expanded metal screen with net free area of guard not less than 80% of fan opening.

.6 Installation

.1 Belt guards to accommodate movement of motors for belt tension adjustment.

.2 Where equipment is installed on resiliently mounted base frame or pad, attach belt guard to this base

.3 Belt guards and fan inlet guards may be omitted where fan and motor is installed in plenum less than 1.4 m (4 ft) high and disconnect for fan motor is mounted adjacent to and outside access door to plenum.

.4 Fan inlet guards may be omitted where fan is fitted with inlet guide vanes.

6 SLEEVES

6.1 General

.1 Sleeve pipes, ducts and conduits passing through masonry walls, concrete floors, and fire rated gypsum board ceilings and partitions.

.2 Maintain fire rating integrity where pipes and ducts pass through fire rated walls, floors and partitions.

6.2 Floor and Wall Sleeves

.1 Sleeves in fire separations:

.1 sized to suit fire stopping methods employed for bare pipes, conduits, insulated pipes, and bare and insulated ducts without fire dampers, and

.2 sized to suit conditions of approval given in manufacturers installation instructions for fire and smoke dampers.

.2 Sleeves in other construction:

.1 sized to clear insulated pipes and ducts by 13 mm (2 in) all round, and

.2 sized to clear conduits, bare pipes, and bare ducts by 6 mm (3 in) all round.

.3 Sleeves for pipes, conduits and ducts smaller than 0.4 m5 (4 sq ft) through solid walls and floors:

.1 Schedule 40 steel pipe or 1 mm (20 ga) (minimum) sheet metal, lapped and spot welded.

.2 Sleeves for pipes, conduits and ducts smaller than 0.4 m5 (4 sq ft) through gypsum board partitions:

(a) 1 mm (20 ga) minimum sheet metal, lapped and spot welded with 20 mm (: in) lip flange at one and.

.4 Sleeves for ducts 0.4 m5 (4 sq ft) and larger through walls and floors:

.1 1.6 mm (16 ga) minimum sheet metal, lapped and spot welded with 20 mm (: in) lip flange at one end.

6.3 Waterproof sleeves

.1 Applications:

.1 where pipes and ducts pass through floors in areas subject to water, in mechanical rooms, in kitchens, in washing areas and in slabs over electric and telephone rooms.

.2 Waterproof sleeves for pipes and conduits:

.1 Schedule 40 pipe, with 75 mm (3 in) wide annular fin continuously welded at midpoint, hot dip galvanized after fabrication.

.3 Waterproof sleeves for ducts less than 0.4 m5 (4 sq ft):

.1 1 mm (20 ga) galvanized steel, with 40 mm (12 in) flange at midpoint.

.4 Waterproof sleeves for ducts 0.4 m5 (4 sq ft) and larger and openings with multiple ducts:

.1 1.6 mm (16 ga) galvanized steel, with 40 mm (12 in) flange at midpoint, or,

.2 form opening with wood (removed after concrete is set) and trim opening with welded steel angle frame 75 mm (3 in) high , bolted to slab and caulked, or,

.3 trim opening with 75 mm x 75 mm (3 in x 3 in) continuous concrete curb doweled to slab.

.5 Modifications for existing construction:

.1 annular fins and flanges attached to sleeve at point equivalent to surrounding floor level or curb.

6.4 Installation

.1 Place and secure sleeves in concrete form work.

.2 Supply sleeves to be set in concrete and masonry walls with installation detail drawings.

.3 Regular sleeves;

.1 terminate flush with surfaces of concrete and masonry walls.

.4 Waterproof sleeves in new construction;

.1 extend 75 mm (3 in) above finished floor.

.2 with flange embedded within concrete floor.

.5 Sleeves in existing concrete and masonry walls and floors;

.1 installed in neatly cut or drilled holes in existing construction,

.2 cutting and drilling of structural elements, such as floors, slabs, walls, columns, or beams to be carried out in accordance with procedure set out in Article ACutting and Patching@ below.

.3 terminate sleeves flush with surfaces of concrete and masonry walls,

.4 extend waterproof sleeves 75 mm (3 in) above finished floor with flange, countersunk, and bolted down flush into floor surface,

.5 fill opening between sleeve and wall or floor with 2 hour fire rated fire-stopping sealant with water barrier.

.6 Fill future-use sleeves with weak concrete, gypsum plaster or similar material.

.7 Coat exposed exterior surfaces of un-galvanized ferrous sleeves with heavy application of zinc rich paint

.8 At fire separations and smoke separations, pack and seal void between sleeve and pipe, duct without fire damper, conduit, or insulation in accordance with Article "Fire Stopping and Smoke Seals" in this Section.

.9 At other locations, pack void between sleeve and pipe, conduit, duct or insulation for full depth of sleeve, with mineral wool and seal with silicone-free caulking compound.

.10 Install fire dampers in accordance with conditions of approval given in manufacturer's instructions.

7 FIRE STOPPING AND SMOKE SEALS

7.1 General

.1 Provide fire stopping and smoke seals where ducts, pipes or conduits penetrate fire separations. Materials to be supplied, worker training to be arranged, and installation to be supervised, by a specialist firm with an established reputation in this field.

.2 Fire stop materials to be impervious to water when installed in a horizontal separation, including waterproof service sleeves.

7.2 Products

.1 Materials to form ULC listed or cUL listed/classified assemblies.

Standard of Acceptance
- 3M
- Nelson Firestop Products
- Hilti Firestop Systems
- Eastern Wire + Conduit (Royal Quickstop)

.2 Other manufacturers having products with explicitly similar characteristics, listings or classifications and approvals are acceptable.

7.3 Installation

.1 Seal space between penetrating service and sleeve or opening in slab with firestop and smoke sealing system in strict accordance with terms and conditions of original ULC or cUL listing and manufacturers recommended procedures.

.2 Select thickness and arrangement of back-up materials to suit size of service, length of sleeve and anticipated movement.

.3 Select firestopping system to allow insulation and vapour barrier to pass un-broken through assembly.

.4 Surfaces to be clean, dry and free from dust, oil, grease, loose or flaking paint and foreign materials at time of application of materials

.5 Do not apply fire stopping materials to fire or smoke dampers.

8 WALL AND FLOOR PLATES

.1 Fit pipes passing through walls, floors and ceilings in finished areas with escutcheon, wall or floor plates.

.2 Plates:

.1 at floor; chrome plated two piece split type with hinge.

.2 at walls and ceilings; similar to floor plate but with set screw to fasten plate to pipe.

8.2 Installation

.1 Plates:

.1 sized to cover sleeves

.2 secured tight against finished surfaces, and

.3 fitted to cover sleeve extensions where sleeves extend above finished floor.

9 LINK SEALS

.1 Fit each pipe passing through floor slab in contact with ground or basement walls below grade with link seal between sleeve and bare pipe.

.2 Submit manufacturer’s literature and schedule showing location, service, inside diameter of wall opening, sleeve length and pipe outside diameter.

.3 Link seal:

.1 Manufactured from modular synthetic rubber links with stainless steel hardware.

.2 Loosely assembled with bolts to form continuous rubber belt around pipe, with pressure plate under each bolt head and nut.

.3 Constructed to provide electrical insulation between pipe and sleeve.

Standard of Acceptance

- Power Plant Supply - "Thunderline Linkseal"
- Advance Products & Systems - AInnerlynx@

.4 Installation

.1 Determine inside diameter of each wall opening or sleeve before ordering seal.

.2 Position seal in sleeve around pipe and tighten bolts to expand rubber links until watertight seal is obtained.

10 PLATFORMS, LADDERS, COVERS, PIPE SUPPORTS, EQUIPMENT SUPPORTS, AND BASES

10.1 Supports for mechanical and electrical work

.1 Fabricate platforms, gratings, ladders, piping and equipment supplementary supporting steel, and trench and pit covers, from steel and provided by this Division.

.2 Concrete housekeeping bases for mechanical and electrical equipment which are in direct contact with floor slab, to be provided by this Division.

.3 Concrete bases for equipment supported on vibration isolation materials (inertia pads), to be provided by this Division.

.4 Work to be done by firms specializing in these fields.

.5 Submit shop drawings for steel and concrete work, prepared by licensed Professional Engineers.

10.2 Applicable codes and standards;

.1 WorkSafeBC requirements

.2 Occupational Health and Safety regulations

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A 269, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.108, Bituminous Solvent Type Paint.

.3 CAN/CGSB-1.181, Ready-Mixed, Organic Zinc-Rich Coating.

.5 Canadian Standards Association (CSA)

.1 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1, Limit States Design of Steel Structures.

.4 CSA W59, Welded Steel Construction (Metal Arc Welding).

10.3 Supplementary supports and support brackets:

.1 Fabricated from structural grade steel with anchor bolts and fastenings.

.2 Designed in consultation with building structural consultant to transfer live loads and dead loads to building structural elements,

.3 Constructed as frames bracketed from walls, and/or supported from building structure above, and/or floor below.

10.4 Platforms, ladders, and gratings

.1 Vertical ladders:

.1 fabricated with steel sides, 50 mm x 10 mm (2 in x d in) and 350 mm (14 in) apart with 20 mm (: in) round bars 300 mm (12 in) on centres secured to sides.

.2 designed to carry live load of 7.5 kPa (150 lb/sq ft) uniformly distributed.

.2 Platforms:

.1 supported from building structure.

.2 fitted with toe angle carried around outside of platform and extending at least 100 mm (4 in) above top of platform.

.3 covered with open steel floorway grating with pressed diagonal spacing bars. Bars to be 30 mm x 3 mm (13 in x c in).

.3 Gratings:

.1 made up in convenient lengths and arranged so that sections may be removed.

.2 full width

.3 fitted with toe angle carried around outside of grating, and extending at least 100 mm (4 in) above top of grating

.4 hot dipped galvanized after fabrication.

Standard of Acceptance
- Irving Type G.
- GS Metals - M.J. International

.4 Steel pipe railing:

.1 1070 mm (42 in) high, with intermediate rail 535 mm (21 in) high, around platforms on both sides, except where platform is within 150 mm (6 in) of building wall.

.2 made of 40 mm (12 in) standard steel pipe with pipe rail fittings and vertical pipe supports secured to platform structure not over 2 m (6 ft 6 in) apart.

.5 Sleeves through grating:

.1 mild steel pipe sleeves of sufficient size for pipe and insulation.

.2 welded to adjacent bars of platform so that platform strength is maintained.

.3 extend up at least 75 mm (3 in) above top of grating.

.6 Equipment openings through gratings:

.1 fitted with toe angles around equipment, framed to support grating and extending up at least 75 mm (3 in) above top of grating.

.7 Stairs:

.1 bolted to floor construction and masonry walls or steel framing of landing.

.2 treads of same grating as platforms.

.3 maximum rise 190 mm (7 2 in), minimum run 230 mm (9 in)

.4 supported on steel carrier angles at stringers with reinforcing and carrier angles not less than 30 mm x 30 mm x 5 mm (1 3 in x 1 3 in x 3/16 in).

.5 steel channel stringers continuous around landing and secured to masonry.

.8 Finish - Outdoor:

.1 Hot-dipped galvanized after fabrication for outdoor installations.

.9 Finish - Indoor:

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer.

.3 Paint on dry surfaces, free from rust, scale, grease.

.4 Do not paint when temperature is lower than 7EC.

.5 Clean surfaces to be field welded; do not paint.

10.5 Trench covers, and pit covers:

.1 Fabricated with:

.1 75 mm x 75 mm x 9.5 mm (3 in x 3 in x d in) welded angle frame with anchor bars,

.2 25 mm x 9.5 mm (1 in x d in) trim bar to fit concrete pit, and with matching chequer plate cover,

.3 hot dip galvanized after fabrication.

10.6 Concrete bases for housekeeping pads:

.1 Constructed using plywood form work and 20 Mpa (3000 lb) concrete,

.2 Doweled to concrete floor slab with not less than 13 mm (2 in) diameter steel rods.

.3 Plan dimensions:

.1 75 mm (3 in) larger all around than base of apparatus for non-seismic applications,

.2 200 mm (8 in) larger all around than base of apparatus for seismically restrained equipment, and

.3 finished to make smooth, neat surfaces with corners chamfered 25 mm (1 in).

.4 Height conforming to following table;

Equipment	Floor Type	Vibration Isolation	Thickness of Housekeeping Pad mm (in)
Stationary, not motorized	All	All	100 (4)
Motorized, up to 7.5kW (10 HP)	All	---	150 (6) (max. for fans)
	Slab on Grade	No	250 (10)

Motorized, 11 to 19kW (15 to 25 HP)	Slab on Grade	Yes	150 (6)
	Suspended Slab	Yes	150 (6)
Motorized, 22kW (30 HP) and over	Slab on Grade	No	300 (12)
	Slab on Grade	Yes	150 (6)
	Suspended Slab	Yes	150 (6)

10.7 Installation - General

.1 Locate supporting steel to permit removal of parts for service or repair, and to allow clear access to valves, fittings, and equipment,

.2 Set equipment on supporting frames and brackets and install hangers, anchor bolts, vibration mountings and snubbers.

.3 Set equipment base plates on housekeeping pads on minimum 13 mm (2 in) epoxy grout and fill hollow portion of base with concrete.

.4 Install anchor bolts, vibration mountings and snubbers between equipment and housekeeping pad, or inertia pad and housekeeping pad.

.5 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.6 Provide anchorage, dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.7 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.8 Supply items for casting into concrete or building into masonry to appropriate trades together with setting templates.

.9 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.10 Where gratings or trench covers are cut in field or damaged, touch up with zinc rich paint.

10.8 Installation - Equipment subject to thermal expansion

.1 Applicable to hot equipment which is not supported on spring vibration isolators, including but not limited to:

- .1 boilers, hot water heaters,
- .2 heat exchangers,
- .3 expansion tanks,
- .4 deaerators and condensate tanks,
- .5 diesel exhaust silencers.

.2 Fasten equipment to building structure to accommodate thermal expansion in accordance with manufacturer's instructions. In the absence of such instructions, fasten equipment support legs as follows unless otherwise shown;

.1 rigidly fasten one support point which is closest to piping connections,

.2 for supports located on the same transverse or longitudinal axis, provide guides with vertical restraint tabs, aligned in direction of fixed support point,

.3 Provide 3mm (1/8") thick PTFE (teflon) glide pads beneath each support leg.

END OF SECTION

ELECTRIC MOTORS
20 05 12

1 GENERAL

1.1 Scope

.1 Provide single phase and three-phase low-voltage induction motors, from fractional horsepower (143T Frame) to 200 horsepower (449T Frame).

1.2 Applicable Codes and Regulations

.1 Motors to be designed, manufactured, and tested in accordance with standards of:

.1 NEMA, ANSI, IEEE, and ASTM,

.2 conform with applicable sections of NEMA Standard No. MG-1 Motors and Generators.

2 PRODUCTS

2.1 General

.1 Test performance equal to or better than level required by Energy Efficiency regulations when tested to CSA 390 M Energy Efficiency Test Methods for Three Phase Induction Motors, or IEE 112b Standard Test Procedure for Polyphase Induction Motors and Generators.

.2 Motor nameplate rating:

.1 not less than input brake horsepower of driven equipment at specified operating condition,

.2 suitable for starting conditions.

.3 Motor characteristics;

.1 Frequency: 60 Hz

.2 Voltage:

(a) 120 volt, for single phase motors
(b) 575 volt, for three phase motors,

.3 Speed: 1750 RPM or as required.

2.2 Single Phase Motors

.1 Motors less than 375 W (½ HP):

.1 single phase,

.2 continuous duty,

.3 resilient mount, and

.4 built-in overload protection.

2.3 Three Phase Fractional Horsepower

.1 Motors of 375 W (½ HP) and 560 W (3/4 HP):

.1 three phase squirrel cage induction type,

.2 NEMA B:

(a) continuous duty,
(b) drip proof,
(c) ball bearing,
(d) Class B insulation, 40°C (104°F) ambient temperature.

2.4 Three Phase Motors for Service with Magnetic Starters

.1 Motors 745 W (1 HP) and larger for sine wave power supply.

.2 General:

.1 Open Drip Proof (ODP), NEMA T frame assembly

.2 NEMA Premium efficiency, general purpose duty type,

.3 suitable for horizontal, vertical or belt-driven mounting

.4 NEMA Design B, squirrel cage, induction type

.5 class B insulation, at 40°C (104°F) ambient temperature.

.6 1.15 service factor,

.7 3 leads for single voltage service.

.8 Two speed motors: six (6) lead motors.

(a) Five lead two-speed motors are not acceptable.

2.5 Three Phase Motors for Service with Adjustable Frequency Drives

.1 Motors 745 W (1 HP) and larger suitable for pulse width modulated wave form.

.2 General:

.1 Totally Enclosed Fan Cooled (TEFC), NEMA T frame assembly

.2 NEMA Premium efficiency, inverter duty type,

.3 suitable for horizontal, vertical or belt-driven mounting

.4 NEMA Design B, squirrel cage, induction type

.5 Fabricated and nameplated in accordance with NEMA MG-1 Part 31 for;

(a) 200% of full load starting torque
(b) Class F triple build winding insulation
(c) continuous duty
(d) 40°C (104°F) ambient temperature

.6 1.15 service factor,

.7 3 leads for single voltage service.

.8 Motor designed for grounding of stray rotor currents by application of electrically conductive bearing grease or rotor bearing brush assembly.

2.6 Enclosure, all motors

.1 Construction:

.1 cast iron, aluminum, or rolled steel construction,

.2 drain openings,

.3 shouldered lifting eye bolts,

.4 bi-directional, spark-proof, abrasion and corrosive resistant fan keyed to shaft,

.5 compression type grounding lug or double ended cap screw of silicon bronze, mounted in conduit box by drilling and tapping into motor frame

.2 Motor nameplate:

.1 Type 316 stainless steel,

.2 Mounted on enclosure with stainless steel fastening pins,

.3 information as described in NEMA Standard MG-1-20.60,

.4 motor bearing part numbers and motor wiring diagram indicated.

.3 Protective coating;

.1 primer and 4-5 mils epoxy overcoat on external surfaces, and corrosion resistant coating of epoxy paint on internal surfaces, shaft, rotor, stator iron, and end bells.

.2 shaft extension protected with rust preventive strippable coating capable of being peeled off or unwrapped.

.4 Motor termination boxes/leads:

.1 cast iron diagonally split, pipe tapped for conduit,

.2 attached to motor frame with cadmium plated hex head cap screws,

.3 arranged for conduit entry from either side or bottom,

.4 gaskets between box and motor frame and between halves of box,

.5 cover secured with cadmium plated hex head cap screws,

.6 box assembled to motor,

.7 motor leads in conduit box;

(a) identified in accordance with ANSI C6.1 ,
(b) with same insulation class as windings,
(c) sized in accordance with EASA recommended minimum ampacity values.

.8 motor leads between motor frame and termination box to pass through tight fitting neoprene rubber seal.

2.7 Three Phase Motor Construction for AFD

.1 Motor stator winding:

.1 made up with copper magnet wire coated with moisture resistant Class F, non-hygroscopic varnish with thermal rating of not less than 150EC for 30,000 hours life when tested in accordance with IEEE No. 57.

.2 insulation resistance greater than 100 megaohms when measured at 25°C with 1000-volt direct current megaohm bridge.

.3 held in stator slots that have had sharp edges and burs removed prior to winding insertion.

.4 coils phase insulated using Nomex paper, laced down.

.5 connection leads mechanically secured and silver soldered.

.6 designed for operation in either direction of rotation.

.2 Motor bearings:

.1 anti-friction single shield, vacuum-degassed steel ball bearings with;

(a) extended pipe zerk fitting, and ½-lb relief fitting for external lubrication while machine is in operation.
(b) bearing shield on motor winding side of bearing.
(c) rated fatigue life of L'-10 (B-10) 150,000 hours for direct coupled applications and 50,000 hours for belted applications.
(d) belted rating based on radial loads and pulley sizes from NEMA MG1-14.43.
(e) high quality bearing seal or Forsheda shaft slinger on outer or shaft end of bearing.

.2 lubricated at factory, after assembly, using zerk fittings to fill grease chamber and pipe extension

.3 Motor shafts and rotors

.1 Shafts:

(a) precision machined from high-strength carbon steel
(b) "standard long" for units 200-hp and smaller, for both direct connected drive duty and V-belt drives.

.2 rotor assemblies to be die cast aluminum, keyed, and shrunk or pressed to shaft using full shaft diameter for full length of rotor.

.3 shaft extension run out not to exceed 0.001" dial indicator reading measuring at right angles to shaft axis.

2.8 Motor over temperature protection

.1 Provide motor thermal protection devices in motors.

.2 Three phase motors 37 kW (50 HP) and larger:

.1 Winding sensors:

(a) three (3) Positive Temperature Coefficient (PTC) temperature sensors, one in each motor winding, wired in series, and compatible with Siemens model 3RN10 12 control unit
(b) control unit provided under section 20 05 13 Motors Starters and Wiring.

2.9 Sliding base for motors with V-belt drives:

.1 Construction:

.1 fabricated from steel as a single unit with double supported slide and two adjusting bolts.

.2 finished with coating as specified above for motor exterior.

2.10 Permissible Vibration

.1 Vibration velocity to be not more than 0.05 inches/second measured at bearing housing.

2.11 Sound pressure level:

.1 Not more than 85dbA, measured at 3 metres in accordance with IEEE publication No. 85.

.2 Motor manufacturer to ensure that motor is compatible with type of adjustable frequency generation to be supplied, and that system will be capable of providing rated torque over frequency range from 15 to 60 hz while operating within motor temperature rise specification.

.3 Motor to be capable of operating between 60 Hz and 90 Hz with torque reducing at drive frequency above 60 Hz.

2.12 Testing

.1 Test motor in accordance with IEEE 112 "Polyphase Induction Motors and Generators" to conform with NEMA MG-1.

.2 Additional tests may be performed on a random sampling of units supplied for the project as follows;

.1 insulation test to establish capability to withstand continuous phase-to-ground RMS voltage of 1000 volts minimum for 30 minutes.

.2 winding to withstand 2500 volt AC phase-to-ground for one second.

.3 surge comparison test using 3000 volts AC phase-to-phase with submission of detailed comparison wave forms.

.4 shaft runout tests with results taken after motor is completely assembled.

.5 measurement of full load amperes, watts, power factor, RPM, and locked rotor current at rated voltage.

.6 verification of vibration status through velocity readings in inches/second taken at both ends of motor.

3 EXECUTION

3.1 Shipping

.1 Ship motors from factory;

.1 packed in Styrofoam or similar material or

.2 fastened to hardwood skid or pallet for fork truck handling

.3 protected against dirt and moisture during transit and outdoor storage.

.4 clearly identified with permanent ink marking on packing.

.2 Motors attached to equipment:

.1 protected against dirt and moisture during transit and outdoor storage.

.2 rotated by hand at one month intervals.

END OF SECTION

MOTOR STARTERS AND WIRING
20 05 13

1 GENERAL

1.1 Scope

.1 Provide constant and multi-speed motor starters and solid state motor starters for electrical equipment provided under Division 20.

.2 Provide wiring, conduit and devices for mechanical services and electrical equipment provided under Division 20.

.3 Electrical wiring for Mechanical Trades work to be performed by specialist firm with an established reputation in this field.

1.2 Related Sections

.1 Electric Motors: to section 20 05 12.

.2 Adjustable Frequency Drives: to section 20 05 14.

1.3 Applicable Codes and Standards

.1 Comply with:

.1 CSA C22.1 Canadian Electrical Code.

.2 CSA Standard C22.1 No. 14 Industrial control equipment

.3 CAN/CSA-C22.2 No. 94 Special purpose enclosures

.2 National Electrical Manufacturers Association (NEMA)Standards relating to:

.1 single and three phase motors,

.2 wiring and,

.3 motor control.

1.4 Permits, Fees and Inspections

.1 Submit to Electrical Safety Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Consultant will provide drawings and specifications required by Electrical Safety Authority at no cost.

.4 Notify Consultant of changes required by Electrical Safety Authority prior to making changes.

.5 Furnish Certificates of Acceptance from Electrical Safety Authority and authorities having jurisdiction on completion of work to Consultant.

1.5 Standard details

.1 Device legend with list of abbreviations, schematic wiring diagrams for single and three phase motor starters and supplementary schematics are included at the end of this section.

.2 This material is to be used in interpretation of specification and schedule requirements for starters and motor control centres (MCC's), accessories within starter enclosures, motor and wiring protection components, and ancillary elements for power wiring and electrical control of Mechanical Trades equipment.

1.6 Shop Drawings

.1 Submit control wiring diagrams for electrical equipment provided under this Division.

.2 Wiring diagrams:

.1 in ladder diagram form with 215 mm (8½ in) space between 120 volt energized conductor on left and grounded conductor on right,

.2 electrical contacts, relays, thermostats, timers and components in control circuits shown.

2 PRODUCTS

2.1 Magnetic and Manual Motor Starters

.1 General:

.1 Rating: NEMA

.2 Supply three phase starters from one manufacturer.

.3 size starters for rated for motor load see 2.1.7(b)

.4 Where three or more starters are grouped together and not mounted in Motor Control Centre, use wall mounted grouped Motor Control rack.

.5 Provide wiring diagrams for control circuits where control wiring extends beyond starter enclosure

.2 Starters for single phase motors:

.1 2 pole manual type, or modified 3 pole magnetic type,

.2 where control elements for single phase motors are not rated for motor starting duty, provide separate 120 VAC control circuit and magnetic contactor rated for motor starting duty,

.3 combination switch with:

(a) overload relay,
(b) pilot light,
(c) control device terminations,
(d) NEMA 1 enclosure.

.3 Starters for three phase motors:

.1 Up to and including 45 kW (60 HP):

(a) combination magnetic type,
(b) magnetic contactor,
(c) fused disconnect,
(d) tin plated copper buswork for 50,000 Amp interrupting rating.

.2 Larger than 56 kW (75 HP):

(a) combination magnetic type,
(b) solid state controller,
(c) series magnetic contactor,
(d) fused disconnect,
(e) tin plated copper buswork for 50,000 Amp interrupting rating.

(f) manual isolation and bypass switch with handle inside enclosure.

.3 Overload system:

(a) solid state, adjustable setting,
(b) wired with normally closed contact ahead of contactor holding coil,
(c) manual reset button,
(d) sized and set to suit characteristics of motor.

.4 Enclosure to CSA Standard C22.1 No. 94:

(a) Type 2 enclosure for indoor installations,
(b) Type 4 enclosure for outdoor installations,
(c) flange mounted disconnect handles on starter compartment.

.5 Operating controls:

(a) momentary push button, or three-position maintained contact rotary switch as required,
(b) four pole switch for Hand-Off-Auto control, with fourth pole use to monitor switch in Auto position.

.6 Pilot lights:

(a) one cover mounted pilot light (green) to indicate motor running,
(b) 120 VAC, push-to-test LED type.

.7 Provided with:

(a) auxiliary contacts or auxiliary relays to satisfy interlocking and automatic control requirements,
(b) 120 volt fused control transformer inside starter enclosure, sized for starter requirements plus an additional 25 VA for remote damper or valve actuator,
(c) engraved lamicoid nameplate identifying load served.

.8 Starters for motors equipped with temperature sensing devices in winding:

(a) compatible control unit supplied by motor manufacturer, installed in starter enclosure and connected into starter circuitry with relays, reset buttons, and pilot lights.

.4 Starters for multi-speed and/or reversing motors as specified for three phase starter:

.1 motor starter control type with control interlocking to prevent simultaneous operation in multi-speeds or direction,

.2 adjustable time delay relays minimum 15 seconds between high-to-low-high speed, and between forward-reverse-forward direction, for operation in both BAS-Auto mode and local-Hand mode,

.3 two-speed single winding for 2:1 speed ratios, unless otherwise required,

.4 two-speed, two-winding for speed ratios which are not 2:1.

2.2 Motor Thermal Protection

.1 Single phase motors mounted in air ducts, plenum chambers or in air stream inside air handling equipment:

.1 motor winding thermostats, normally closed contact, phenolic snap-acting disc thermal switch, temperature calibrated,

.2 automatic reset type.

Standard of Acceptance
° Texas Instruments - Klixon Phenolic Motor Protectors

.2 Three phase motors less than 37 kW (50 HP) mounted in air ducts, plenum chambers or in air stream inside air handling equipment:

.1 Winding sensors:

(a) three (3) Positive Temperature Coefficient (PTC) temperature sensors, one in each motor winding, wired in series, type compatible to control unit.
(b) winding sensors provided under section 20 05 12 Electric Motors

.2 Control unit:

(a) electronic motor protection module, single channel, 3 sensors per channel,
(b) 120 VAC line power,
(c) manual reset.

Standard of Acceptance
° Texas Instruments - Klixon model 42AA100E

.3 Starter control wiring:

(a) control unit mounted inside starter enclosure,
(b) 120 VAC power to control unit,
(c) momentary normally-closed reset button located inside of starter enclosure,
(d) auxiliary output relay for safety interlock to motor contactor,
(e) red pilot light indicating high-winding temperature,
(f) 1 N.O. contact for remote alarm monitoring

.3 Three phase motors 37 kW (50 HP) and larger:

.1 Winding sensors:

(a) three (3) Positive Temperature Coefficient (PTC) temperature sensors, one in each motor winding, wired in series, type compatible to control unit.
(b) winding sensors provided under section 20 05 12 Electric Motors

.2 Control unit:

(a) temperature monitoring relay, single channel, 3 sensors per channel,
(b) 120 VAC line power,
(c) unit holds relay contacts on power supply failure,
(d) automatic/manual reset, with remote reset

Standard of Acceptance
° Siemens - 3RN10 12

.3 Starter control wiring:

(a) control unit mounted inside starter enclosure,
(b) 120 VAC power to control unit,
(c) momentary normally-closed reset button located inside of starter enclosure,
(d) test and test-reset button located on front of starter enclosure,
(e) auxiliary output relay for safety interlock to motor contactor,
(f) red pilot light indicating high-winding temperature,
(g) 1 N.O. contact for remote alarm monitoring.

2.3 Motor Control Centres (MCC's)

.1 Provide MCC's as required with front connected plug-in type starters incorporating features described in this Section.

Standard of Acceptance
- Siemens
- Klockner Moeller
- Square D
- Allen Bradley
- Cutler Hammer (Eaton Electrical)

.2 MCC's throughout project :

.1 supplied by one manufacturer,

.2 Class II, Type 'B' construction, with load and control connections to be made at unit terminal blocks adjacent to vertical wiring channel.

.3 CSA Standard C22.1 Type 2 enclosure,

.4 made up from vertical sections with;

(a) full height vertical wiring trough with cable supports for unit wiring,
(b) insulated vertical bus connecting control units to non-insulated main horizontal bus at top of sections,
(c) cable lugs or bus duct terminals on main bus to match feeder provided under Electrical Division 26 .
(d) ground bus for full height of each section.
(e) bus work of 98% conductivity tin plated copper, suitably braced to withstand an available short circuit current of 65,000 ampere RMS asymmetrical, joined to adjacent section by horizontal bus;
- suitable for extension and
- sized for minimum 750 ampere capacity at 1000 ampere per square inch density.

.3 Power distribution panel and transformer provided in each MCC:

.1 for single phase motors fed from MCC's, and other miscellaneous mechanical loads.

.2 minimum 12 circuit NLAB type 115/230 volt, single phase, 3 wire, lighting panels with suitably sized bolt-on breakers.

.3 Panels mounted in MCC behind separate hinged doors, and

.4 fed by 115/230 volt, single phase transformers:

(a) constructed with standard taps and Class 'B' or 'H' insulation,
(b) sized for connected loads, but not less than 5 kVa, and
(c) provided with suitable primary protection.

.4 Provide one full section for future starters, and include rails, blank covers and hardware to accommodate starters.

.5 Provide spare full height section fitted with hinged access door to house;

.1 fire alarm shutdown relays,

.2 smoke evacuation wiring terminals and accessories.

.6 Treat casings of MCC's with rust inhibiting metal treatment, and paint;

.1 interior with white enamel.

.2 exterior with enamel, colours according to service;

(a) Normal power MCC's: Dupont RFK-402-S8 (blue).
(b) Emergency power MCC's: Dupont RFS-500-S8 (International orange).

.7 Submit coordinated field drawing showing final location, orientation and clearances for access.

2.4 Service Isolation (Disconnect) Switches, Fused and Un-fused

.1 General:

.1 Fusible and non-fusible disconnect switch in sprinkler proof EEMAC 3 enclosure, sized to suit equipment.

.2 2 pole or 3 pole as required for single phase or three phase circuits,

.3 2 pole with solid neutral or 3 pole with solid neutral for three wire and four wire circuits with neutral,

.4 6 pole for two speed motor applications,

.5 provision for padlocking in off switch position,

.6 mechanically interlocked door to prevent opening when handle in ON position,

.7 fuses: sized in accordance with connected equipment manufacturer's requirements,

.8 fuseholders: suitable without adaptors, for type and size of fuse indicated.

.9 heavy Duty, quick-make, quick-break action,

.10 ON-OFF switch position indication on switch enclosure cover.

.2 Labeling:

.1 Provide a permanent label on front of switch: “SERVICE ISOLATION ONLY - DO NOT OPEN UNDER LOAD”.

.3 Special requirements:

.1 for separate disconnect switches installed on load side of Variable Speed Drive;

(a) disconnect switch status switch, to open contacts when disconnect switch is Not-Closed.

.4 Ratings:

.1 IEC 90 rotary switch for motors up to 18.6 kW (25 HP),

.2 NEMA flange mount for all ratings.

Standard of Acceptance

- Square "D" Company (Canada) Ltd.
- Cutler Hammer
- Siemens Canada Ltd.
- Federal Pioneer Ltd.
- Klockner Moeller
- Allan Bradley

2.5 Circuit Breakers for Motor Protection

.1 General

.1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.

.2 Circuit breakers which are part of a combination motor starter to be motor circuit protector type instantaneous magnetic only trip units. Feeder circuit breakers to be thermal magnetic or solid state LSI type as noted. Minimum frame size to be 100A.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating. Fixed instantaneous type to be minimum 8 times current rating.

.5 Circuit breakers with interchangeable trips over 150 A.

.6 Include:

(a) on-off locking device.
(b) handle mechanism.

.2 Thermal Magnetic Breakers

.1 To operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

.3 Circuit Breaker Ratings

.1 600 V: 50,000 Amps symmetrical interrupting rating.

2.6 Equipment Service Lights (Marine Lights)

.1 Pyrex globe, wire guard and 100 watt I.F. lamp

Standard of Acceptance
° Crouse Hinds - Type ARB-31
° Killark - Type VOBG-100

.2 Switches: 20 ampere, single pole, with neon pilot light, installed in cast metal condulet box.

Standard of Acceptance
° Smith & Stone - No. 4-4901

.3 Mount switches in accessible location on outside of plenum. Provide one switch for each fan system.

.4 Provide minimum of one marine light per 3 m (10 ft) width of plenum.

2.7 Wire type and size:

.1 Wire:

.1 RW-90 copper X-link type 1000V insulation installed in conduit, sized to carry 125% of full load running current in accordance with Electrical Code:

(a) Minimum no. 12 gauge for power.
(b) Colour coded no. 14 gauge for control.

.2 AFD Inverter Duty:

(a) liquid tight, flexible metal conduit and cable to be specifically manufactured for this duty,
(b) voltage rating: nominal 1000 V, and voltage spikes to 2000 V,
(c) 3 phase and 3 ground conductors.

Standard of Acceptance

- NEXANS - Drive Rx - Variable speed drive cable
- LAPP USA - OLFLEX® VFD SLIM; Severe duty power cable for AFD drives
- ShawCor - Shawflex VFD cable
- Rockbestos-Suprenant Cable - EXANE - VFD sheathed armoured power cable.

.2 Conduit:

.1 EMT and Rigid.

.2 Liquid-tight flexible metallic conduit.

.3 Grounding:

.1 Provide insulated green bonding conductor in each power and control conduit sized per Table 16 of the Electrical Safety Code. Minimum bonding conductor size #12AWG copper.

.4 Mineral Insulated Copper Cable (MICC):

.1 ULC listed 2 hour fire rating,

.2 shipped with ends temporarily sealed and stored under dry conditions,

.3 capacities and types noted on drawings and terminated using suitable terminating hardware,

.4 PVC jackets for embedded cables.

Standard of Acceptance
- Pyrotenax

3 EXECUTION

3.1 Wiring for Mechanical - General

.1 Electrical materials, equipment and installation procedures under Mechanical Division 20 to conform to Canadian Electrical Code as amended to date.

.2 Wiring methods and standards to conform with those specified in Electrical Division 26 for area of building in which installation is to be made.

.3 Use MICC cable for power and control wiring to motors and dampers, including local control devices such as limit switches, etc., comprising the following systems:

.1 stair pressurization systems,

.2 smoke venting, smoke evacuation, and aid to firefighting ventilation systems, and

.3 smoke dampers, combination smoke dampers.

.4 Use AFD Inverter Duty wiring between adjustable frequency drives (AFD) and associated motor.

.5 Conduit:

.1 EMT: Use thin wall conduit up to and including 32 mm (1 ¼ in) size for wiring in ceilings, furred spaces, in hollow walls and partitions and where not exposed to mechanical injury.

.2 Rigid: Use rigid galvanized steel conduit for wiring in poured concrete, where exposed, and for conduit 40 mm (1½ in) size and larger. All wiring to be installed in conduit or approved raceway.

.3 Liquid-tight flexible: use only for last 1000 mm (3 ft) of motor feeder at connection to motor.

.6 Provide separate conduit for power wiring for each motor or starter. Do not install control wiring in the same conduit as power wiring.

3.2 Grounding

.1 Ground electrical equipment and wiring in accordance with Canadian Electrical Code and Local Authority's Rules and Regulations.

.2 Install grounding conductors, outside electrical rooms and electrical closets, in conduit and concealed.

.3 Make connections to neutral and equipment with brass, copper or bronze bolts and connectors.

.4 Ground all motors with separate green insulated copper ground conductor installed in power feeder conduit, wired from ground terminal in starter to a ground lug bolted directly to motor frame inside terminal box of motor. Size ground conductor per Table 16 of the Canadian Electrical Code. Minimum conductor size to be #12 AWG.

3.3 Disconnect Switches

.1 Motors:

.1 Provide disconnect switches for motor driven equipment provided under Division 20;

(a) unfused: where line feeder is provided directly by Division 26,
(b) fused: where line feeder is provided by Division 20 from a splitter box, motor starter rack, or MCC.

.2 Location:

(a) Within 9 meters and line-of-site of motors serving non-refrigeration equipment.
(b) Within 3 meters and line-of-site of equipment containing refrigeration compressors, and equipment serving refrigeration compressors such as air-cooled condensers.

.2 Non-Motor Equipment:

.1 Provide disconnect switch for the following type of equipment provided under Division 20;

(a) VAV terminal boxes

.2 Location:

(a) Immediately adjacent to equipment served.

.3 Disconnects for the above equipment may be provided by the equipment manufacturer.

3.4 Motor Winding Temperature Protection

.1 Coordinate with motor suppliers that the motor winding temperature sensors provided by the motor supplier is compatible with the thermal protection control units, as applicable.

.2 Provide control wiring between PTC sensors in three phase motors and control units in starters.

3.5 Equipment Service Lights (Marine Lights)

.1 Mount switches in accessible location on outside of plenum. Provide one switch for each fan system.

.2 Provide minimum of one marine light per 3 m (10 ft) width of plenum.

3.6 Wiring Diagrams

.1 Attached device legend and wiring diagrams to be read in conjunction with equipment specifications, control sequences, and motor/starter schedules for implementation of control sequences and identification of components required in each starter or AFD.

.2 Wiring from MCC or distribution panel to each AFD to be in individual, separate, rigid steel conduit. Do not combine wiring from any other source within AFD conduit.

END OF SECTION

ADJUSTABLE FREQUENCY DRIVES
20 05 14

1 GENERAL

1.1 Scope

.1 Provide adjustable frequency drives (AFD) for electrically driven equipment provided under Division 20.

1.2 Related Sections

.1 Electric Motors: to section 20 05 12

.2 Motor Starters and Wiring: to section 20 05 13.

1.3 Applicable Codes and Standards

.1 Comply with:

.1 CSA C22.1 Canadian Electrical Code.

.2 Reference Standards:

.1 IEEE Standard 519 IEEE Guide for Harmonic Content and Control

.2 UL 508C Power Conversion Equipment

.3 NEMA ICS 7.0 AC Adjustable Speed Drives

.4 IEC 16800 Parts 1 and 2.

1.4 Quality Assurance

.1 Manufacturer specializing in development and production of the products specified in this Section.

.2 Product:

.1 AFD and options UL listed as a complete assembly,

.2 AFD's that require the customer to supply external fuses are not acceptable,

.3 AFD and options tested to ANSI/UL Standard 508 and listed by a nationally recognized testing agency such as UL or ETL, subject to the drives are suitable for use on a nominal voltages up to 600 V AC with a nominal supply range of ±5%.

1.5 Shop Drawings

.1 Submit for AFD’s in addition to the requirements of Division 01:

.1 outline dimensions, conduit entry locations and weight,

.2 control and power wiring diagrams,

.3 complete technical product description including a list of options provided,

.4 a detailed statement of non-compliance issues to this specification, absent which the vendor and/or contractor shall be liable to provide all additional components required to meet this specification,

.5 termination diagrams for electrical contacts, relays, thermostats, timers and components in control circuits shown.

1.6 Product Support

.1 Manufacturer to have factory trained application engineering and service personnel locally available at the installation locations and/or available through a toll free 24/365 technical support line.

1.7 Warranty

.1 AFD warranted for twenty-four (24) months from date of certified start-up by manufacturer's representative, not to exceed 30 months from date of shipment, but in no instance less than twelve (12) months from hand-over of equipment to the Owner (start of the Work warranty period).

.2 The warranty shall include all parts, labor, travel time and expenses.

2 PRODUCTS

2.1 Adjustable Frequency Drives (AFD)

.1 General:

.1 electronic pulse width modulating design for speed control of NEMA Design B induction motors,

.2 CSA listed,

.3 mounted in CSA Standard C22.1 Type 1 enclosure,

.4 door or frame mounted interlocked disconnect switch, padlockable, to disconnect all input power from the drive and all internally mounted options,

.5 operating voltage:

(a) +30%, -35% of nominal supply voltage range to drive,
(b) protection circuitry to lock-in drive or bypass over this voltage tolerance,
(c) as per associated equipment, and

.6 Environmental operating conditions:

(a) Temperature : 0 - 40°C (32 - 104 F) continuous,
(b) Altitude : 0 - 1000 m (0 - 3300 ft) above sea level,
(c) Humidity : up to 95% relative humidity non-condensing.

.7 Cooling fans:

(a) designed for easy replacement, and without requiring removing the AFD from the wall or removal of circuit boards,
(b) operate only when required; AFD cycles the cooling fans on and off as required.

.8 Seismic rated:

(a) drive and bypass package seismic certified,
(b) seismic importance factor of 1.5 rating is required,
(c) rating certification based upon actual shake table test data as defined by ICC AC-156.

.9 Manufacturer:

(a) AFD's manufacturer by a 3rd party and "brand-labeled" are not acceptable.

Standard of Acceptance

- ABB
- Danfoss
- Siemans
- Yaskawa
- Toshiba

- ° Cutler Hammer
- ° Allen Bradley

.2 Performance requirements:

.1 capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start),

.2 ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip.

.3 programmable number of restart attempts, trial time, and time between attempts,

.4 drive overload rating:

(a) 110% of its normal duty current rating for 1 minute every 10 minutes,
(b) 130% overload for 2 seconds

.5 maximum input current rating of the AFD: not more than 3% greater than the output current rating,

.6 input and output current ratings must be shown on the AFD nameplate.

.7 include a coordinated AC transient surge protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.

.8 power mis-wiring detection and alarm on drives up to 75 HP.

.3 Power conditioning:

.1 built-in as part of drive,

.2 input impedance reactors to reduce the total harmonic current demand (TDD) to a maximum of 45% TDD measured at the drive line terminals composed of either:

(a) Dual (positive and negative DC bus) Link, or
(b) 5% AC link, or
(c) Single DC Link and an AC link.

.3 input transient protection,

.4 RFI filter,

.5 Output LC load reactor for drives with motor feeders exceeding 10 meter (30 ft) developed length between drive and motor, matched to motor.

.4 Equipment and motor protection:

.1 under and over voltage protection, phase loss protection and phase unbalance protection,

.2 current limiting device adjustable from 70% to 100% of rated motor current,

.3 ground fault protection,

.4 inherent short circuit protection for line to line and line to ground faults giving safe shut down without damage to power circuit devices,

.5 instantaneous electronic over current-protection,

.6 internal over-temperature protection,

.7 motor stall protection.

.5 Operator Interface Keypad and Display:

.1 same interface across motor rating range,

.2 digital display with keypad,

.3 keypad includes “Hand-Off-Auto” selections and manual speed control,

.4 fault reset and "Help" buttons on the keypad,

.5 loss-of-load alarm,

.6 Keypad:

(a) backlit LCD display,
(b) complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable),
(c) faults displayed in English words,

.7 Help button access to "on-line" assistance for programming and troubleshooting, including a minimum of 14 programming assistants:

(a) Start-up
(b) Parameter
(c) PID
(d) Reference
(e) I/O
(f) Serial communications
(g) Option module
(h) Panel display
(i) Low noise set-up
(j) Maintenance
(k) Troubleshooting
(l) Drive optimizer

.8 Operating values displayed in engineering (user) units, with a minimum of three values displayed at one time from the following:

(a) Output Frequency
(b) Motor Speed (RPM, %, or Engineering units)
(c) Motor Current
(d) Motor Torque
(e) Motor Power (kW)
(f) DC Bus Voltage
(g) Output Voltage

.6 Control Functions:

.1 three (3) programmable critical frequency lockout ranges to prevent AFD from operating the load continuously at an unstable speed, fully adjustable, from 0 to full speed.

.2 two (2) PID Set point controllers allowing pressure or flow signals to be connected directly to the AFD;

(a) AFD microprocessor for the closed-loop control,
(b) 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others,
(c) PID set point adjustable from the AFD keypad, analog inputs, or over the communications bus,
(d) two (2) independent parameter sets for the PID controller and the capability to switch between the parameter sets via a discrete input, serial communications or from the keypad.

.3 the independent second PID loop able to utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (ie. valves, dampers, etc.),

.4 all set points, process variables, etc. to be accessible from the serial communication network,

.5 programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.,

.6 "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes.

.7 programmable loss-of-load (broken belt / broken coupling) Form-C relay output and over the serial communications bus, with programmable time delay for motor start-up,

.8 programmable underload and overload curve functions to allow user defined indications of broken belt or mechanical failure / jam condition causing motor overload,

.9 loss of input reference (4-20mA or 2-10V); user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the AFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user with alarm output to a Form-C relay output and over the serial communication bus,

.10 password protection against parameter changes.

.7 Input Connections:

.1 Analog; two (2) programmable inputs for current or voltage signals,

.2 Discrete; six (6) programmable inputs for interfacing with external devices;

(a) programmable to initiate upon an application or removal of 24VDC or 24VAC.

.3 Run permissive circuit for damper or valve control:

(a) when the damper or valve is fully open, a damper normally open dry contact (end-switch) closes, and the closed end-switch is wired to a discrete input and allows AFD motor operation,

.4 Safety interlock circuits:

(a) two (2) separate safety interlock inputs,
(b) when either safety is opened, the motor coasts to stop and associated damper/valve commanded to close,
(c) keypad displays "start enable 1 (or 2) missing" and the safety input status transmitted over the serial communications bus.

.8 Output Connections:

.1 Analog; two (2) programmable outputs for 0-20ma, 4-20 ma, or 0-10VDC;

(a) each programmable as a minimum to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback.

.2 Discrete: three (3) programmable, digital Form-C relay outputs;

(a) programmable on and off delay times and adjustable hysteresis,
(b) rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC,
(c) maximum voltage 300 VDC and 250 VAC with continuous current rating of 2 amps RMS,
(d) true Form-C type contacts; open collector outputs are not acceptable.

.3 Run command circuit for damper or valve control:

(a) functions regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications),
(b) Form-C relay closure that will signal the damper to open (AFD motor does not operate),

.9 Programmable Time Delay functions:

.1 AFD start delay and a keypad indication that this time delay is active,

.2 a Form C relay output provides a contact closure to signal the VAV boxes open; this will allow VAV boxes to be driven open before the motor operates,

.3 field programmable from 0 - 120 seconds,

.4 Start delay active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.

.10 Speed Control functions:

.1 Seven (7) programmable preset speeds,

.2 Two (2) independently adjustable accel and decel ramps with 1 - 1800 seconds adjustable time ramps.

.3 minimum speed setting adjustable from 0 to 70%,

.4 maximum speed setting adjustable from 50 to 110%,

.5 rotating motor restart routine to match frequency and actual speed before accelerating to set speed.

.6 acceleration/deceleration ramp adjustable from 10 to 100 seconds for 0 to 100% speed,

.7 motor flux optimization circuit to automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise;

(a) selectable software for optimization of motor noise, energy consumption, and motor speed control.

.8 carrier frequency control circuit to reduce the carrier frequency based on actual AFD temperature that allows higher carrier frequency settings without derating the AFD.

.11 Programming:

.1 built-in time clock in the AFD keypad with battery back up of 10 years minimum life span,

.2 time clock date and time stamp faults and records operating parameters at the time of fault. On battery failure, the AFD automatically reverts to hours of operation since initial power up,

.3 time clock programmable to control start/stop functions, constant speeds, PID parameter sets and output Form-C relays,

.4 discrete input that allows an override to the time clock (when in the off mode) for a programmable time frame,

.5 four (4) separate, independent timer functions that have both weekday and weekend settings,

.6 utilize pre-programmed application macro's specifically designed to facilitate start-up,

.7 application macros provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time,and

.8 two user macros to allow the end-user to create and save custom settings.

.12 Fireman’s Override Input:

.1 On receipt of a contact closure from the fire / smoke control station, the AFD operates in one of two selectable modes:

(a) Operate at a programmed predetermined fixed speed ranging from -500Hz (reverse) to 500Hz (forward), or
(b) Operate in a specific fireman's override PID algorithm that automatically adjusts motor speed based on override set point and feedback; setpoint adjusted over the serial communications bus.

.2 Operating mode overrides all other inputs (analog/digital, serial communication, and all keypad commands), except safety run interlocks, and force the motor to run in one of the two modes above.

.3 "Override Mode" displayed on the keypad.

.4 Upon removal of the override signal, the AFD resumes normal operation, without the need to cycle the normal discrete input run command.

.13 Building Automation System Integration:

.1 EIA-485 port as standard for the following protocols which are resident in the base AFD;

(a) BACnet MS/TP
(b) BACnet IP
(c) LonWorks
(d) Modbus

.2 The use of third party gateways and multiplexers is not permitted.

.3 All protocols"certified" by the governing authority including:

(a) BTL Listing for BACnet,
(b) Lonmark functional profile 6010, for both mandatory and optional items.

.4 Use of non-certified protocols is not permitted.

.5 BACnet interface:

(a) EIA-485, MS/TP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps,
(b) connection tested by the BACnet Testing Labs (BTL) and be BTL Listed,
(c) conforms to the BACnet standard device type of an Applications Specific Controller (B-ASC),
(d) interface support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
- Data Sharing - Read Property - B.
- Data Sharing - Write Property - B.
- Device Management - Dynamic Device Binding (Who-Is; I-Am).
- Device Management - Dynamic Object Binding (Who-Has; I-Have).
- Device Management - Communication Control - B.

(e) if additional hardware is required to obtain the BACnet interface, the AFD manufacturer to provide one BACnet gateway per drive; multiple AFDs sharing one gateway shall not be acceptable.

.6 Serial communication capabilities in AFD mode include:

(a) run-stop control,
(b) speed set adjustment,
(c) proportional/integral/derivative PID control adjustments,
(d) current limit,
(e) accel/decel time adjustments,
(f) lock and unlock the keypad,
(g) allow the BAS to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature.
(h) BAS capable of monitoring the AFD relay output status, discrete input status, and all analog input and analog output values.
(i) all diagnostic warning and fault information,
(j) remote AFD fault reset.

.7 Digital and analog output control:

(a) BAS may control digital and analog outputs via the serial interface; this control is independent of any AFD function,
(b) the analog outputs may be used for modulating chilled water valves or cooling tower bypass valves,
(c) Form-C relay outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation,
(d) discrete inputs capable of being monitored by the BAS system, including monitoring of which (of up to 4) safeties are open.

.8 Independent PID loop:

(a) may be used for cooling tower bypass value control, chilled water value / hot water valve control, etc.
(b) both the AFD PID control loop and the independent PID control loop continue functioning even if the serial communications connection is lost,
(c) as default, the AFD keeps the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.

2.2 Harmonic Filters

.1 Harmonic filters are provided in addition to the drive built-in power conditioning input filters.

.2 General;

.1 type: passive inductor/capacitor network.

.2 treat low frequency harmonics generated by AFD drives.

.3 no resonance between harmonic filter with system impedances or attract harmonic currents from other harmonic sources.

.4 wiring:

(a) all copper.
(b) Wiring insulation class: 220°C (428 F).
(c) Temperature rise: 130°C (266 F).

.5 anti-vibration pad mounts for reactor and/or transformers.

.6 enclosure: NEMA-3R.

.3 Performance:

.1 power factor: 0.98 lagging to 0.95 leading in operating range form 50% to 100% full load.

.2 maximum capacitive reactive power KVAR generated: 20% of kVA rating.

.3 combined drive and harmonic filter mitigation:

(a) to IEEE standard 519, to Table 10.2 and Table 10.3,
(b) for the purpose of testing filters, the Point of Common Coupling (PCC) is measured at the input terminals of the harmonic filter,
(c) filter requirements to obtain the maximum Total Current Demand Distortion (TDD) at the PCC based on motor HP rating is as follows:

Motor Size		Filter Rating (1)	TDD Rating
Size	HP		
Small	≤ 25	Base filters only	35%
Medium	Between 30 and less than 60	10% passive	8%
Large	75≥	5% passive	5%

Notes :
(1) In addition to the Drive built-in line filters.
(2) Drive built-in line filters only.

.4 efficiency at full load:

(a) Harmonic filter only: minimum 99%
(b) Harmonic filter and Drive combined: minimum 96%.

.5 Manufacturers:

Standard of Acceptance
- Mirius - Lineator AUHF
- Matrix

2.3 AFD Drive to Motor Wiring:

.1 Wiring from AFD to motor :

.1 liquid tight, flexible metal conduit and cable to be specifically manufactured for this duty,

.2 voltage rating: nominal 1000 V, and voltage spikes to 2000 V,

.3 3 phase and 3 ground conductors.
- NEXANS - Drive Rx - Variable speed drive cable
- LAPP USA - OLFLEX® VFD SLIM; Severe duty power cable for AFD drives
- ShawCor - Shawflex VFD cable
- Rockbestos-Suprenant Cable - EXANE - VFD sheathed armoured power cable.

3 EXECUTION

3.1 Variable Speed Drives

.1 Install variable speed drives in accordance with manufacturer's requirements.

.2 Where a separate disconnect is installed between the drive and the controlled equipment, provide interlock wiring between disconnect status contact switch, and AFD, to prevent drive from operating if disconnect switch is open.

.3 Conduct impact vibration test to determine first natural harmonic of driven equipment, and program AFD skip speed function to prevent operation at this speed.

.1 nominal skip speed range equal to ± 5% of measured harmonic frequency, or as determined on site.

.4 Provide power wiring, conduit and branch circuit protection to line side of AFD, selected for drive input current.

3.2 Harmonic Filters

.1 Install harmonic filters in accordance with manufacturer's requirements.

.2 Commission filters units onsite. Provide test records of site condition performance at 0%, 50% and 100% motor load including measurements of:

.1 voltage and current harmonic distortion at input terminals of filter,

.2 obtain measurements with a recording type Fluke 41 or equivalent harmonics analyzer for individual and total harmonic currents and voltages.

3.3 Cleaning

.1 Do not start-up drives until local area has been brought to final clean, floors are sealed, and any drywall in the same space is sanded and painted.

3.4 Start-Up and Testing

.1 If such heating equipment is to be used prior to final construction clean, provide temporary magnetic starters, or, provide enclosures around the drives and pressurized the enclosures with a source of clean air.

.2 Provide the services of a certified factory authorized representative for the start-up of each drive. Complete and submit a certified start-up form filled out for each drive.

3.5 Demonstration and Training

.1 Provide the services of a factory trained manufacturer's representative to provide training to Owners staff. Include in training:

- .1 installation instructions,
- .2 programming of AFD,
- .3 operation of AFD,
- .4 at-site servicing of AFD
- .5 replacement of AFD keypad controller
- .6 manual and automatic operation of bypass, if applicable.
- .7 serial communications
- .8 fireman's smoke control override.

.2 Provide a computer based training CD or 8-hour professionally generated video (VCR format) to the Owner at the time of project closeout for the above topics.

END OF SECTION

FLEX CONNECTIONS, EXPANSION JOINTS, ANCHORS & GUIDES
20 05 16

1 GENERAL

1.1 Scope

.1 Provide flexible connections, expansion joints, anchors and guides as required.

1.2 Applicable codes and standards

.1 ASTM A53 Standard Specification for Pipe, Steel, Black and hot dipped, zinc-coated, welded and Seamless

.2 ASTM F1120 Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications

.3 ASME B31.1 Power Piping Code.

1.3 Design requirements

.1 Provide design services, sealed by a professional engineer licensed in the province of British Columbia, for the design of pipe anchors including pipe stress design and resulting forces and moments at point of building attachment for the following pipe sizes and/or systems.

.1 any piping system using expansion joints,

.2	chilled water:	NPS 10 and larger
.3	condenser water:	NPS 10 and larger
.4	hot water heating, max 93°C (200 F) :	NPS 8 and larger
.5	steam, low pressure < 100 kPa (15 psig) :	NPS 8 and larger
.6	steam > 100 kPa (15 psig) :	NPS 4 and larger

.7 glycol heating or cooling systems, in accordance with temperatures and pipe sizes described above.

1.4 Shop drawings

.1 Submit manufacturers product data sheets for expansion joint equipment showing

.1 Manufacturer, model number, piping service, pressure and temperature rating.

.2 Design allowances for axial, lateral and angular movement.

.3 Nominal size and overall dimensions.

.2 Submit sealed design drawings for pipe anchors, and include;

.1 plan drawings showing location of anchors and guides,

.2 fabrication details,

.3 pipe expansion forces,

.4 resulting reaction force and bending moments at building connection,

.5 building fastening details.

2 PRODUCTS

2.1 Slip type expansion joints:

.1 Application:

.1 for axial pipe movement,

.2 travel: 100 mm (4 in) to 300 mm (12 in) single unit, 200 mm (8 in) to 600 mm (24 in) for double units.

.3 size: NPS 1-1/2 to NPS 24

.4 Working pressure: 2070 kPa (300 psig) saturated steam.

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 body and packing housings: Class 300 carbon steel pipe to ASTM A 53, Grade B,

.2 wall thickness to match service pipe with flanges or weld ends to match service pipe jointing specification.

.3 adjustable packing gland or fixed packing gland arrangement with a packing injection assembly, arranged for repacking under full line pressure.,

.4 slip pipe of carbon steel pipe to ASTM A 53, Grade B, hard chrome plated,

.5 anchor base constructed of steel welded to body on double units,

.6 internal and external guides in packing housing with concentric alignment of slip pipe,

.7 extension limit stop of stainless steel, with accessible and removable pins,

.8 not less than six packing rings of teflon or graphite impregnated material,

.9 lubricating fittings with grease nipple, pet cocks, and lubricant gun with hose assembly or plunger body of heavy wall carbon steel and plunger of carbon steel with hex head for use with socket wrench.

.10 lubricant: to manufacturer's recommendations. .

.11 drip connection coupling with drain plug.

- Flexonics – style “Slip Pakt”
- Yarway – style “Gun Pakt”
- Adsco – style “Ram Pak”
- Hyspan - style 6500
- Advanced Thermal System – style Thermal Pak
- Flexpression – style “Perma-Pax”

2.2 Controlled flexing expansion joints

.1 Application:

.1 for axial and lateral movements,

.2 travel: up to 190 mm (7.5 in) axial and 8 mm (1.5 in) lateral depending on size.

.3 size: NPS 3 to NPS 18

.4 Working pressure: 2070 kPa (300 psig) at up to 425°C (800°F)

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 bellows hydraulically formed, type 304 stainless steel for specified fluid,

.2 two piece nickel iron reinforcing or control rings,

.3 flanges or weld ends to match service pipe jointing specification,

.4 austenitic stainless steel liner oriented with direction of flow ,

.5 carbon steel tie rods,

.6 carbon steel painted shroud.

Standard of Acceptance

- Flexonics – style CSF/CSW
- Adsco
- Metraflex
- Badger
- Flex-Hose Co
- Flexpression.

2.3 Externally pressurized expansion joints

.1 Application:

.1 for axial movements,

.2 travel: 100 mm (4 in) to 200 mm (8 in) single unit, 200 mm (8 in) to 400 mm (16 in) double unit.

.3 size: NPS 2 to NPS 12

.4 Working pressure: 2070 kPa (300 psig) at up to 425°C (800°F)

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 external pressurized design,

.2 housing: ASME A53 Gr B carbon steel,

.3 connections: ASME/ANSI B16.5 flanges, weld ends to ASME/ANSI B16.9, or grooved ends as applicable.

.4 bellows: hydraulically formed, three ply laminated, ASTM A240 T321 stainless steel or specified fluid,

.5 internal steel liner,

.6 internal and external guides.

Standard of Acceptance

- Flexonics – style SX/ DX
- Adsco
- Hyspan
- Metraflex
- Flex-Hose Co

2.4 Expansion compensators (bellows type)

.1 Application:

.1 for axial movements,

.2 travel: 50 mm (2 in) to 75 mm (3 in) carbon steel, 50 mm (2 in) for copper.

.3 size: NPS ¾ to 4 for carbon steel, and NPS 3/4 to 3 for copper

.4 Working pressure: 2070 kPa (300 psig) at up to 400°C (700°F)

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 external pressurized design,

.2 pipe: schedule 40 ASME A53 Gr B carbon steel,

.3 bellows: hydraulically formed, three ply laminated, ASTM A240 T321 stainless steel for specified fluid,

.4 connections:

(a) steel pipe: ASME/ANSI B16.5 flanges with floating flange as required, weld ends to ASME/ANSI B16.9, or grooved ends as applicable.
(b) copper tubing: female copper solder type ends for copper pipe,

.5 flow liner: ASTM A240 T304 stainless steel,

Standard of Acceptance
- Flexonics – style HS/HS/HB
- Adsco
- Hyspan
- Metraflex
- Flex-Hose Co

2.5 Bellows pump connectors

.1 Application:

.1 for axial and lateral movements and vibration isolation at pumps,

.2 travel: 25 mm (1 in) compression, 9.5 mm (3/8 in) extension, and 3 mm (1/89 in) to 7.5 mm (0.3 in) lateral, depending on size.

.3 size: NPS 2 to NPS 14

.4 Working pressure: 1450 kPa (210 psig) at up to 121°C (250°F)

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 pipe: schedule 40 ASME A53 Gr B carbon steel,

.2 bellows: hydraulically formed, three ply laminated, ASTM A240 T304 stainless steel,

.3 flange plate: matching to ASTM A36 carbon steel, ASME/ANSI B16.5 class 300,

.4 flow liner: ASTM A240 T304 stainless steel,

.5 restraint/limit rods,

Standard of Acceptance
- Flexonics – series TCS-R
- Hyspan
- Metraflex
- Flex-Hose Co

2.6 Braided equipment connector

.1 Application:

.1 for axial and lateral movements and vibration isolation at pumps and equipment,

.2 size: NPS 2 to NPS 10

.3 Working pressure: 1100 kPa (160 psig) at up to 121°C (250°F)

.4 factory tested to 1 ½ times maximum working pressure; furnish test certificate.

.2 Construction:

.1 Type 304 stainless steel corrugate internal liner with braided stainless steel cover,

.2 flanges: to ASTM A36 carbon steel, ASME/ANSI B16.5 class 150,

Standard of Acceptance
- Flexonics – series PCS
- Hyspan
- Metraflex
- Flex-Hose Co

2.7 Flexible rubber joints

.1 Application:

.1 for axial, lateral and angular movements,

.2 travel:

(a) axial: up to 55 mm (2-1.4 in) for double arch, and 19 mm (3/4 in) for single arch
(b) lateral: up to 35 mm (1-1./8 in) for double arch, and 9.5 mm (3/8 in) for single arch
(c) angular: 35° for double arch, and 15° for single arch.

.3 size: NPS 1-1/2 to NPS 12 for double arch, NPS 14 to 20 for single arch.

.4 Working pressure: 1450 kPa (210 psig) at up to 37°C (100°F)

.5 factory tested to 1 ½ times maximum working pressure; furnish test certificate

.2 Construction:

.1 spool type, reinforced EPDM inner liner and outer cover, with wire reinforced flange collars.

.2 NPS 1-1/2 to 12: two filled arches with stabilizing ring,

.3 NPS 14 to 20 : one filled arch.

.4 tie rod control units with vibration isolation washers,

.5 retaining rings, and

.6 neoprene covers.

Standard of Acceptance
- Flexonics – style 101/102
- Garlock Canada Limited - Style 204
- Metraflex
- Proco
- Flex-Hose Co

2.8 Flexible metal hose connections

.1 Construction:

.1 inner hose: corrugated T304 stainless steel,

.2 outer jacket: braided T304 stainless steel wire mesh,

.3 threaded or female soldered end connections up to NPS 2, flanged NPS 2½ and larger,

.4 selected for 1034 kPa (150 psi) working pressure and 93 C (200 F) working temperature,

Standard of Acceptance
- Flexonics
- Metraflex
- Flex-Hose Co
- Flexpression Ltd

2.9 Guides

.1 Construction:

.1 fabricated from steel

.2 guide spider clamped to pipe

.3 guide body with split bolted housing and angle bracket base.

Standard of Acceptance
- Flexonics Series PGT
- Adsco Model E
- Hyspan Series 9500
- Advanced Thermal System Type GA
- Flex-Hose Co
- Flexpression

3 EXECUTION

3.1 General

.1 Provide expansion loops in preference to expansion joints, where space permits.

3.2 Expansion joints installation

.1 Select expansion joints to compensate for thermal expansion in pipe between anchors with not less than 25% safety margin, calculating expansion based on the following operating temperatures;

.1 for heating systems, from-18°C (0°F) ambient up to maximum possible operating fluid temperature, but not less than 93°C (200°F) for water and design saturation temperature for steam,

.2 for cooling systems, from 15°C (60°F) ambient down to 5°C (40°F).

.2 Provide expansion joint types as follows:

Service	Limits	Type
Steam piping Boiler Feedwater piping	Over 1030 kPa (150 psig)	Slip
	501 - 1030 kPa (76 - 150 psig)	Slip, Ring Controlled or Externally Pressurized
	500 kPa (75 psig) and less	Ring Controlled or Externally Pressurized
Heating water piping	NPS 20 and larger	Slip

Service	Limits	Type
Condensate piping Glycol heating piping Chilled water piping Glycol cooling piping Condenser water piping	NPS 10 to NPS 18	Ring Controlled
	NPS 2 to NPS 12	Externally Pressurized
	NPS 4 and smaller	Expansion Compensator
Domestic Hot Water piping Domestic Recirculation Water piping	NPS 2 and larger	Externally Pressurized
	NPS 3 and smaller	Expansion Compensator
Domestic Cold Water piping	NPS 2 and larger	Externally Pressurized

.1 Support and guide piping adjacent to expansion joints;

.1 support piping on each side of expansion joint as specified herein,

.2 support expansion joint when provided with mounting supports,

.3 do not rely on pipe guides to support piping and expansion joint

3.3 Pump connectors

.1 Install pump connectors and select connector types as follows:

Service	Pump Type	Limits	Connector Type
Heating pumps Glycol Heating pumps Condensate pumps	Base Mount	Flange NPS 6 to NPS 14	Bellows
		Flange NPS 4 and smaller	Braided
	Vertical In-Line	All	Braided
	Circulator	All	None required
Steam Feedwater pumps	Base Mount or Multi-stage	NPS 3 and larger	Bellows
		NPS 2 ½ and smaller	None required
Chilled water pumps Glycol cooling pumps	Base Mount	Flange NPS 10 to NPS 14	Bellows
		Flange NPS 8 and smaller	Braided
	Vertical In-Line	All	Braided
	Circulator	All	None required
Condenser water pumps	Base Mount	All	Flexible Rubber
	Vertical In-Line	All	Braided
Domestic Booster pumps	All	All	Braided
Sump pumps (sanitary and storm)	All	NPS 2-1/2 and larger	Braided
Fire pumps	All	All	None required

.1 Install pump connectors at;

.1 outlet only of sump pumps, and

.2 inlet and discharge side for all other pumps.

.2 For vertical-in-line pumps, install connector in vertical portion of piping; do not install connectors between valves and pump.

.3 For base mount pumps, install connectors at pump inlet and outlet flanges.

.4 Support and guide piping adjacent to pump connector to eliminate lateral misalignment; support piping independently from the connector.

3.4 Equipment connector installation

.1 Install equipment connectors on piping connections to equipment and select connector types as follows:

Service	Limits	Connector Type
Refrigeration equipment	Chilled Water Piping	Braided
	Condenser Water Piping	Braided or Flexible Rubber
	Refrigerant Relief Piping	Braided
Domestic Hot Water Tanks	Inlet and Discharge piping NPS 3 and larger	Flexible Metal Hose
	Inlet and Discharge piping NPS 2 ½ and smaller	None required
Steam, heating and cooling coils, and humidifiers	Air handling units supported on spring vibration isolators	Flexible Metal Hose
	Other air handling units	None required
Hot water reheat coils	All sizes	Flexible Metal Hose

.2 Connector and hose sizing:

.1 nominal diameter: same size as pipe.

.2 length: selected at not less than manufacturers catalogued minimum active length for the configuration, and not more than 1.5 times this minimum recommended length.

.3 Support or guide piping firmly adjacent to equipment connectors and prevent pipes from swaying.

.4 Where equipment connectors are to be installed at steam coils, locate connectors;

.1 between control valve and coil on steam supply side, and

.2 after steam trap on condensate line.

.5 Where equipment connectors are to be installed at chilled and/or hot water coils, locate connectors;

.1 between strainer and coil on the supply side, and

.2 between coil and control valve on return side

.6 At reheat coils installed in terminal boxes or in ductwork, arrange equipment connectors so there are no bends, and no axial offsets greater than the OD of the connector measured from the centerline of the connector.

3.5 Piping anchors installation

.1 Anchors;

.1 submit shop drawings sealed by a professional engineer licensed in the jurisdiction of the project,

.2 include connection loads to the building structure to be reviewed by the Structural Engineering Consultant

.2 Fabricate piping anchors from structural steel angles, channels, or plates secured directly to piping and the building structure:

.1 single leg design, for piping NPS 4 and smaller and where distance between side of pipe and building attachment point is 200 mm(8 in) and less,

.2 minimum four-contact point design for all other distances.

3.6 Pipe guides installation

.1 Guides;

.1 submit shop drawings sealed by a professional engineer licensed in the jurisdiction of the project,

.2 include connection loads to the building structure to be reviewed by the Structural Engineering Consultant

.2 Guide locations:

.1 as required, and

.2 for each expansion joint and expansion loop, provide two guides on each side of and adjacent to the joint or loop;

(a) locate the first guide within 4 x pipe diameters from joint or loop,
(b) locate the second guide within 10-14 x pipe diameter from first guide and additional guides as required to suite anchor design, and
(c) guide expansion joints as per expansion joint manufacturer requirements.

.3 Guide installation:

.1 factory fabricated type, pipe rolls, or structural steel shapes

.2 secured to building structure and arranged to restrict lateral displacement and bowing of pipe adjacent to expansion joint or loop,

.3 supported from building structure with structural steel angles, channels or plates,

.4 guide may be omitted between joint and anchor where an anchor is located within minimum distance in accordance with expansion joint manufacturer installation instructions.

3.7 Inspection of anchor and guide installation

.1 Make arrangements and pay for expansion joint manufacturer's field representative to review anchors and guides around expansion joints on;

.1 steam piping

.2 domestic hot water and recirculating water piping NPS 6 size and larger

.3 heating system and chilled water piping NPS 6 size and larger

.2 Submit written report, prepared by field representative, confirming that expansion joints, anchors, and guides are installed in accordance with joint manufacturers recommendations.

3.8 Start-Up and Testing

.1 Prior to placing expansion joint in service, apply match-marks to joint flanges/connectors to record axial, lateral, rotation and angular movement of joint connections. After system is at operating temperature, inspect match-marks and record displacement of joint connections compared to pre-start conditions. Submit report including photos of displaced match-marks.

END OF SECTION

FLOW AND ENERGY METERS
20 05 18

1 GENERAL

1.1 Scope

.1 Provide volume flow, mass flow and energy meters for liquids and steam services.

.2 Provide ancillary pressure and temperature sensors and transmitters for calculation of compensate mass and energy flow.

1.2 Shop drawings / product data

.1 Submit manufacturer's catalogue literature for;
- .1 Volume and Mass Flow meters
- .2 Energy meters.

.2 Include schedules for each instrument:
- .1 identification number,
- .2 location,
- .3 type,
- .4 range, and
- .5 accessories.

1.3 Applicable codes and standards

.1 ASME PTC 19.3 TW – Thermowells

.2 CSA B51 Boiler and Pressure Vessel Code

2 PRODUCTS

2.1 Mass Flow Meter - Vortex

.1 Type:
- .1 in-line vortex with temperature compensation.
- .2 suitable for;
  - (a) HVAC saturated steam.

.2 Flow sensor:
- .1 flow body: stainless steel T316 schedule 40 pipe, ANSI Class 150 flanges, with integral pipe reducers,
- .2 sensors: vortex shedding,
- .3 accuracy: ∀1% of volume flow rate,
- .4 design pressure: 1380 kPa (150 psig) saturated steam,
- .5 CRN registered.

.3 Temperature sensor:

.1 1000 ohm Platinum RTD, 2 or 4 wire,

.2 matched thermowells or sensor integrated with flow body,

.3 temperature range: 100 - 200°C (212 – 392°F),

.4 removable sensor without process shut-down.

.4 Mass Flow transmitter:

.1 flow-body mounted electronic mass flow transmitter:

(a) LCD local display to indicate mass flow, temperature, and calculated steam (U.S and metric units),
(b) field settable and adjustable meter K values.
(c) stainless steel body with integral or separate three way valve manifold
(d) accuracy: ∀2%
(e) dynamic range: 38 : 1 turndown,
(f) NIST traceable

.2 inputs:

(a) one flow meter sensor
(b) one temperature sensor

.3 outputs:

(a) 4-20 mA with HART, or
(b) Modbus RTU over RS485

.4 output values:

(a) velocity flow
(b) volumetric flow
(c) mass flow
(d) totalized mass flow

.5 power supply:

(a) 24VDC

Standard of Acceptance

- Rosemount – 8800D Series
- Siemens
- Sierra

2.2 Mass Flow Meter –Variable Area Differential Pressure

.1 Type:

.1 variable area orifice with pressure compensation.

.2 suitable for;

(a) HVAC saturated steam.

.3 Flow sensor: flow body: stainless steel T316 schedule 40 pipe, ANSI Class 150 flanges, with integral pipe reducers,

.4 sensors: stainless steel type 316L variable area orifice with Inconel X750 calibrated compression spring,

.5 output: linear response to changes in flow rate,

.6 accuracy: ∀ 1.0% of actual flow from 5 to 100% of maximum rated flow.

.7 dynamic range: 100:1 turndown

.8 maximum pressure drop: 35 kPa (5 psig)

.9 design pressure: 1380 kPa (150 psig) saturated steam,

.10 CRN registered.

.2 Mass Flow transmitter:

.1 remote mounted electronic mass flow transmitter:

(a) LCD local display to indicate mass flow, and calculated steam (U.S and metric units),
(b) pressure compensation for saturated steam
(c) stainless steel body with integral or separate three way valve manifold

.2 accuracy: ∀0.5%

.3 inputs:

(a) high and low pressure impulse ports.

.4 outputs:

(a) Modubs RTU over RS485

.5 output values:

(a) static pressure
(b) differential pressure (volume flow rate)
(c) corrected mass flow rate

.6 power supply:

(a) 24VDC

Standard of Acceptance
° Spirax Sarco Gilflo/Scanner 2000

2.3 Energy Meter - Liquids – Inline Ultrasonic

.1 Type:

.1 two path, in-line ultrasonic with matched temperature sensors.

.2 revenue grade utility transfer,

.3 suitable for;

(a) HVAC chilled water – closed loop
(b) HVAC heating water – closed loop

.2 Flow sensor:

.1 flow body: carbon steel or stainless steel schedule 40 pipe, ANSI Class 150 flanges, with integral dual channel sensor sending and receiving ports.

.2 sensors: two path ultrasonic transmit time operation,

.3 design pressure: 1380 kPa (150 psig) at maximum design temperature.

.4 design temperature: 4°C to 100°C (40°F to 212°F)

.5 CRN registered.

.3 Temperature sensors:

.1 two matched 1000 ohm Platinum RTD, 2 or 4 wire (supply water and return water)

.2 matched thermowells,

.3 temperature range: -20 to 190°C (-4 to 374°F)

.4 Energy meter:

.1 real-time energy calculation based on flow and dual temperature sensors:

(a) wall mounted, NEMA 4 enclosure,
(b) measurement of thermal energy flow rate in Kj/hr (Btu/hr),
(c) keypad input
(d) backlit LCD local display to indicate flow, temperature and energy (U.S and metric units),
(e) accuracy: 0.5% to 1% at velocities greater than 0.3 m,/s (1 fps),
(f) data time stamping.
(g) NIST traceable

.2 inputs:

(a) one flow meter sensor
(b) two temperature sensors

.3 outputs:

(a) 2x 4-20 mA (flow and energy)
(b) Modbus RTU over RS 485.

.4 output values:

(a) flow velocity
(b) volumetric flow rate
(c) mass flow rate
(d) temperature
(e) energy

.5 power supply:

(a) 120 VAC power or 24VAC with external 120 VAC transformer, and
(b) lithium battery back-up

Standard of Acceptance

- Siemens Sitrans FUS380 with FUE950
- Sierra
- Dynasonic
- Emerson

2.4 Energy Meter - Liquids – Clamp-on Ultrasonic

.1 Type:

.1 clamp-on ultrasonic with matched temperature sensors,

.2 revenue grade sub-metering,

.3 suitable for;

(a) HVAC chilled water – closed loop
(b) HVAC heating water – closed loop.

.2 Flow sensor:

.1 dual channel/dual path arrangement,

.2 sensors: external pipe clamp-on, ultrasonic transmit time operation,

.3 operating medium temperature: -40 to 230°C (-40 to 450°F)

.4 output signal: 4-20 mA, loop powered.

.3 Temperature sensors:

.1 two matched 1000 ohm Platinum RTD, 2 or 4 wire (supply water and return water)

.2 matched thermowells,

.3 temperature range: -20 to 190°C (-4 to 374°F)

.4 Energy meter:

.1 real-time energy calculation based on flow and dual temperature sensors:

(a) wall mount NEMA 4 enclosure.
(b) measurement of thermal energy flow rate in Kj/hr (Btu/hr),
(c) keypad input
(d) backlit LCD local display to indicate flow, temperature and energy (U.S and metric units),
(e) accuracy: 0.5% to 1% at velocities greater than 0.3 m,/s (1 fps),
(f) data time stamping.
(g) NIST traceable

.2 inputs:

(a) two 4-20 mA (flow meter sensor)
(b) two temperature sensors

.3 outputs:

(a) 2x 4-20 mA
(b) 2x 0-10 V
(c) 2 x frequency
(d) 4 relay (status)
(e) Modbus RTU.

.4 output values:

(a) flow velocity
(b) volumetric flow rate
(c) mass flow rate
(d) temperature
(e) energy

.5 power supply:

(a) 120 VAC power or 24VAC with external 120 VAC transformer, and
(b) lithium battery back-up

Standard of Acceptance
- Siemens Sitrans FUE1010
- Sierra
- Dynasonic
- Emerson

2.5 Flow Meter – Condensate – Inline Magnetic

.1 Type:

.1 in-line magnetic

.2 suitable for fluid medium: condensate (from steam).

~~.2~~ Flow sensor:

.1 flow body: carbon steel or stainless steel schedule 40 pipe, ANSI Class 150 flanges,

.2 body liner: PFA or PTFE,

.3 sensors: encapsulated and rigidly retained magnet coils and stainless steel T316L electrodes,

.4 design pressure: 1380 kPa (150 psig)

.5 design temperature: 120°C (248°F)

.3 Flow transmitter:

.1 flow-body mounted electronic flow meter

.2 output: 4-20 mA for volume, and Modbus RTU over RS485

.3 local display to indicate instantaneous flow rate and flow total (U.S and metric units),

.4 accuracy: 0.25% of flow rate,

.5 dynamic range: 300 : 1 turndown,

.6 field calibration and K factor adjustment,

.7 power: 120 VAC or 24 VAC

.8 measuring range from 0.03 m/s to 7 m/s (0.1 fps to 23 fps),

Standard of Acceptance

° Central Station Stem Co – CMAG series
° Rosemount – E Series 8705
° Sierra
° Dynasonic

2.6 Flow Meter – Liquid General Purpose

.1 Type:

.1 in-line turbine meter, pulse output.

.2 suitable for intermittent flow and maximum capacity as listed.

.2 Flow meter:

.1 maximum pressure drop 7 kPa (1 psi) at full flow.

.2 maximum operating temperature: 95 C (200 F).

.3 accuracy of ± 1% of reading.

.4 equipped with dual flow scale calibrated in l/s and USGPM.

.5 contacts for remote monitoring and/or initiation of system chemical feed pumps after each 200 litres (50 US gallons)

Standard of Acceptance

° Neptune Hot Water Trident

2.7 Flow meter - Natural gas sub-meter

.1 Type:

.1 positive displacement rotary type,

.2 suitable for;

(a) natural gas sub-metering.

~~.2~~ Flow body:

.1 to ANSI/ASC-B109.3, non-compensated,

.2 flanged inlet and outlet connections,

.3 counters with electronic high frequency transmitter with magnetically coupled pulser.

.4 accuracy: ∀1% at minimum 26 : 1 turndown ration,

.5 design pressure: 1200 kPa (175 psig)

.6 power supply:

(a) 24VDC

Standard of Acceptance
- Roots/Dressser – Series B3
- Elster Canadian Meter – RPM Rotary Gas Meter

2.8 Energy Computer – Steam and Condensate

.1 Type:

.1 energy computer with temperature and pressure compensation,

.2 suitable for;

(a) HVAC saturated steam.
(b) HVAC condensate (from steam).

.3 compatible with mass and volume flow meters specified.

.2 Construction:

.1 Meter:

(a) microprocessor based computer with real time clock,
(b) memory for storage of minimum 5000 measured or calculated values,
(c) backlit LCD display and membrane keybad,
(d) selectable units of measure,
(e) ROM for built-in saturated steam tables,
(f) EEPROM/RAM for entered stored values ,
(g) wall mount NEMA 4 enclosure
(h) accuracy: ∀2% on calculated mass flow and heat rate.

.2 inputs:

(a) one 4-20 mA flow meter sensor
(b) one pulse input for flow
(c) one temperature sensor,
(d) two pressure sensors.

.3 outputs:

(a) 2 x 4-20 mA, selectable for measured or calculated values,
(b) 2 x relay outputs, configurable for measured or calculated values,
(c) 1 x isolated output, configurable for measured or calculated values,
(d) Modbus RTU over RS485

.4 output values:

(a) velocity
(b) volumetric flow
(c) corrected mass flow
(d) totalized mass flow
(e) corrected energy flow

.5 power supply:

(a) 120 VAC

Standard of Acceptance

° Rosemount
° Siemens
° Sierra
° Spirax Sarco

2.9 Pressure Transmitters

.1 Construction:

.1 remote mount gage and differential pressure transmitters,

.2 isolating diaphragm: stainless steel Type 316L,

.3 aluminium housing, with 50 mm (2 in) extended necks for insulation clearance,

.4 local LCD display,

.5 accuracy: ∀0.15% of span,

.6 input pressure range: -98 to 2000 kPa (-14.2 to 300 psig),

.7 transmitter output: 4-20 mA with HART,

.8 stainless steel T316L block, bleed and vent manifold for process connections,

.9 flange mounting bracket,

.10 power supply : 24 VAC.

Standard of Acceptance

° Rosemount – 3051C

2.10 Temperature Transmitters

.1 Construction:

.1 sensor mounted body,

.2 sensor: 1000 ohm Platinum RTD, 2 or 4 wire,

.3 matched thermowells,

.4 aluminium housing, with 50 mm (2 in) extended necks for insulation clearance.

.5 Local LCD display,

.6 accuracy: ∀0.22°C combined accuracy at 100°C span.

.7 self calibration to internal reference,

.8 input temperature range: -200 to 300°C (-328 to 572°F),

.9 transmitter output: 4-20 mA with HART.

.10 power supply: 24 VAC.

Standard of Acceptance

° Rosemount - 644

2.11 Instrument accessories

.1 Valves:

.1 quarter-turn ball valve,

.2 body and trim: stainless steel type 316,

.3 packing material: PTFE,

.4 minimum pressure rating: minimum 2000 kPa (300 psig)

.2 Manifolds:

.1 drilled and tapped stainless steel manifold block

.2 3 valve configuration (block, bleed and vent)

.3 number of ports to suit instrument.

.3 Impulse tubing:

.1 stainless steel tubing: to ASTM A269 T316, seamless

.2 1/2" OD x 0.049" wall thickness.

.3 pressure rating: minimum 2000 kPa (300 psig)

.4 Fittings and adaptors

.1 double ferrule compression fittings,

.2 gaugable depth penetration,

.3 minimum pressure rating: minimum 2000 kPa (300 psig)

Standard of Acceptance

° Swagelock – Gaugeable Tube Fittings and Adaptor Fittings

2.12 Temperature sensor thermowells

.1 Construction:

.1 Body material:

(a) in copper pipe : brass.
(b) in steel pipe : stainless steel.

.2 threaded connection, manufactured from bar stock or forged brass with cap and chain, compatible with temperature sensors used.

.3 pressure rating: 2000 kPa (300 psig) at 121°C (250°F)

.4 C.R.N. registered.

3 EXECUTION

3.1 Fluid energy meter selection

Provide meters and associated instrumentation as follows:

Service	Function	Primary Instrument	Secondary Instruments	Energy Meter	Energy Computer	Reported Values
District Heating and Cooling Water	Energy	In-line Ultrasonic	Differential Temperature	Yes	---	Volumetric Flow, Mass Flow, Energy, Temperatures

Service	Function	Primary Instrument	Secondary Instruments	Energy Meter	Energy Computer	Reported Values
Central Plant Steam, District Heating Steam	Energy	Vortex	Temperature, Pressure	---	Yes	Mass Flow, Energy
Secondary Steam	Mass	Variable Area	Static Pressure, Differential Pressure	---	No	Mass Flow, Pressure, Diff Pressure
Central Plant Condensate	Energy	Magnetic	Temperature	---	Yes	Volumetric Flow Energy
Secondary Condensate	Flow	Magnetic	None	---	No	Volumetric Flow
Heating Water Chilled Water Glycol	Energy	Clamp-on Ultrasonic	Differential Temperature	Yes	---	Volumetric Flow, Mass Flow, Energy, Temperatures
Domestic Cold Water DCW to HVAC (Make-up Water) DCW to Pure Water	Flow	Turbine	None	No	---	Volumetric Flow
Domestic Hot Water Domestic Hot Water Recirculation	Energy	Clamp-on Ultrasonic	Temperature	Yes	---	Volumetric Flow, Mass Flow, Energy, Temperature

3.2 Flow meter installation

.1 Install flow sensors in horizontal straight pipe runs, free of valves and fittings.

.2 Install in locations to provide straight pipe before and after metering elements which are the greater of:

.1 10 pipe diameters before and 5 pipe diameters after, or

.2 1 m (3 ft) before and 1 m (3 ft) after, or

.3 unless as otherwise recommended by manufacturer.

.3 Natural Gas sub-meters:

.1 Install gas sub-meters in locations complete with three valve bypass.

.2 Provide a Y-strainer with 100 mesh screen immediately upstream of meter.

.3 Support meter rigidly from adjacent piping. Support piping to prevent piping strain transmitted to meter.

.4 Connect meter pulse output to B.M.S. system.

3.3 Energy and Flow Computers installation

.1 Mount meter display units at approximately 1650 mm (65 in) above the floor or working surface, and provide impulse piping and wiring to complete installation.

3.4 Temperature sensor and transmitter installation

.1 Install temperature sensors/transmitters in thermowells.

.2 Locate and install thermowells and sensors orientated as follows:

.1 in horizontal piping: at top of pipe

.2 in vertical piping: on side of pipe 90° away from traffic aisles or other risks of mechanical damage.

3.5 Pressure transmitter installation

.1 Install pressure transmitters with three-valve manifolds.

.2 Provide impulse lines with carefully formed radius elbows and compression fittings. Arrange impulse lines to prevent trapping of gases in inverted loops for liquid systems, and trapping of liquid in steam systems.

.3 Provide service isolation valves at process line connection in addition to instrument manifold valves.

.4 Install impulse lines for gage pressure sensors:

.1 where transmitter is higher than the connections to the process line;

(a) provide 360° coils on impulse lines when connecting to the top of the pipe,
(b) provide 180° U-tube on impulse lines when process tapping is on the side of horizontal pipes, and for any connection to vertical pipes;

.2 where transmitter is lower than the connections to the process line, coils and U-loops are not required.

.5 Impulse lines for differential pressure sensors:

.1 mount pressure sensor below the connections to the process line,

.2 provide equal length impulse lines for both the high and low pressure lines.

.6 Fabricate transmitter supports from NPS 2 carbon steel pipe, and attach transmitter with mounting flange.

3.6 Power and control wiring

.1 Provide power and control wiring for each transmitter and meter. Where devices require other than 120 VAC mains power, provide fused control transformers as required to suit instrument and install in main control panels, or mount on junction box adjacent to instrument.

.2 Provide power wiring installed in conduit in accordance with Section 20 05 13.

.3 Provide control wiring installed in conduit in accordance with Section 25 05 01.

.4 Use flexible liquid-tight conduit for the last 300 mm (12 in) at connection to instruments.

3.7 Testing and Calibration

.1 Make field calibration checks on flow, pressure, and temperature instruments in accordance with manufacturer instructions, before system balancing is started.

.2 Instrument systems that fail to meet accuracy criteria to be returned to the manufacturer for factory re-calibration, repair and/or replacement. Reinstall instrument upon correction of defects.

.3 Prepare and complete a field calibration test record for each instrument and submit to Engineer for review. Include copy of report in the operating and maintenance manuals.

.4 Cross-check output values of energy meters against other measured values of associated equipment;

.1 for heating and chilled water systems, compare energy meter output against calculated energy based on circulation pump flow reports, and system temperature differentials.

.2 for steam systems, compare energy meter values against boiler fuel consumption and/or firing rate.

.3 for condensate, compare energy meter values against temperature gauge values and condensate pump flow rates.

.4 Include cross-check results in the calibration report.

END OF SECTION

INDICATING GAUGES
20 05 19

1 GENERAL

1.1 Scope

.1 Provide temperature and pressure measuring devices and flow indicators as required.

1.2 Shop drawings / product data

.1 Submit manufacturer's catalogue literature for;
  .1 Flow indicators
  .2 Thermometers
  .3 Pressure gauges

.2 Include schedule of thermometers, and pressure gauges showing for each instrument:
  .1 identification number,
  .2 location,
  .3 type,
  .4 range and
  .5 accessories.

1.3 Applicable codes and standards;

.1 ASME B40.200 Thermometers, Direct Reading and Remote Reading

.2 ASME B40.100 Pressure Gauges and Gauge Attachments

.3 ASME PTC 19.3 TW – Thermowells

.4 CSA B51 Boiler and Pressure Vessel Code

2 PRODUCTS

2.1 Flow indicators;

.1 Construction:
  .1 visual flow indication.
  .2 equipped with dual flow scale calibrated in l/s and USGPM.
  .3 protected against accidental breakage of the glass indicator.
  .4 in-line type for pipe sizes up to NPS 1½.

Standard of Acceptance
° ITT Bell & Gossett - Thermoflow

2.2 Thermometers and Pressure Gauges - Selection Criteria

.1 General:

.1 normal operating reading to be between half and two thirds of full scale range and

.2 expected maximum and minimum readings to be within scale range.

.3 thermometers to have both Fahrenheit and Celsius scales.

.4 pressure gauges to have both psi and kPa scales.

.2 Product identification

.1 Pressure gauges and thermometers to be selected from manufacturers standard product line.

Standard of Acceptance
- Trerice
- Dresser - Ashcroft
- Weksler - Baker Instruments
- Winter's Thermogauges
- Weiss
- WIKA

.3 Model designations from Trerice catalogue are used to establish quality standards and construction details to allow assessment of products from other unlisted manufacturers.

2.3 Direct reading thermometers

.1 Solar powered 178mm (7 in) industrial, variable angle type, passivated thermistor, cast aluminum epoxy coated case, with solar cell and 11mm (7/16 in) LCD display.

Standard of Acceptance
- Trerice SX9

2.4 Remote reading thermometers

.1 115 mm (4½ in) liquid filled or gas activated type, stainless steel capillary, stainless steel spring armour, stainless steel bulb and phenolic, cast aluminum, or stainless steel case for surface mounting.

Standard of Acceptance
- Trerice - L80300 Series (liquid filled)
- Weskler - Baker Instruments - 413BE (gas activated)
- Dresser - Ashcroft 600A Series (gas activated)

2.5 Thermometer wells

.1 Construction:

.1 Body material:

(a) in copper pipe : brass.
(b) in steel pipe : stainless steel.

.2 threaded connection, manufactured from bar stock or forged brass with cap and chain, compatible with temperature sensors used.

.3 pressure rating: 2000 kPa (300 psig) at 121°C (250°F)

.4 C.R.N. registered

Standard of Acceptance
- Trerice 5550 Series

2.6 Temperature well conversion kits

.1 Retrofit kit to convert straight liquid filled thermometer wells to accept bi-metal dial thermometers.

2.7 Pressure gauges

.1 For direct pressure measurement

.1 115 mm (4½ in) dial type, silicone-free dampening, black solid front case, ½% accuracy, adjustable pointer to ASME B40.100 Grade 2A.

Standard of Acceptance
° Trerice - 450B

.2 For differential pressure measurement

.1 115 mm (4½ in) dial type, silicone-free dampening, black solid front case, ½% accuracy, adjustable pointer and maximum registering pointer to ASME B40.100 Grade 2A., complete with impulse snubber and 3-way switching valve.

Standard of Acceptance
° Trerice - 450B

.3 Accessories:

.1 pressure snubbers, brass or T303 stainless steel construction:

Standard of Acceptance
° Trerice - 872

.2 needle valves, rising stem, brass or T316 stainless steel construction.

Standard of Acceptance
° Trerice - 735 / 740

.3 coil syphons, 1/4" NPT, welded 304SS Sch.40 body, 180° coil, 2060 kPa (300 psig) and 650°F max

Standard of Acceptance
° Trerice – 885

3 EXECUTION

3.1 Thermometer and Pressure Gauges - General installation criteria

.1 Install thermometers and gauges not more than 3 m (10 ft) from floor or platform, or install remote reading thermometers and gauges, with dial mounted at eye level, on steel or aluminum plate.

.2 Provide nameplates for each gauge and thermometer as specified in Section 20 19 00 Identification.

3.2 Thermometer installation

.1 Install thermometers in wells.

.2 Install wells with extension necks where piping and equipment to be insulated.

.3 Install thermometers on inlet and outlet of;

.1 heat exchangers,

.2 water heating and cooling coils,
.3 water boilers,
.4 chillers,
.5 cooling towers, and
.6 domestic hot water tanks.

3.3 Pressure gauge installation

.1 Install pressure gauges on inlet and outlet of;
  .1 heat exchangers,
  .2 water heating and cooling coils,
  .3 steam piping to heating coils
  .4 water boilers,
  .5 chillers,
  .6 cooling towers,
  .7 domestic hot water tanks,
  .8 steam boilers,
  .9 condensate receivers, and
  .10 deaerators..

.2 Install needle valves on pressure gauges.
  .1 For differential pressure gauge, provide needle valve on each sensing line.

.3 Install pressure snubbers on pressure gauges at;
  .1 suction and discharge sides of oil pumps, and positive displacement pumps,
  .2 compressed air; at compressors, dryers and receivers.

.4 Install coil syphons on steam and condensate pressure gauges.

END OF SECTION

VALVES
20 05 23

1 GENERAL

1.1 Scope

.1 Provide valves in piping systems throughout project for shut-off service, manual balancing, and check-stops.

.2 Refer to relevant specification sections for specialty and control valves.

1.2 Applicable Codes and Standards

.1 Temperature and pressure ratings, material composition, and manufacturer's testing procedures conforming to latest specifications from:

.1 Manufacturers Standardization Society of Valve and Fittings Industry (MSS), and

.2 ASTM A216 Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service, or

.3 British Standards Institution (BSI) Kitemarks, or

.4 supplied by manufacturer operating with ISO 9001 certification.

.2 Valves subject to registration in pressure piping service to have current Canadian Registration Numbers (CRN) in accordance with:

.1 BC Safety Authority

.2 CSA B51 Boiler, Pressure Vessel, and Piping Code.

1.3 Quality and Equivalence

.1 Valve selections are in general identified by model designations taken from manufacturers catalogues to indicate physical properties and quality standards not otherwise described.

.2 Companies, and/or trade names listed below are acceptable for various valve types, where products offered are essentially similar to those identified by manufacturer or model number under “Standard of Acceptance” designation.

.1 Specific duty valves are specified in each piping service article.

.2 for gate, globe, angle, and check valves

Standard of Acceptance

- Kitz
- Crane
- Newman Hattersley
- Jenkins
- Bonney Forge
- Dahl Bros
- Neo Valves
- Nibco
- Trueline
- Toyo Valves (Red &White)
- S.A. Armstrong
- Velan

- Watts
- A-Chem Valves & Controls

.3 for double regulating valves

- S.A. Armstrong
- Tour & Anderson
- Preso
- Newman Hattersley

.4 for silent check valves

Standard of Acceptance

- Valmatic
- APCO
- Durabla
- Nibco
- Mueller

.5 for butterfly valves

Standard of Acceptance

- Crane Centreline
- Crane Flowseal
- Kitz
- Mueller
- Crane
- Keystone
- Demco
- Newman Hattersley
- Grinnell
- DeZurik
- Apollo
- Milwaukee Valve
- Bray
- Jenkins
- Nibco
- Watts
- Challenger
- Velan
- A-Chem Valves & Controls
- Sure Seal

.6 for plug valves (with CGA approval when used in gas service)

Standard of Acceptance

- Mueller
- Nordstrom
- Newman Hattersley

.7 for ball valves

Standard of Acceptance

- American Valve
- Kitz
- Crane
- Newman Hattersley

- Jenkins
- Apollo
- Dahl Bros
- Neo Valves
- Milwaukee Valve
- Nibco
- Canadian Worcester Controls
- Toyo Valve (Red&White)
- Watts
- Velan
- A-Chem Valves & Controls
- Trueline

.8 for grooved piping valve products

Standard of Acceptance

- Victaulic
- Nibco
- Gruvlok
- Couplox
- Mueller
- Shurjoint

2 PRODUCTS

2.1 Selection criteria

.1 Valves to be line size, selected as follows

.1 for shut-off or isolating service, valves to be

(a) Gate
(b) Butterfly
(c) Ball or
(d) Plug

.2 for flow balancing and shut-off service valves to be

(a) Double regulating, or
(b) Plug and
(c) to incorporate adjustable limit stops.

.3 at discharge of pumps check valves to be silent or spring assisted or combination check and flow control valves.

.2 On mains and risers, drain valves to be selected as follows

.1 On mains NPS 4 and under

(a) NPS ¾ brass threaded ball valve of appropriate pressure rating with hose thread, cap and chain.

.2 On mains NPS 5 and over

(a) NPS 1 brass threaded ball valve of appropriate pressure rating with hose thread, cap and chain.

2.2 Sprinkler and standpipe valves

.1 Approvals

.1 Valves to be ULC and FM listed for fire protection.

.2 Gate valves up to NPS 2, threaded

.1 1200 kPa (175 psi) Class 150 bronze body, solid wedge bronze disc, rising stem, OS & Y, screw in yoke bonnet,

Standard of Acceptance
- Crane 459
- Nibco T-104-0

.3 Gate valves NPS 2½ and over, flanged

.1 1200 kPa (175 psi) to ASTM A216 class B, 175 CWP non shock, cast iron body with flat face flanges, bronze or bronze faced solid wedge disc, bronze seat rings, rising stem, OS & Y, bolted bonnet
- Crane 467
- Jenkins 825CJ
- Nibco F-607-OTS

.4 Butterfly valves up to NPS 2½, threaded

.1 1200 kPa (175 psi), bronze body, stainless steel disc, with lever handle

Standard of Acceptance
- Milwaukee BB2-100
-

.5 Butterfly valves NPS 2½ and over, lug style

.1 1200 kPa (175 psi), cast iron body, ductile iron disc nickel plated, EPDM seat, "OPEN/SHUT" indicator

Standard of Acceptance
- Grinnell X8292ULOS
- Nibco LD3510-4
- Sure Seal 600 Series

.6 Butterfly valves NPS 2½ and over, grooved joint style

.1 1200 kPa (175 psi), cast iron body, EPDM coated or brass disc, EPDM seat, "OPEN/SHUT" indicator, with supervisory switch

Standard of Acceptance
- Nibco G-4765-8N
- Gruvlox 7700
- Victaulic Series 705W

.7 Swing check valves NPS 2½ and over, flanged

.1 1200 kPa (175 psi),to ASTM A216 class B, 175 CWP, cast iron body with flat faced flanges, regrind, renew bronze disc and seat ring, bolted cover,

Standard of Acceptance
- Crane 375

- Jenkins 477J
- Nibco F-908-W

.8 Buried key valves:

.1 post indicator

Standard of Acceptance
- Nibco NIP-1AJ

.2 extension type valve box with cover:

.3 valves:

(a) AWWA C509 resilient seated epoxy coated

Standard of Acceptance
- Mueller
- Clow
- Nibco
- AVK

.9 Fire hydrants

.1 Cast iron body, full bronze mounted for 1035 kPa (150 psi) service pressure and with 2½ NPS hose nozzles at 180 Es, complete with 'O' rings and suitable for 2 m (6 ft 6 in) bury.

.2 Flanged at ground line with flange approximately 50 mm (2 in) above finished grade level.

.3 Open counterclockwise.

.4 Standard Province of British Columbia hose threads with caps and chains and operating nuts.

.5 Of manufacture and type approved by local Municipal Authorities.

Standard of Acceptance
- McAvity Hydrant M-67
- Clow D-67-M

.10 Double check valves and backflow preventers

.1 Isolate automatic sprinkler system to comply with Plumbing Code

.2 ULC and FM listed for fire service.

.3 Double check valve assemblies to be in accordance with CSA Standard B64.5

.4 Backflow preventer assemblies to be in accordance with CSA Standard B64.4

Standard of Acceptance
- Hersey
- Watts

2.3 Domestic water valves

.1 Gate valves NPS 2 and under, soldered

.1 1000 kPa (150 psi) to MSS SP-80, Class 150,bronze body, solid wedge bronze disc, rising stem, screw in, or union bonnet.

Standard of Acceptance
- Kitz 43
- Crane 1334

- Jenkins 813J
- Newman Hattersley T608 with NPT to copper adapters
- Nibco S-131

.2 Gate valves NPS 2 and under, threaded

.1 1000 kPa (150 psi), to MSS SP-80, Class 150, bronze body, solid wedge disc, rising stem, screw in, or union bonnet.

Standard of Acceptance
- Kitz 42
- Crane 431
- Jenkins 281OJ
- Newman Hattersley T608
- Nibco T-131

.2 1000 kPa (150 psi) to 2000 kPa (300 psi), to MSS SP-80, Class 300, bronze body, solid wedge disc, rising stem, union or screw in bonnet.

Standard of Acceptance
- Kitz 37
- Crane 634E
- Jenkins 228OUJ
- Newman Hattersley #C1174
- Nibco T-174A

.3 Gate valves NPS 2½ and over flanged

.1 850 kPa (125 psi), to MSS SP-70, Class 125, cast iron body with flat faced flange, bronze or bronze faced solid wedge disc with bronze seat rings, rising stem, OS & Y, bolted bonnet.

Standard of Acceptance
- Kitz 72
- Crane 465 ½
- Jenkins 454J
- Newman Hattersley #504
- Nibco F-617-O

.2 1000 kPa (150 psi), to ASTM A216 grade WCB, Class 150, cast steel body with raised faced flange, flexible Type 416 stainless steel disc and hard faced seat rings, rising stem, OS & Y, bolted bonnet.

Standard of Acceptance
- Kitz 150 SCLS
- Crane 47XUT
- Jenkins J1009B8F
- Newman Hattersley #C1481

.3 1000 kPa (150 psi) to 2000 kPa (300 psi), to ASTM A216 grade WCB, Class 300, cast steel body with raised faced flange, flexible Type 416 stainless steel disc and hard faced seat rings, rising stem, OS & Y, bolted bonnet.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 33½ XU-F
- Newman Hattersley #C1482

.4 Globe valves NPS 2 and under, soldered

.1 850 kPa (125 psi),to MSS SP-80, 300 CWP, bronze body, renewable composition PTFE disc, threaded over bonnet., lock shield handles as indicated.

Standard of Acceptance
- Kitz 10
- Crane 1334/1320
- Jenkins 813J
- Newman Hattersley 13 with NPT copper adaptors
- Nibco S-235-Y

.5 Globe valves NPS 2 and under, threaded

.1 1000 kPa (150 psi),to MSS SP-80, Class 150, bronze body, renewable composition PTFE disc, union bonnet, lock shield handles as indicated.

Standard of Acceptance
- Kitz 09
- Crane7TF
- Jenkins 106BJ
- Newman Hattersley 13
- Nibco T-235-Y

.6 Butterfly valves NPS 2 to NPS 12, flanged

.1 1378 kPa (200 psi) to MSS-SP-67, cast iron lug body style with holes drilled and tapped for ANSI 125/150 flange pattern;

(a) stainless steel shaft, aluminum bronze or 316 stainless steel or ductile iron/nickel plated disc, and replaceable EPDM resilient seat to provide bubble tight shut-off under system pressure from either side with flange removed from un-pressurized side.
(b) ANSI 150 temperature and pressure rating and suitable for working pressures up to 1378 kPa (200 psi) at 100°C (212°F), factory tested to minimum of 2067 kPa (300 Psi) at 37.8°C (100°F)
(c) with locking handles up to NPS 4 and gear operators for NPS 6 and over.

Standard of Acceptance
- Crane Center Line - Series 200
- Kitz - 6122E
- Colton - CILB Series
- Nibco LC-2000
- Challenger #20CN4E
- DeZurik BOS
- Watts BF
- SureSeal 600

.2 1720 kPa (250 psi) to MSS-SP-67, cast iron lug body style with holes drilled and tapped for ANSI 125/150 flange pattern;

(a) stainless steel shaft, aluminum bronze or T316 stainless steel disc, and replaceable EPDM resilient seat to provide bubble tight shut-off under system pressure from either side with flange removed from un-pressurized side.
(b) ANSI 150 temperature and pressure rated and suitable for working pressures up to 1720 kPa (250 psi) at 37.8°C (100°F), factory tested to minimum of 2067 kPa (300 Psi) at 37.8°C (100°F).
(c) with locking handles up to NPS 4 and gear operators for NPS 6 and over.

Standard of Acceptance

- Crane Center Line – Series 225
- Kitz – 6123E
- Nibco – LD-3010

.3 High performance type for working pressures up to 4800 kPa (740 psi), ANSI B16.34 temperature and pressure rated carbon steel lug body with holes drilled and tapped for ANSI Class 300 flange pattern.

(a) 316 or 17-4 stainless steel disc and shaft, Teflon seat complete with titanium or 316 stainless steel spiral wound back-up ring to provide bubble tight shut-off under system pressure from either side, when installed with single flange.
(b) with locking handles up to NPS 4 and gear operators for NPS 6 and over.
(c) ANSI 300 temperature and pressure rated and suitable for working pressures up to 4823 kPa (740 psi) at 37.8°C (100°F), factory tested to minimum of 4823 kPa (740 psi) at 37.8°C (100°F)

Standard of Acceptance
- Crane Flowseal
- DeZurik BHP Series
- Keystone K-Lok Series
- Mueller
- SureSeal

.7 Butterfly valves NPS 2 to NPS 12, for roll grooved piping

.1 2000 kPa (300 psi), Class 300, Iron body, grade E dual seal disc, with lever handle up to NPS 3 and gear operators NPS 4 and up.

.2 Suitable for mounting motorized control actuators.

Standard of Acceptance
- Victaulic - Vic 300 Master seal for steel pipe
- Gruvlok - 7700 for steel pipe
- Nibco GD-4765 for steel pipe
- Victaulic - Vic 608 for copper pipe
- Gruvlok - 7721 for copper pipe
- Mueller - 59G

.8 Butterfly valves NPS 14 to NPS 24, for roll grooved piping

.1 1200 kPa (175 psi), Class 175, Iron body, grade E dual seal disc, with gear operator.

Standard of Acceptance
- Victaulic - Vic 709, Series W709 AGS

.9 Swing check valves NPS 2 and under, soldered

.1 850 kPa (125 psi),to MSS SP-80, bronze body, bronze swing disc, regrindable seat, screw-in cap,

Standard of Acceptance
- Kitz 23
- Crane 1342
- Jenkins4093J
- Newman Hattersley 47 with NPT copper adaptors
- Nibco S-413

.10 Swing check valves NPS 2 and under, threaded

.1 850 kPa (125 psi), to MSS SP-80, Class 125, bronze body, bronze swing disc, regrindable seat, screw-in cap

Standard of Acceptance
- Kitz 22
- Crane 37
- Jenkins 4073J
- Newman Hattersley 47
- Nibco T-413

.11 Swing checks NPS 2 ½ and over, flanged

.1 850 kPa (125 psi), to MSS SP-71, Class 125, cast iron body with flat faced flange, renewable bronze seat rings, bronze faced iron or bronze disc, bolted cap.

Standard of Acceptance
- Kitz 78
- Crane 373
- Jenkins 587J
- Newman Hattersley 651
- Nibco F-918

.12 Swing check valves NPS 2 and over, grooved:

.1 2065 kPa (300 psig), ductile iron body with spring-assisted disc.

Standard of Acceptance
- Victaulic series 719, NPS 2 ½ to 4
- Victaulic series 779, NPS 4 to 14

.13 Ball valves up to NPS 2:

.1 1000 kPa (150 psi), two piece bronze body and chrome plated bronze ball, PTFE seat rings, solder joint or NPT to copper adapters, full port.

.2 handle extensions suitable to clear 50 mm (2 in) pipe insulation thickness.

Standard of Acceptance
- Kitz 59(soldered)
- Kitz 58 (threaded)
- Crane 9322 (soldered)
- Crane 9302 (threaded)
- Jenkins 202J (soldered)
- Jenkins 201J (threaded)
- Newman Hattersley 1999 (soldered)
- Newman Hattersley 1969F (threaded)
- Nibco S-FP-600 (soldered)
- Nibco T-FP-600 (threaded)
- Victaulic 722 (threaded)
- Anvil Fig 171N (threaded)

.14 Double regulating valves (DRV), NPS 2 and under, threaded

.1 1000 kPa (150 psi) Copper alloy body, plug type stem with flow measurement ports and tamper-proof setting.

Standard of Acceptance
- S.A. Armstong CBV

- Tour & Anderson STAD
- Newman Hattersley #1700
- Preso B-PLUS

.15 Double regulating valves (DRV), NPS 2½ and over, flanged

.1 860 psi (125 psi), cast or ductile iron body, raised face flanges, copper alloy trim, with flow measurement ports, tamper-proof setting.

Standard of Acceptance
- S.A. Armstrong CBV II
- Tour & Anderson series 787
- Newman Hattersley #737
- Preso B-PLUS

.16 Flow meter for DRVs

.1 Direct digital flow readout type computerized meter with hoses and fittings.

Standard of Acceptance
- S.A. Armstong "Compu Flow Meter"
- Tour & Anderson CBI
- Newman Hattersley 1010
- Preso Flowcomp

2.4 Natural gas, Propane gas valves

.1 Approvals:

.1 CSA/CGA

.2 Ball valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) large port, Class 150 with two piece bronze body stainless steel or chrome plated bronze ball, PTFE seats and seals.

Standard of Acceptance
- Kitz 58
- Toyo 5044A
- Crane 9302
- Jenkins 201J
- Grinnell GR 1550
- Newman Hattersley #1969F
- Nibco T-FP-600

.3 Ball valves NPS 2 ½ to NPS 12, flanged

.1 1000 kPa (150 psi) standard port, Class 150 with carbon steel body, stainless steel ball and stem, PTFE seats and packing. (lever or gear operator)

Standard of Acceptance
- Kitz 150 SCTAM FS-N (150)
- Trueline 715 AIT

.4 Plug Valves NPS 2 and under, threaded

.1 1200 kPa (175 psi) cast iron body, Class 175 WOG, rectangular port, lubricated plug.

Standard of Acceptance
- Nordstrom 142
- Newman Hattersley #171M

.5 Plug Valves NPS 2 ½ to NPS 12, flanged

.1 1200 kPa (175 psi) cast iron body, Class 200 WOG, rectangular port, full bore, lubricated plug.

Standard of Acceptance
- Nordstrom Fig. 143
- Newman Hattersley #201M
- Mueller

.6 Three way cock

Standard of Acceptance
- Crane 268
- Nordstrom Fig. 3402
- Newman Hattersley #200L

.7 Test cocks, threaded

.1 Class 125 bronze

Standard of Acceptance
- Crane 254XR

2.5 Fuel oil valves

.1 Ball valves

.1 NPS 2 and under

(a) 600 WOG, two piece brass body, threaded ends
(b) stainless steel or chrome plated brass ball,
(c) full ported solid ball,
(d) PTFE seats and seals
(e) pressure rating (flammable liquid): 4100 kPa (600 psig WOG)
(f) lockable lever handle with nylon grip,
(g) UL/ULC listed to ULC/ORD C842

Standard of Acceptance
- Conbraco/Apollo fig. 77G-UL (NPS ½ to NPS 1 only)
- Crane fig F9202
- Milwaukee fig PM01, or BA-475B

.2 NPS 2½ to NPS 10

(a) Class 150 cast steel body, flanged ends, split body design,
(b) chrome plated carbon steel ball,
(c) full ported solid ball,
(d) PTFE seats and seals,
(e) pressure rating (flammable liquid): 1790 kPa (260 psig) at 93°C (200°F)
(f) lockable lever handle with nylon grip for NPS 2 ½,
(g) gear operator with standard wheel and locking device for NPS 3 – NPS 10
(h) UL 842 listed

Standard of Acceptance
- Apollo fig 88A-200

° Velan fig SB-150

.2 Swing check valves

.1 Fuel oil suction NPS 2 and under

(a) Class 125 bronze, threaded

Standard of Acceptance
° Crane 4037J
° Jenkins 4092J
° Nibco T-413-B
° Kitz 22

.2 Fuel Oil Suction NPS 2½ and over

(a) Class 125 cast iron, flanged.

Standard of Acceptance
° Crane 373J
° Jenkins 587J
° Nibco F-918-B
° Kitz 78

.3 Fuel Oil Discharge NPS 2 and under

(a) Class 800 forged steel socket weld, lift check

Standard of Acceptance
° Crane B3674XUW
° Bonney Forge HL-41-T

.4 Fuel Oil check valve at pump discharge NPS 2 and under

(a) Class 800 forged steel socket weld.

Standard of Acceptance
° Crane 41, 6 or 27 disc.
° Bonney Forge HL-41-SW.

2.6 Heating and cooling water valves

.1 Gate valves NPS 2 and under, soldered

.1 1000 kPa (150 psi) rising stem to MSS SP-80, Class 125 with bronze body, bronze wedge disc and screw in bonnet.

Standard of Acceptance
° Kitz 44
° Crane 1700-S
° Jenkins 991AJ
° Newman Hattersley #608 with NPT copper adaptor
° Nibco S-111

.2 Gate valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) rising stem to MSS SP-80-1990, Class 125, with bronze body and bronze solid wedge disc, screw in bonnet.

Standard of Acceptance

- Kitz 24
- Crane 428
- Jenkins 810J
- Newman Hattersley #608
- Nibco T-111

.2 1000 kPa (150 psi) to 2000 kPa (300 psi) rising stem, 800 pound forged steel body, solid wedge disc, bolted bonnet.

Standard of Acceptance
- Bonney Forge HL-11-T
- Crane B-3604XUT
- Newman Hattersley #C1174

.3 1000 kPa (150 psi) to 2000 kPa (300 psi) rising stem to MSS SP-80, Class 300, with bronze body, copper nickel alloy trim, solid wedge disc, and union bonnet

Standard of Acceptance
- Kitz 37
- Crane 636E
- Jenkins 2282J
- Nibco T-174-SS

.3 Gate valves NPS 2½ and over, flanged

.1 850 kPa (125 psi) rising stem to MSS SP-70-1990, 200WOG, Class 125 with flat faced flanges, cast iron body, bronze trim, OS & Y and bolted bonnet.

Standard of Acceptance
- Kitz 72
- Crane 465½
- Jenkins 4545
- Newman Hattersley #504
- Nibco F-617-O

.2 1000 kPa (150 psi) to 2000 kPa (300 psi), rising stem, to ASTM A216 Gr WCB, Class 300 with raised face flanges, cast steel body, flexible disc, 13% chrome to stellite trim, OS & Y. bolted bonnet.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 33XU-F
- Jenkins J1010B8F
- Newman Hattersley #C1482

.4 Globe valves NPS 2 and under, soldered

.1 1000 kPa (150 psi), Class 150 to MSS SP-80, Class 150, bronze body, renewable PTFE composition disc, threaded in bonnet, and lockshield handles where required.

Standard of Acceptance
- Kitz 10
- Crane 7
- Jenkins 106BP5
- Newman Hattersley #13 with NPT to copper adaptors

- Nibco S-235-Y

.5 Globe valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) to MSS SP-80, Class 150, bronze body, renewable PTFE composition disc, union bonnet, and lockshield handles where required.

Standard of Acceptance
- Kitz 09
- Crane 7TF
- Jenkins 106BJ
- Newman Hattersley #13
- Nibco T-235-Y

.2 1000 kPa (150 psi) and 2000 kPa (300 psi) to MSS SP-80, Class 300 with bronze body, hardened stainless steel plug, renewable seat and union bonnet.

Standard of Acceptance
- Kitz 17S
- Crane 382P
- Jenkins 592J
- Newman Hattersley #23
- Nibco T-276-AP

.3 1000 kPa (150 psi) to 2000 kPa (300 psi) threaded, 800 pound forged steel body, bolted bonnet, hard faced disc and seat ring.

Standard of Acceptance
- Bonney Forge HL-31-T
- Crane B-3644XU-T
- Newman Hattersley #C1874

.6 Globe valve NPS 2½ and over, flanged

.1 850 kPa (125 psi) to MSS SP-85, 200WOG, Class 125, flat faced flanges, cast iron body, bronze trim, OS & Y bolted bonnet, bronze disc and seat ring.

Standard of Acceptance
- Kitz 76
- Crane 351
- Jenkins 2342J
- Newman Hattersley #731
- Nibco F-718-B

.7 Globe valves NPS 2½ and over, flanged

.1 1000 kPa (150 psi) to ASTM A216 Gr WCB, Class 300, cast steel body, 13% chrome to stellite trim, OS & Y and bolted bonnet.

Standard of Acceptance
- Kitz 300SCJS
- Crane 151XU
- Jenkins J104B2
- Newman Hattersley #C1882

.8 Ball valves NPS 2 and under, soldered

.1 1000 kPa (150 psi) Class 150, full port, two piece bronze body, stainless steel or chrome plated bronze ball, PTFE seat and seals.

.2 handle extensions suitable to clear 50 mm (2 in) pipe insulation thickness.

Standard of Acceptance
- Kitz 59
- Crane 9322
- Jenkins 202J
- Newman Hattersley #1999
- Nibco S-FP-600
- Watts

.9 Ball valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) Class 150, full port, two piece bronze body, chrome plated bronze ball, PTFE seat and seals.

.2 handle extensions suitable to clear 50 mm (2 in) pipe insulation thickness.

Standard of Acceptance
- Kitz 58
- Crane 9302
- Jenkins 201J
- Newman Hattersley #1969F
- Nibco T-FP-600
- Victaulic 722
- Anvil Fig 171N

.10 Butterfly valves NPS 2½ to 12, for grooved end pipe:

.1 1000 kPa (150 psi) Class 150, long neck design malleable or ductile iron body, EPDM Grade "E" dual seal coated disc for 93EC (230EF) working temperature, lever operator to NPS 4, gear operator NPS 6 to 12

Standard of Acceptance
- Victaulic Series 300
- Nibco GD-4765
- Mueller 59G

.11 Butterfly valves NPS 14 to NPS 24, for grooved end pipe

.1 1200 kPa (175 psi) Class 175, long neck design malleable or ductile iron body, ductile iron disc, EPDM Grade "E" seating edge on disc for 93EC (230EF) working temperature, gear operator.

Standard of Acceptance
- Victaulic Series 709

.12 Butterfly valves NPS 2½ and over, flanged

.1 1000 kPa (150 psi) to MSS-SP-67, cast iron lug body style with holes drilled and tapped;

(a) stainless steel shaft, bronze or cast iron disc with nickel chrome seating edge and replaceable EPDM resilient seat to provide bubble tight shut-off under system pressure from either side with flange removed from un-pressurized side.
(b) with locking handles up to NPS 4 and gear operators for NPS 6 and over.

Standard of Acceptance
- Crane Center Line series 200

- Kitz 6122E
- Colton CILB Series
- Nibco LD-3010
- Challenger #20CN4E
- DeZurik BOS
- Watts BF
- SureSeal 600

.2 High performance type for working pressures over 1000 kPa (150 psi), ANSI B16.34 temperature and pressure rated carbon steel lug body with holes drilled and tapped.

(a) 316 or 17-4 stainless steel disc and shaft, Teflon seat complete with titanium or 316 stainless steel spiral wound back-up ring to provide bubble tight shut-off under system pressure from either side, when installed with single flange.
(b) with locking handles up to NPS 4 and gear operators for NPS 6 and over.
(c) ANSI 300 temperature and pressure rated and suitable for working pressures 1964 kPa (285 Psi) to 4823 kPa (740 psi) at 37.8°C (100°F), factory tested to minimum of 4823 kPa (740 psi) at 37.8°C (100°F)

Standard of Acceptance
- Crane Flowseal
- DeZurik BHP Series
- Keystone K-Lok Series
- Mueller
- SureSeal

.13 Swing check valves NPS 2 and under, soldered

.1 1000 kPa (150 psi) to MSS SP-80, Class 125, bronze body, bronze swing disc, screw in cap, regrindable seat.

Standard of Acceptance
- Kitz 23
- Crane 1342
- Jenkins 4093J
- Newman Hattersley #47 with NPT copper adaptors
- Nibco S-413-B

.14 Swing check valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) to MSS SP-80, Class 125, bronze body, bronze swing disc, screw in cap, regrindable seat.

Standard of Acceptance
- Kitz 22
- Crane 37
- Jenkins 4037J
- Newman Hattersley #47
- Nibco T-143-B

.2 1000 kPa (150 psi) and 2000 kPa (300 psi) to MSS SP-80, Class 300, bronze body, bronze swing disc, screw in cap, regrindable seat

Standard of Acceptance.
- Kitz 19

- Crane 76E
- Jenkins 4962J
- Nibco T-473-B

.15 Swing check valves NPS 2½ and over, flanged

.1 1000 kPa (150 psi) to MSS SP-71, Class 125, cast iron body, flat faced flange, renewable bronze seat ring, bronze disc, bolted cap.

Standard of Acceptance
- Kitz 78
- Crane 373
- Jenkins 587J
- Newman Hattersley #651
- Nibco F-918-B
- Valmatic Series 500 Swing Flex

.2 1000 kPa (150 psi) and 2000 kPa (300 psi) to ASTM A216 Gr WCB, Class 300, cast steel body, renewable stainless steel seat ring, stainless steel disc, bolted cap.

Standard of Acceptance
- Kitz 300 SCOS
- Crane 159XU
- Newman Hattersley #C1982

.16 Silent check valves NPS 2 and under, threaded

.1 1000 kPa (150 psi) Class 125, cast iron or bronze body, globe style, (non flapper), bronze trim, stainless steel spring.

Standard of Acceptance
- APCO 300 Series
- Durabla SCV
- Nibco T-480
- Kitz 36/26
- Valmatic

.17 Silent check valves NPS 2½ and over, flanged

.1 Class 125, cast iron body globe style, bronze trim, stainless steel spring

Standard of Acceptance
- APCO 600 Series
- Valmatic series 1800
- Durabla GLC
- Mueller 105 MAP
- Nibco F-910

.18 Silent check valves NPS 2, for grooved end pipe

.1 300 pound design, ductile iron body, stainless steel clapper, Grade E EPDM liner suitable for 93ºC (230ºF) operating temperature.

Standard of Acceptance
- Victaulic 712
- Gruvlok 7800
- Valmatic

.19 Silent check valves NPS 2½ and over, for grooved end pipe

.1 300 pound design, ductile iron body, ductile iron or bronze disc, nickel seat, EPDM liner, suitable for 93ºC (230ºF) operating temperature

Standard of Acceptance
- Victaulic 716
- Gruvlok GBV

.20 Double regulating valves (DRV), NPS 2 and under, threaded

.1 1000 kPa (150 psi) Copper alloy body, plug type stem with flow measurement ports and tamper-proof setting.

Standard of Acceptance
- S.A. Armstong CBV
- Tour & Anderson series 787
- Newman Hattersley #1700
- Preso B-PLUS

.21 Double regulating valves (DRV), NPS 2½ and over, flanged

.1 860 psi (125 psi), cast or ductile iron body, copper alloy trim, with flow measurement ports, tamper-proof setting.

Standard of Acceptance
- S.A. Armstrong CBV II
- Tour & Anderson STAF
- Newman Hattersley #737
- Preso B-PLUS

.22 Flow meter for DRVs

.1 Direct digital flow readout type computerized meter with hoses and fittings.

Standard of Acceptance
- S.A. Armstong "Compu Flow Meter"
- Tour & Anderson CBI
- Preso Flowcomp
- Newman Hattersley #1010

.23 Triple duty valves, flanged

.1 1200 kPa (175 psi) Cast iron body, bronze disc, EPDM seat ring, stainless steel spring, plug type stem, flow measurement ports, tamper-proof setting.

Standard of Acceptance
- S.A. Armstrong FLO-TREX
- ITT Bell & Gossett

.24 Triple duty valves, for grooved end pipe

.1 2000 kPa (300 psi) Ductile iron body, butterfly check valve assembly, flow measurement ports, tamper-proof setting.

Standard of Acceptance
- Victaulic “triple service”

2.7 Steam, condensate and boiler feed valves

.1 Gate valves for steam and condensate NPS 2 and under, threaded

.1 700 kPa (100 psi) to MSS SP-80, Class 125, rising stem with bronze body and solid wedge disc.

Standard of Acceptance
- Kitz 24
- Crane 428
- Jenkins 990AJ
- Newman Hattersley #608
- Nibco T-111

.2 700 kPa (100 psi) and 1000 kPa (150 psi) to MSS SP-80, Class 200, rising stem with bronze body, exelloy, monel, or bronze seat rings, inside screw and solid nickel alloy wedge disc.

Standard of Acceptance
- Kitz 37
- Crane 424
- Jenkins 227OUJ
- Newman Hattersley #668
- Nibco T-154

.3 1000 kPa (150 psi) and 2000 kPa (300 psi) to MSS SP-80, Class 300, rising stem with bronze body, copper nickel alloy trim, union bonnet and solid wedge disc.

Standard of Acceptance
- Kitz 37
- Crane 634E
- Jenkins 228OUJ
- Nibco T-174-SS

.4 1000 kPa (150 psi) and 2000 kPa (300 psi) 800 pound forged steel, bolted bonnet

Standard of Acceptance
- Bonney Forge HL-11-T
- Crane B-3604XUT
- Newman Hattersley #C1174

.2 Gate valves for steam and condensate NPS 2½ and over, flanged

.1 700 kPa (100 psi) to MSS SP-70, Class 125 OS & Y, rising stem, cast iron body, with flat faced flanges and bronze trim.

Standard of Acceptance
- Kitz 72
- Crane 465 ½
- Jenkins 454J
- Newman Hattersley #504
- Nibco F-617-O

.2 700 kPa (100 psi) and 1000 kPa (150 psi) to ASTM A216 Gr WCB, Class 150 OS & Y, rising stem cast steel body, with raised faced flanges, 13% chrome disc and stellited seat rings.

Standard of Acceptance

- Kitz 150 SCLS
- Crane 47XUT
- Jenkins J1009B8F
- Newman Hattersley #C1481

.3 1000 kPa (150 psi) and 2000 kPa (300 psi) to ASTM A216 Gr WCB, Class 300 OS & Y, rising stem, cast steel body with raised faced flanges, stellite faced disc and stellited seat rings.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 33XUF
- Jenkins J1010B8F
- Newman Hattersley #C1482

.3 Gate valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2 and under, socket weld or threaded

.1 Class 800, rising stem, forged steel body, conventional port, stellite faced disc and stellited seat rings, bolted bonnet and solid wedge disc.

Standard of Acceptance - socket weld
- Bonney Forge HL-11-SW
- Crane B3604XUW
- Newman Hattersley #O1144

Standard of Acceptance - threaded
- Bonney Forge HL-11-T
- Crane B3604 XUT
- Newman Hattersley #C1174

.4 Gate valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2½ and over, flanged

.1 to ASTM A216 Gr WCB, Class 300 rising stem, cast steel body with raised faced flanges,, OS & Y, stellite faced disc and stellited seat rings.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 33XUF
- Jenkins J1010B8F
- Newman Hattersley #C1482

.5 Globe valves for steam and condensate NPS 2 and under, threaded

.1 700 kPa (100 psi) to MSS SP-80, Class 150 with bronze body, union bonnet, stainless steel plug type disc and seat, and lockshield handles where required.

Standard of Acceptance
- Kitz 17S
- Crane 14-½P
- Jenkins 2032J
- Newman Hattersley #14
- Nibco T-256-AP

.2 700 kPa (100 psi) to 850 kPa (150 psi) to MSS SP-80, Class 200 with bronze body, hardened alloy, or stainless steel plug, renewable seat and union bonnet.

Standard of Acceptance
- Kitz 17S
- Crane 212P
- Jenkins 2050J
- Newman Hattersley #14
- Nibco T-256-AP

.3 1000 kPa (150 psi) and 2000 kPa (300 psi) to MSS SP-80, Class 300 with bronze body, hardened stainless steel plug, renewable seat and union bonnet.

Standard of Acceptance
- Kitz 17S
- Crane 382 P
- Jenkins 592J
- Newman Hattersley #23

.4 1000 kPa (150 psi) and 5500 kPa (800 psi) Class 800, threaded, rising stem, forged steel body, hard faced disc and seat rings, and bolted bonnet

Standard of Acceptance.
- Bonney Forge HL-31-T
- Crane B-3644XU-T
- Newman Hattersley #C1874

.6 Globe valves for steam and condensate NPS 2½ and over, flanged

.1 700 kPa (100 psi) to MSS SP-85, Class 125, cast iron body with flat faced flanges, bronze trim, OS & Y bolted bonnet, bronze disc and seat ring.

Standard of Acceptance
- Kitz 76
- Crane 351
- Jenkins 2342J
- Newman Hattersley #731
- Nibco F-718-B

.2 700 kPa (100 psi) to 850 kPa (150 psi) to ASTM A216 Gr WCB, Class 150, cast steel body, exelloy and stellite trim, OS & Y and bolted bonnet.

Standard of Acceptance
- Kitz 150 SCLS
- Crane 143XU
- Jenkins J1040B2
- Newman Hattersley #C1881

.3 1000 kPa (150 psi) and 2000 kPa (300 psi) to ASTM A216 Gr WCB, Class 300, cast steel body, exelloy and stellite trim, OS & Y and bolted bonnet.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 151XUF
- Jenkins J1042B2
- Newman Hattersley #C1882

.7 Globe valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2 and under, socket weld or threaded

.1 Class 800, forged steel body, exelloy or monel seat rings, rising stem, OS&Y and solid plug type disc.

Standard of Acceptance - socket weld
- Bonney Forge HL-31-SW
- Crane B3644XU-W
- Newman Hattersley #C1884

Standard of Acceptance - threaded
- Bonney Forge HL-31-T
- Crane 3644 XUT
- Newman Hattersley #C1874

.8 Globe valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2½ and over, flanged

.1 to ASTM A216 Gr WCB, Class 300 cast steel body with raised face flanges, rising stem, OS & Y, exelloy plug type disc and stellited seat rings.

Standard of Acceptance
- Kitz 300 SCLS
- Crane 151XU
- Newman Hattersley #C1882

.9 Ball valves for steam and condensate NPS 2 and under, threaded

.1 1000 kPa (150 psi) Class 150, two piece bronze body, full port, stainless steel or chrome plated bronze ball, PTFE seat and seals.

Standard of Acceptance
- Kitz 68AM
- Crane 9302S
- Newman Hattersley #1969F
- Nibco T-685-70-NS

.10 Swing check valves for steam and condensate NPS 2 and under, threaded

.1 850 kPa (125 psi) to MSS SP-80, Class 125, bronze body, bronze swing disc, screw in cap, regrindable seat.

Standard of Acceptance
- Kitz 22
- Crane 37
- Newman Hattersley #47
- Nibco T-413-B

.2 850 kPa (125 psi) and 2000 kPa (300 psi) to MSS SP-80, Class 300, bronze body, bronze swing disc, screw in cap, regrindable seat.

Standard of Acceptance
- Kitz 19
- Crane 76E
- Nibco T-473-B

.3 850 kPa (125 psi) and 2000 kPa (300 psi) 800 pound forged steel, full ported with bolted cap

Standard of Acceptance
- Bonney Forge HL-41-T

- Crane FB-3675XU-T
- Newman Hattersley #C1674 (lift type)

.11 Swing check valves NPS 2½ and over, flanged

.1 850 kPa (125 psi) to MSS SP-71-1990, Class 125, cast iron body, flat faced flange, renewable bronze seat ring, bronze disc, bolted cap.

Standard of Acceptance
- Kitz 78
- Crane 373
- Newman Hattersley #651
- Nibco F-918-B

.2 850 kPa (125 psi) and 2000 kPa (300 psi) to ASTM A216 Gr WCB, Class 300, cast steel body, renewable stainless steel seat ring, stainless steel disc, bolted cap.

Standard of Acceptance
- Kitz 300 SCOS
- Crane 159XU
- Newman Hattersley #C1982

.12 Swing check valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2 and under, socket weld or threaded

.1 Class 800, forged steel body, piston check, bolted bonnet, renewable seat.

Standard of Acceptance - socket weld
- Bonney Forge HL-41-SW
- Crane 3674XU-W
- Newman Hattersley #C1644

Standard of Acceptance - threaded
- Bonney Forge HL-41-T
- Crane 3674 XUT
- Newman Hattersley #C1674 (lift type)

.13 Swing check valves for Boiler-feed pump discharge and boiler-feed bleed-off NPS 2½ and over, flanged

.1 To ASTM A216 Gr WCB, Class 300, cast steel body, raised face flanges, renewable stainless steel seat ring, stainless steel disc, bolted cap.

Standard of Acceptance
- Kitz 300 SCOS
- Crane 154XU
- Newman Hattersley #C1982

.14 Silent check valves for condensate service 93°C (200°F) NPS 2 and under

.1 850 kPa (125 psi) Class 125, cast iron, globe style, (non-flapper) bronze trim, stainless steel spring.

Standard of Acceptance
- APCO 300 Series
- Durabla SCV
- Valmatic

.15 Silent check valves for condensate service 93°C (200°F) NPS 2 ½ and over

.1 850 kPa (125 psi) Class 125, cast iron, globe style, bronze trim, stainless steel spring

Standard of Acceptance
- APCO 600 Series
- Valmatic Series 1800
- Durabla GLC
- Nibco F-910

.16 Stop and check valves for boiler steam feeds

.1 1700 kPa (250 psi) Class 250 cast iron, flanged combination steam stop and check valve with plugged and tapped screwed drip connection

Standard of Acceptance
- Crane 28E straight through type
- Crane 38E angle type
- Jenkins 540 straight through type
- Jenkins 541 angle type

3 EXECUTION

3.1 Valve installation

.1 Install shut off valves at:

.1 branch take-offs, and

.2 to isolate piping to each piece of equipment.

.2 Install valves in upright position with stem above horizontal

.3 Remove internal parts of valves before soldering, welding or brazing pipe to valve body.

.4 Arrange valve hand wheels and operating levers to be accessible

.5 In equipment rooms and service spaces provide chain operators for valves mounted more than 2m (6 ft) above floor or access platform. Chains to extend to 1.5m (4 ft-6 in) above floor or platform and to be hooked on clips secured to building structure, clear of walking aisles.

.6 Install double regulating valves with five pipe diameters of straight pipe on inlet side and two pipe diameters on outlet side.

.7 Install triple duty or throttling valves at pump discharge piping with ten pipe diameters of straight pipe on the inlet side and two pipe diameters on outlet side.

.8 Supply one flow meter for double regulating and triple duty valves and turn over to operating staff during operations and maintenance training. Obtained signed receipt showing time, date, and name of recipient.

.9 Install butterfly valves between weldneck flanges

.10 Provide drip assemblies above valves installed in vertical steam lines and ahead (upstream) of valves installed in horizontal steam lines.

.11 pressure steam headers, and where branches a be globe valves suitable for steam temperature and pressure, NPS 1 around isolating valves from NPS 3 to NPS 4 and NPS 2 for isolating valves NPS 6 and larger.

3.2 Double regulating valves

.1 Consult with double regulating valve manufacturer to ensure correct valve selection. Balancing valves to be sized according to design flow

.2 Size and select valves for flows at 6 kPa (2 ft) pressure drop across the valve in the fully open position, and in accordance with manufactures recommendation. Table 1 identifies the nominal valve size selection:

Valve **Size (in)**	**Nominal Flow**			
	Min. (l/s)	**Max. (l/s)**	**Min. (gpm)**	**Max. (gpm)**
½	0.038	0.177	0.6	2.8
¾	0.126	0.379	2.0	6.0
1	0.246	0.631	3.9	10.0
1-¼	0.316	0.947	5.0	15.0
1-½	0.416	1.262	6.6	20.0
2	0.795	2.272	12.6	36.0
2-½	2.398	6.310	38.0	100.0
3	1.956	8.203	31.0	130.0
4	4.291	12.620	68.0	200.0
5	5.679	20.192	90.0	320.0
6	11.48	28.395	182.0	450.0
8	23.16	51.742	367.0	820.0
10	34.07	82.030	540.0	1300.0
12	60.58	94.650	960.0	1500.0

.3 Install double regulating valves with five pipe diameters of straight pipe on inlet side, two pipe diameters on outlet side and 10 pipe diameters from any pump.

END OF SECTION

HANGERS AND SUPPORTS
20 05 29

1 GENERAL

1.1 Scope

.1 Provide hangers and supports for piping and conduits.

1.3 Shop drawings

.1 Product data to show:
- .1 upper attachment.
- .2 hanger rods.
- .3 pipe attachment.
- .4 riser clamps.
- .5 shields and saddles.
- .6 inserts.

.2 Submit details for supports, guides, and anchors for glass, fibre-reinforced plastic, and plastic piping systems.

.3 Submit design drawings for custom fabricated trapeze hangers, sealed by a professional engineer licensed in the project location jurisdiction.
- .1 Shop drawing details:
  - (a) construction detail drawings for each loading condition,
  - (b) span deflection calculations,
  - (c) building attachment load calculations and type.
- .2 Provide services of engineer who sealed the custom trapeze hanger shop drawings to conduct a general review of the completed installation on site.

1.4 Applicable Codes and Standards;

.1 ASME B31.1 Pressure Piping Code

.2 Manufacturers Standardization Society of Valve and Fittings Industry (MSS)
- .1 MSS SP-58 Pipe Hangers and Supports - Materials Design and Manufacture
- .2 MSS SP-69 Pipe Hangers and Supports - Selection and Application
- .3 MSS SP-77 Guidelines for Pipe Support Contractual Relationships
- .4 MSS SP-90 Guidelines for Terminology for Pipe Hangers and Supports

2 PRODUCTS

2.1 General

.1 Hangers, supports, sway braces, to be made up from stock or production parts, manufactured and fabricated in accordance with ASME B31.1 and MSS SP-58, SP-69, and SP-90.

.2 Select elements of pipe support systems to provide adequate factors of safety under loads applied by gravity, by temperature induced expansion and contraction, by internal pressure in mechanically jointed plain end pipe, by change of momentum in fluid flow.

2.2 Product identification

.1 Pipe support products to be selected from manufacturers standard product line

Standard of Acceptance
- Anvil
- Unistrut
- Myatt
- Hunt Erico
- Taylor
- National Concrete Accessories - Acrow Richmond
- Pipe Shields
- Portable Pipe Hangers
- Hilti

.2 Model designations from these manufacturer's catalogue are used to establish quality standards and construction details to permit assessment of products from other manufacturers.

2.3 Upper attachments

.1 Cast-in-place concrete:

.1 single or double pipe runs up to and including 300 mm (12 in) diameter:

(a) galvanized wedge inserts to MSS SP-58, type 18.
(b) ULC listed for pipe NPS ¾ through NPS 8.

Standard of Acceptance
- Anvil - Model 281
- Unistrut - Model P-3245

.2 pipe runs of three or more pipes:

(a) multiple inserts, spaced to suit smallest pipe in group.

Standard of Acceptance
- Unistrut of Canada Limited

.3 pipes runs 350 mm (14 in) diameter and over use special inserts.

Standard of Acceptance
- National Concrete Accessories - Acrow Richmond - Type EC-2 with ferrule

.2 Surface mount on concrete:

.1 carbon steel plate with clevis and malleable iron socket and expansion case and bolt with minimum of two expansion cases and bolts for each hanger.

Standard of Acceptance
- Anvil plate, Fig. 49 socket, Fig. 290 expansion case, Fig. 117
- Myatt cut plate, double angle clip, Fig. 535 socket, Fig. 480 expansion case, Fig. 485 for existing concrete

.2 Do not use explosive drive pins in any section of Work without obtaining prior approval.

.3 Piping or equipment supported from existing concrete construction:

.1 drill and install threaded inserts.

Standard of Acceptance
° Hilti - HDI, Kwick Bolt, HSL

.4 Steel framed construction:

.1 steel beam (bottom flange) and cold piping NPS 2 and under:

(a) beam clamp to MSS SP-58, type 30, ULC listed.

Standard of Acceptance
° Anvil Fig. 218
° Myatt Fig. 500

.2 steel beam (bottom flange) and cold piping NPS 2½ and larger and hot piping:

(a) heavy beam clamp assembly to MSS SP-58, type 28 or 29, or
(b) fabricated equivalent, ULC listed.

Standard of Acceptance
° Anvil Fig. 228 or 292
° Myatt Fig. 510 X-HEAVY, or 511 X-HEAVY.

.3 steel beam (top flange) and cold piping and hot piping NPS 2 and under:

(a) steel jaw, hook rod with nut, spring washer and plain washer, to MSS SP-58, type 25, ULC listed.

Standard of Acceptance
° Anvil Fig. 227
° Myatt Fig. 506

.4 steel joists and cold piping NPS 2 and under:

(a) steel washer plate with double locking nuts.

Standard of Acceptance
° Anvil Fig. 60
° Myatt Fig. 545

.5 steel joists and cold piping NPS 2½ and larger and hot piping:

(a) steel washer plates with double locking nut, carbon steel clevis and malleable iron socket.

Standard of Acceptance
° Anvil washer plate - Fig. 60, clevis - Fig. 66, socket - Fig. 290.
° Myatt washer plate - Fig. 545, clevis - Fig. 530, socket - Fig. 480.

2.4 Hanger rod

.1 Carbon steel threaded rod;

.1 electro-galvanized finish in mechanical rooms and outdoors.

.2 black steel finish in other areas.

Standard of Acceptance
° Anvil Fig. 146
° Myatt Fig. 432

2.5 Horizontal pipe support - suspended

.1 Hot or cold suspended piping, including conduits, where horizontal movement is 25 mm (1 in) or less and hanger rod is longer than 300 mm (12 in).

.1 steel or cast iron piping:

(a) adjustable clevis to MSS SP-58, type 1, ULC listed, sized for outside dimension of pipe and insulation.

Standard of Acceptance
° Anvil Fig. 260
° Myatt Fig. 124
°

.2 copper piping:

(a) adjustable clevis to MSS SP-58, type 1, copper plated.

Standard of Acceptance
° Anvil Fig CT-65
° Myatt 151 CT

.2 Suspended hot steel or copper piping having horizontal movement in excess of 25 mm (1 in) or hot steel piping with hanger rod 300 mm (12 in) or less:

.1 trapeze or yoke style pipe roller to MSS SP-58, type 43.

Standard of Acceptance
° Anvil Fig. 171 or fig. 181
° Myatt Fig. 261 or fig. 258

2.6 Horizontal pipe support - bottom supported

.1 Hot and cold steel and copper piping:

.1 adjustable pipe roller stand to MSS SP-58, type 44.

Standard of Acceptance
° Anvil Fig. 177
° Myatt Fig. 262

2.7 Trapeze hangers

.1 Performance:

.1 Manufactured:

(a) to product load listings.

.2 Custom fabricated:

(a) maximum deflection between supports: 1/250 (0.4%) of span
(b) minimum factor of safety : 5 times load to ultimate tensile or compressive strength.

.2 Construction:

.1 Carbon steel shapes, to suit load application:

(a) hollow steel section,
(b) equal leg El section, or
(c) double C channel “strong-back”, with welded clips.

.2 Hanger rods:

(a) as specified above, and
(b) minimum two support rods,
(c) rods selected for minimum factor of safety of 5 times load to ultimate tensile or compressive strength of rod.

.3 Pipe restraint:

.1 restrain pipes from lateral movement with:

(a) bolt-on angle brackets or pipe U-bolts for manufactured hangers,
(b) welded-on angles for fabricated hangers.

.4 Finish:

.1 electro-galvanized finish in mechanical rooms and outdoors.

.2 black steel finish in other areas.

Standard of Acceptance
° Anvil Fig 45, 46, 50

2.8 Vertical pipe supports:

.1 Steel or cast iron pipe:

.1 floor supported, black carbon steel riser clamps to MSS SP-58, type 42, ULC listed, field-welded pipe lugs.

Standard of Acceptance
° Anvil Fig. 261
° Myatt Fig. 182 or 183

.2 suspended, black carbon steel riser clamps to MSS SP-58, type 42, ULC listed, 4 or 6 bolt pattern, field-welded pipe lugs.

Standard of Acceptance
° Anvil fig. 40
° Myatt fig. 190 or 191

.2 Copper pipe:

.1 carbon steel, copper finished, riser clamps to MSS SP-58, type 8.

Standard of Acceptance
° Anvil Fig. CT-121
° Myatt Fig. 150CT

2.9 Variable load supports

.1 Performance:

.1 Selected for piping loads and estimated travel under service conditions.

.2 Construction:

.1 carbon steel housing and spring,

.2 precommressed spring,

.3 load indicator,

.4 welding to ASME Section IX

.5 welded attachement points

.6 finish: semi gloss primer coat.

Standard of Acceptance
° Anvil – Fig 82, 268, 98

2.10 Constant load supports

.1 Performance:

.1 maintains constant support load under variable hanger displacements.

.2 selected for piping loads and estimated travel under service conditions, with a minimum safety factor of 25 mm (1 in) extra travel or 20% of total travel, whichever is greater.

.2 Construction:

.1 to WW-H-171E, ANSI/MSS SP-69 and 58

.2 carbon steel housing and spring,

.3 combination hanger moment arm and balancing spring design,

.4 horizontal and vertical arrangements,

.5 load adjustment and load indicator scale,

.6 factory set for load and travel,

.7 welding to ASME Section IX

.8 welded attachement points

.9 finish: semi gloss primer coat.

Standard of Acceptance
° Anvil – Fig R 80-V, 81-H

2.11 Roding for mechanical joint pipe

.1 Plain end cast iron and asbestos cement drain waste and vent pipe, NPS 5 and over,

.1 bell clamps and rodding at each joint

Standard of Acceptance
° Myatt Fig. 175 in configuration Fig. 176
° Anvil Fig. 595 with Fig. 594 washers
° Taylor Fig. 35

.2 bell clamp and rodding at each tee branch
° Myatt Fig. 175 in configuration Fig. 180
° Anvil Fig. 595 with Fig. 594 washers
° Taylor Fig. 35

2.12 Saddles and shields at pipe supports

.1 Cold piping insulation shields:

.1 provided for steel, copper, stainless, glass and plastic piping, all sizes,

.2 galvanized steel protection shield.

Standard of Acceptance
- Anvil Fig. 167 (up to NPS 24)
- Anvil Fig. 168 - Riblok (up to NPS 8)
- Myatt Fig. 251

.2 Hot piping insulation shields:

.1 provided for steel piping NPS 1-1/4 and smaller,

.2 provided for copper tubing, all sizes,

.3 galvanized steel protection shield.

Standard of Acceptance
- Anvil Fig. 167 (up to NPS 24)
- Anvil Fig. 168 - Riblok (up to NPS 8)
- Myatt Fig. 251

.3 Hot piping saddles:

.1 provided for steel piping, NPS 1½ and larger:

.2 protective saddle welded to pipe with insulation inserted between saddle and pipe.

Standard of Acceptance
- Anvil Fig. 160 to 166
- Myatt Fig. 210 to 240

3 EXECUTION

3.1 Coordination with concrete work

.1 Supply and deliver inserts to site in ample time to be built into work.

.2 Set and correctly locate inserts for pipes and equipment hangers. Secure inserts firmly to formwork before concrete is poured.

3.2 Hanger installation

.1 Support piping and conduit directly from or on structural building elements. Do not support pipe or conduit directly from other services except as described below.

.2 The hanger rod size and spacing in the following articles is based on supporting a single pipe directly from the structure.

.1 If multi-level pipe or conduit supports are proposed, such as trapeze or roller hanger supports, submit shop drawings designed and sealed by a professional engineer licensed as a consulting engineer in the province of the project location and include details for each support system including load calculations.

.2 Coordinate with the structural engineer for point load connections to the building structure.

.3 Install hangers for steel pipe with spacing and hanger rod diameter in accordance with table 1.

.1 Exception: fuel oil, natural gas, propane, and medical gas piping.

.4 Install hangers for copper pipe with spacing and hanger rod diameter in accordance with table 2.

.1 Exception: fuel oil, natural gas, propane, and medical gas piping.

.5 Install hangers for cast iron soil pipe with hanger spacing and hanger rod diameter in accordance with table 3 and as follows:

.1 provide at least one pipe hanger for each length of pipe, located at or within 300 mm (12 in) of each hub or mechanical joint,

.2 provide a hanger at or adjacent to each fitting hub or mechanical joint except where multiple joints occur within a 1200 mm (4 ft) developed pipe length then;

(a) support may be reduced to every other hub or mechanical joint, or
(b) where the pipe run is made of multiple fittings connected end-to-end, a 1.6 mm (16 ga) galvanized steel half sleeve may be used underneath the pipe and fittings and supported with a hanger at each end of the sleeve.

.3 for mechanical joints, if the spacing between adjacent joints is 300 mm (12 in) or less, reduce the support spacing to a maximum of 1000 mm (39 in),

.6 Refer to Section 23 11 13 for hanger spacing for Fuel Oil Piping.

.7 Refer to Section 23 11 23 for hanger spacing for Natural Gas and Propane Piping.

Table 1 : Hanger Spacing for Steel Piping

Pipe Size NPS	Rod Diameter	Maximum Spacing
½	10 mm (3/8 in)	1.8 m (6 ft)
3/4 to 1¼	10 mm (3/8 in)	2.1 m (7 ft)
1½	10 mm (3/8 in)	2.7 m (9 ft)
2	10 mm (3/8 in)	3.0 m (10 ft)
2½	13 mm (½ in)	3.3 m (11 ft)
3	13 mm (½ in)	3.3 m (12 ft)
4	16 mm (5/8 in)	4.2 m (14 ft)
6	16 mm (3/4 in)	5.1 m (17 ft)
8	22 mm (3/4 in)	5.7 m (19 ft)
10	22 mm (7/8 in)	6.7 m (22 ft)
12	22 mm (7/8 in)	7.0 m (23 ft)
14	25 mm (1 in)	7.5 m (25 ft)
16	25 mm (1 in)	8.0 m (27 ft)
18	25 mm (1 in)	8.4 m (28 ft)
20	30 mm (1-1/4 in)	9.0 m (30 ft)
24	30 mm (1-1/4 in)	9.6 m (32 ft)

Table 2 : Hanger Spacing for Copper Piping

Pipe Size NPS	Rod Diameter	Maximum Spacing (Copper)
½	10 mm (3/8 in)	1.5 m (5 ft)
3/4 to 1¼	10 mm (3/8 in)	1.8 m (6 ft)
1½	10 mm (3/8 in)	2.4 m (8 ft)
2	10 mm (3/8 in)	2.7 m (9 ft)
2½	13 mm (½ in)	3.0 m (10 ft)
3	13 mm (½ in)	3.0 m (10 ft)
4	16 mm (5/8 in)	3.0 m (10 ft)

Table 3: Hanger Spacing for Cast Iron Soil Piping

Pipe Size NPS	Rod Diameter	Maximum Spacing (CI soil pipe)
3	13 mm (½ in)	3 m (9.8 ft)
4	16 mm (5/8 in)	3 m (9.8 ft)
6	16 mm (3/4 in)	3 m (9.8 ft)
8	22 mm (3/4 in)	3 m (9.8 ft)
10	22 mm (7/8 in)	3 m (9.8 ft}

.8 Hanger spacing and hanger rod diameter for steel or copper flexible joint roll groove pipe to be as shown in table above for appropriate pipe material with not less than one hanger between joints and with anchors and guides located to maintain piping true to line and grade.

.9 In steel framed construction, support piping from structural members. Where structural members are not suitably located for upper hanger attachments and inserts of adequate capacity can not be installed in floor slabs over, provide supplementary steel framing members;

.1 fabricate supplementary steel from standard HSS sections, single EL section, double C "strongback" sections, or pipe rolls,

.2 size supporting steel to limit span deflection to 1/250 (0.4%) between support points,

.3 mechanically fasten supplementary steel to structural steel.

.10 Offset hangers so that rods are vertical in operating position.

.11 Provide hanger within 300 mm (12 in) of each horizontal elbow and tee.

.12 Clamp and rod tees, elbows, and joints, in plain end mechanical joint pipe NPS 5 and over.

.13 Riser clamps:

.1 Weld lugs onto steel piping.

.2 Solder copper pipe to copper riser clamps.

.14 Trapeze hangers

.1 Shim pipes on common trapeze hangers to slope each pipe in required direction.

.2 Mechanical fasten shim plates to hanger. Shim plates and pipe lateral restraints may be fastened as one unit.

3.3 Variable load supports

.1 Size, select and install variable load supports for piping in mechanical rooms at first three load points from a shaft penetration.

.2 Provide vibration isolation hangers for other locations in accordance with Section 20 05 48 Vibration Isolation.

3.4 Constant load supports

.1 Size, select and install constant load supports at the following locations;

.1 pipe risers, located at the top of the riser, and intermediate riser locations,

.2 first hanger support for main steam piping connections NPS 6 and larger to steam boilers,

.3 first hanger support for water piping connections NPS 8 and larger to hot water boilers,

.4 first hanger support for water piping connections NPS 12 and larger to refrigeration equipment

.5 first hanger support inside the building for water piping NPS 12 and larger for condenser water piping to a cooling tower.

3.5 Saddles and shields

.1 On cold insulated piping, provide insulation shields between insulation and pipe support.

.2 On hot insulated piping, weld protective saddles to pipe at pipe support locations.

.3 No saddles or shields are required on un-insulated piping.

3.6 Load nut retention requirements

.1 Adhere fastening nuts, including top and bottom load nuts, and clevis bolt nuts, to threaded rods or fittings with Loctite 266.

3.7 Set-up after installation

.1 Adjust hangers to equalize hanger loads, to support piping true to line and grade, and to minimize loads transferred through connections to equipment and outlets.

END OF SECTION

VIBRATION ISOLATION
20 05 48

1 GENERAL

1.1 Scope

.1 Isolate motor driven mechanical equipment.

.2 Provide restraints for equipment mounted on vibration isolation to limit movement during start-up and normal operation.

.3 Isolator and base type designations are taken from appropriate chapter of current ASHRAE Applications Handbook.

.4 Base type, isolator type and minimum static deflection are shown in equipment schedules and equipment selection sheets.

.5 Information shown in equipment schedules is to establish minimum standards, vibration isolation equipment to be selected to maintain noise levels in building in accordance with values listed in Appendix 1D.

1.2 Related Sections

.1 Pipe movement control to Section 20 05 16 Flexible Connections, Expansion Joints, Anchors & Guides

.2 Piping constant load supports to Section 20 05 29 Hangers and Supports

1.3 Shop drawings

.1 Show vibration isolation for each piece of equipment hung from the structure or supported from the floor.

.2 Submit product data sheets for isolation components.

.3 Show fabrication details, location and size of anchor bolts and concrete requirements for inertia bases.

.4 Provide vibration isolation equipment by one manufacturer.

Standard of Acceptance
- Vibron / Kinetics
- BVA
- KorfundMason
- Tecoustics

2 PRODUCTS

2.1 Resilient isolator Type 1 (R1)

.1 Rubber waffle or ribbed pads:

.1 30 durometer natural rubber, minimum of 13 mm (½ in) thick,

.2 selected for maximum loading of 350 kPa (50 psi).

.2 Rubber-steel-rubber pads:

.1 two layers of rubber waffle or ribbed pad, 13 mm (½ in) thick, as specified above,

.2 bonded to 6 mm (¼ in) steel plate with holes sleeved and fitted with isolation washers.

.3 Neoprene jacketed pre-compressed moulded fibreglass.

2.2 Resilient isolator Type 2 (R2)

.1 Elastomer rubber:

.1 threaded insert,

.2 hold down bolts.

.2 Neoprene, 50 mm (2 in) free height:

.1 natural frequency not to exceed 15 Hz at full load,

.2 capable of sustaining load of 110 kg (250 lb) with maximum deflection of 5 mm (3/16 in).

2.3 Elastomeric mounts (E1)

.1 Construction:

.1 colour coded neoprene in shear with

.2 maximum durometer of 60,

.3 threaded insert,

.4 two bolt down holes,

.5 ribbed top and bottom surfaces.

2.4 General requirements for spring mounts

.1 Isolator springs:

.1 designed so that ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height,

.2 selected for 50% travel beyond rated load,

.3 cadmium plated,

.4 colour coded.

.2 Mounts:

.1 zinc or cadmium plated hardware,

.2 rubber isolation washers,

.3 housings coated with rust resistant paint,

.4 levelling devices, and

.5 6 mm (¼ in) thick ribbed rubber sound pad bonded to load plate.

.3 Clearance between metal parts: 6 mm (¼ in) minimum.

2.5 Spring isolator Type 1 (S1)

.1 Open spring isolators:

.1 extra stiff springs with ratio of lateral to axial stiffness of 1.0.

2.6 Spring isolator Type 2 (S2)

.1 Controlled spring isolators with

.1 heavy rigid steel base frames,

.2 built-in vertical limit stops,

.3 removable spacers, and

.4 extra stiff springs with ratio of lateral to axial stiffness of 1.0.

2.7 Spring isolator snubber Type 3 (S3)

.1 Open spring isolators:

.1 horizontal arrangement

.2 heavy rigid steel equipment base mount, and structure mount

.3 open spring, with 25 mm (1 in) deflection range.

.4 isolator bushings.

2.8 General requirements for isolation hangers

.1 General

.1 swivel arrangement to permit hanger box or rod to move through 20 arc without metal to metal contact.

2.9 Hanger Type 1 (H1)

.1 Spring hanger:

.1 welded steel housing with one coat anti-rust paint,

.2 colour coded spring,

.3 retaining cups,

.4 elastomeric washers.

2.10 Hanger Type 2 (H2)

.1 Rubber isolation hanger:

.1 welded steel housing with one coat anti-rust paint,

.2 25 mm (1 in) colour coded neoprene in shear with maximum durometer of 60,

.3 threaded insert.

2.11 Hanger Type 3 (H3)

.1 Horizontal thrust restraint:

.1 spring and elastomeric element

.2 housed in box frame with rods and angle brackets to connect unit between isolated equipment and fixed object, and

.3 fitted with means to adjust maximum start-stop movement to 9 mm (in).

2.12 Acoustic barriers for anchors and guides

.1 Manufactured from 25 mm (1 in) thick neoprene isolation with duck reinforcing material.

2.13 Equipment base Type A

.1 Direct isolation:

.1 used where equipment is unitary and rigid

.2 motor slide rails welded to unit.

2.14 Equipment base Type B

.1 Prefabricated steel base:

.1 welded from structural sections and

.2 reinforced for drive with;

(a) isolation elements attached to base brackets and
(b) adjustable motor slide rails.

.3 minimum vertical section of base selected on basis of motor size from following;

Motor Size Horsepower	Motor Size kW	Vertical Side mm (in)
up to 3	up to 2.2	75 (3)
7.5	5.5	100 (4)
20	15	150 (6)
50	37	200 (8)
over 50	37	250 (10)

2.15 Equipment base Type C

.1 Concrete filled inertia base:

.1 Type B base and,

.2 full depth perimeter structural section or formed plate channel frame with;

(a) welded in place reinforcing rods running in both directions and
(b) 1 mm (20 ga) metal pans,
(c) base section filled with concrete, vibrated into place.

.3 spring mount units carried by gusseted brackets welded to frame and

.4 'T' shaped bases to support pump elbows.

2.16 Base Type D

.1 Roof curb isolation rails:

.1 manufactured with structural steel or aluminum upper and lower members, with

(a) continuous flexible reinforced water and air tight seal fastened to upper and lower members,

.2 protected by removable metal weather shield.

.3 supported from lower members by stable steel springs, with

.4 maximum deflection 50 mm (2 in) and

.5 closed cell neoprene gaskets.

.6 constructed with neoprene cushioned restraints to resist wind load in any direction.

3 EXECUTION

3.1 General

.1 Install vibration isolation equipment in accordance with manufacturer's instructions and locate isolation for equipment to provide stable support under saddles, frames and projections of equipment.

3.2 Equipment vibration isolation

.1 Provide additional steel in bases and rails to obtain rigidity and uniform load distribution.

.2 Pumps, fans and motor driven equipment to be mounted on vibration isolation as required.

.3 Suspended fans to be supported on

.1 Type A or B base with

.2 Type H3 hangers.

.4 Provide Type S3 horizontal thrust restraints for high pressure horizontal discharge fans developing over 1.5 kPa (6 in wg), arranged symmetrically on either side of unit and attached at centre line of thrust.

.5 Block and shim bases level at correct operating height.

.1 Bases to clear housekeeping pads by:

(a) 25 mm (1 in) minimum for concrete and
(b) 50 mm (2 in) minimum for steel.

.6 Where isolation is bolted to floor, housekeeping slab or overhead structure:

.1 provide vibration isolation rubber washers.

.7 Where pumps are mounted on vibration isolators

.1 provide flanged or grooved coupling steel removable spool pieces on inlet and discharge connections to allow future installation of flexible connectors,

.2 locate spool pieces between system isolating valve and pump with flange to flange lengths as follows;

Pipe size (inches)	Spool Length (inches)	Pipe Size (mm)	Spool Length (mm)
2	18	50	450
2½ & 3	24¼	65 & 75	616

4 & 5	24⅝	100 & 125	625
6 to 12	25	150 to 300	635

.8 Where ducts attach to resiliently mounted equipment, flexible connections will be provided by ductwork installer.

3.3 Service connection vibration isolation

.1 Make pipe, duct and electrical connections to isolated equipment so as to maintain isolation system flexibility.

3.4 Piping vibration isolation

.1 Piping connected to isolated equipment:

.1 supported with;

(a) spring mounts or spring hangers with static deflection of twice deflection of isolated equipment at first point of support and
(b) 25 mm (1 in) minimum static deflection at remaining supports.

.2 installed with distance between support points selected as for regular pipe hangers and using spring type for

(a) first three supports for piping up to NPS 4.
(b) first four supports for piping NPS 5 to NPS 8.
(c) first six supports for piping NPS 10 and over.

.3 Isolated, with acoustic barrier material, at anchors and guides within pipe shafts, duct shafts, equipment and fan rooms, and up to first anchor outside these rooms or areas.

.2 Where piping crosses building expansion joint

.3 provide spring hangers at first two support locations of piping at either side of joint line.

3.5 Start-up and set-up

.1 After installation of connections to resiliently mounted equipment;

.1 remove shims and blocking and adjust mountings to level equipment,

.2 adjust connections, hangers, snubbers, and restraints ,

.3 ensure that there is no physical contact between isolated equipment and building structure.

.2 On completion of installation and start-up of equipment;

.1 make arrangements for manufacturer/supplier of Vibration Isolation equipment to visit site, check performance of systems, inspect installation, adjust seismic restraints, and submit written recommendations,

.2 make corrections to installation in accordance with manufacturer/suppliers recommendations,

.3 provide notice 24 hours in advance of this site visit.

3.6 Testing

.1 Engage and pay for an experienced sound and vibration professional to take measurements of sound and vibration generated by HVAC systems.

.2 Co-operate with manufacturer/supplier of Sound Attenuation equipment in this measurement and testing.

.3 Sound measurements to extend over full audio frequency range and to be taken in areas adjacent to mechanical equipment rooms, duct and pipe shafts, and main electrical rooms.

.4 Submit outline of tests to be performed, details of instrumentation to be used and floor plans showing test locations prior to commencing work.

.5 Provide notice one week in advance of commencement of tests.

.6 Submit complete report of tests addressing noise and vibration levels measured in occupied areas and adequacy of Sound Attenuation and Vibration Isolation equipment.

END OF SECTION

SEISMIC RESTRAINT
20 05 49

1 GENERAL

1.1 Scope

.1 Provide seismic restraint systems to limit movement of piping, ducts, conduits, bus ducts, cable trays and equipment.

.2 Provide design, selection and provision of materials, installation instructions, installation and inspection of seismic restraint of mechanical piping, ductwork, fire protection and equipment.

.3 The requirements under this Section are in addition to the requirements for equipment, piping and duct supports and vibration isolation specified in other Sections.

.4 Where specifications of materials of this Section differ from those in other Sections of Division 20, this Section governs, including but not limited to vibration isolation devices.

1.2 Systems

.1 Seismically restrain the following equipment and systems:

.1 Piping:

(a) medical gas, natural gas, vacuum, petroleum based liquids and compressed air, NPS 1 and larger,
(b) piping located inside of mechanical equipment and service rooms, NPS 1¼ and larger,
(c) all other piping NPS 2½ and larger.

.2 Fire protection piping – Sprinkler Systems:

(a) design and install systems in accordance with NFPA 13.

.3 Ductwork:

(a) rectangular and oval ductwork with cross sectional area 0.55 m^2 (6 ft^2) and greater,
(b) round ducts with diameters 710 mm (28”) and larger.

.4 Electrical conduit:

(a) conduit 64 mm (2½”) I.D. and larger,
(b) cable trays supporting conduit which is sized 64 mm (2½”) I.D. and larger.

.5 Equipment:

(a) vibration isolated equipment,
(b) rigidly or gravity supported equipment.

1.3 Exemptions

.1 The following portions of systems do not require seismic restraint:

.1 piping suspended from hangers at a distance of 305 mm (12”) or less, measured from the top surface of the pipe, to the underside of the supporting structure above,

.2 ductwork suspended by hangers at a distance of 305 mm (12”) or less, measured from the top surface of the duct to the underside of the supporting structure above,

.3 electrical conduit or cable trays suspended by hangers at a distance of 305 mm (12”) or less, measured from the top surface of the conduit / tray to the underside of the supporting structure above.

1.4 Applicable Codes and Standards

.1 Comply with the latest edition of the following:

.1 SMACNA - “Seismic Restraint Manual Guidelines for Mechanical Systems”

.2 NFPA 13 - “Installation of Sprinkler Systems”

.3 ASHRAE - “HVAC Applications, Seismic and Wind Restraint Design”

.4 Applicable Codes and Standards.

.2 Manufacturers Standardization Society of Valve and Fittings Industry (MSS):

.1 MSS SP-127 Bracing for Piping Systems Seismic - Wind - Dynamic Design, Selection, Application.

1.5 Design Criteria

.1 Design seismic restraint systems to conform to the British Columbia Building Code for the project location:

.2 For Fire Protection systems constructed to NFPA 13, the horizontal force is:
F_p = “K” x W_p x 1.15, where W_p = weight of pipe and water

.3 For Fire Protection systems constructed to NFPA 13, the vertical uplift force is:

$F_v = 0.15 \times F_p$

.4 For all other pipework, and duct systems, the vertical uplift force is restrained by the systems as defined in the SMACNA standard.

1.6 Shop Drawings

.1 Submit shop drawings in accordance with Division 1.

.2 Submit test certificates for each seismic restraint device, identifying maximum tested load capacities.

.3 Submit calculations for each piece of restrained equipment, piping, ductwork and conduit, including seismic forces, restraint selection, and selection data.

.4 Provide a calculation analysis summary (spreadsheet is acceptable) for each piece of equipment, including the following information:

.1 Equipment ID

.2 Floor level

.3 Horizontal seismic force factor

.4 Equipment weight

.5 Horizontal seismic force

.6 Vertical uplift seismic force (where applicable)

.7 Equipment centre of gravity in three directions

.8 Design condition (worst case) overturning moment

.9 Number of restraint fastenings

.10 Pull-out tension per fastener

.11 Horizontal shear per fastener

.12 Pull-out tension load rating per fastener

.13 Horizontal shear rating per fastener.

.5 Include worst case combination of tension and shear loads at each snubber and restraint location.

.6 Include anchor bolt diameters, embedment depth, full welding details including type and length for field welds, and required housekeeping base dimensions.

.7 Calculations to be sealed by a Professional Engineer licensed in the province of British Columbia.

1.7 Sample Materials

.1 None required.

1.8 Quality Assurance

.1 Pre-Construction meeting:

.1 Request and arrange a meeting with the Consultant to review seismic restraint approach, prior to any restraint installation. Obtain approval from the Consultant before commencing work.

.2 Testing and Review

.1 Install the first three lateral and three longitudinal braces for each of: each fire protection systems; one (1) building service piping system; and one (1) ductwork system.

.2 request and arrange for a review of the installation by the Consultant. Obtain approval of the installation before commencing remainder of the work.

.3 Provide services of the manufacturer's technical representative to conduct site inspections of the Work in progress, and to conduct a final inspection of the work. Provide a copy of the final inspection report to the Consultant for review.

.4 Request and arrange for a construction review by the Consultant of the completed seismic restraint installation, before any ceilings are installed.

2 PRODUCTS

2.1 Material

.1 Seismic restraint design and material supply

Standard of Acceptance
- Vibron/Kinetics Noise Control Inc.
- BVA
- VMC/Korfund
- Tecoustics
- Hilti

2.2 Seismic Snubber Restraints

.1 Type "SS1" – Single-Axis Limit Stop Snubber Assemblies:

.1 steel construction, attached to equipment structure and equipment, maximum of 6 mm¼" seismic movement .

.2 designed to restrict movement in one axis.

.3 minimum 6 mm¼" thick resilient neoprene pads to prevent metal-to-metal impact.

.4 minimum four (4) snubbers for each piece of equipment.

.2 Type "SS2 / SS3" – Multi-Axis Limit Stop Snubber Assemblies:

.1 interlocking steel construction, attached to equipment structure and equipment, maximum of 6 mm¼" seismic movement .

.2 designed to restrict movement in two (2) or three (3) axis.

.3 minimum 6 mm¼" thick resilient neoprene pads to prevent metal-to-metal impact.

.4 minimum two (2) snubbers for each piece of equipment.

2.3 Seismic Vibration Isolators

.1 Type "2-S" – All Direction Neoprene Isolator:

.1 molded, oil resistant neoprene compound, with encapsulated cast-in-place top steel load plate, and steel base plate with anchor holes

.2 designed for seismic loads in all directions with no metal-to-metal contact.

.2 Type "3-S" – Restrained Spring Isolator – Constant Load:

.1 colour coded seismic-controlled spring isolator, single or multiple spring coils, with minimum 6 mm¼" neoprene pad.

.2 removable coil spring element without having to disturb supported equipment.

.3 lateral stiffness greater than 1.2 times rated vertical stiffness.

.4 minimum 50% overload capacity

.5 non-welded spring elements: epoxy coated, with a minimum 1000 hour rating when tested in accordance with ASTM B-117.

.6 steel housing design to limit lateral and vertical movement of the supported equipment.

.7 neoprene snubber, to limit maximum equipment movement in any direction to 6 mm¼".

.8 adaptor base suitable sized for larger anchors, when required to suit anchorage capacity.

.3 Type "4-S" – Restrained Spring Isolator – Variable Load:

.1 colour coded seismic-controlled spring isolator, single or multiple spring coils, with minimum 6 mm¼" neoprene pad.

.2 removable coil spring element without having to disturb supported equipment.

.3 lateral stiffness greater than 1.2 times rated vertical stiffness.

.4 minimum 50% overload capacity

.5 non-welded spring elements: epoxy coated, with a minimum 1000 hour rating when tested in accordance with ASTM B-117.

.6 steel housing design to limit lateral and vertical movement of the supported equipment.

.7 top load plate with adjustable and leveling bolts.

.8 adjustable vertical restraints

.9 isolation washers

.10 bottom load plate with internal non-skid isolation pads and anchor holes

.11 hot dipped galvanized for outdoor installations.

.12 neoprene snubber, to limit maximum equipment movement in any direction to 6 mm¼".

.13 adaptor base suitable sized for larger anchors, when required to suit anchorage capacity.

2.4 Piping and Ductwork Restraint

.1 Type "SCR" – Cable Restraints for Suspended Piping and Ductwork:

.1 manufactured system consisting of cable, building attachment, and vertical rod reinforcement assembly,

.2 field-built assemblies are not acceptable,

.3 steel wire strand cables:

(a) galvanized steel aircraft cable
(b) sized for seismic load with a safety factor of 2,
(c) arranged for restraint in both longitudinal and transverse directions.
(d) Rope connections: overlap wire "U" clips, or, tool-less wedge insert lock connectors.
(e) Connector strength rating equal to 90% of cable breaking strength rating.

.4 Building and equipment attachment brackets: designed to permit free cable movement in all directions up to a 45 degree misalignment:

(a) protective thimbles at sharp corners to protect against cable wear,
(b) Selected to exceed the cable working design load by 50%,
(c) Single sided "C" beam clamps are not acceptable.

.5 Vertical Suspension Rods:

(a) braced to avoid potential for buckling due to vertical up-lift forces,
(b) structural steel angle or formed channel brace selected to prevent support rod buckling,
(c) brace attached to support rod with a series of adjustable clips, without the use of hand-tools.

.2 Type "SRR" - steel angles or channels:

.1 sized for seismic load with a safety factor of 2,

.2 arranged for restraint in both longitudinal and transverse directions.

2.5 Rigidly Mounted Equipment Restraint

.1 Undercut or Heavy-Duty Sleeve type, for post concrete-cure installation:

.1 carbon steel bolt, nut and sleeve,

.2 selected for concurrent shear and tension loads with a safety factor not less than 2.0 x estimated load.

3 EXECUTION

3.1 General:

.1 Design seismic restraints to;

.1 keep equipment in place during and after seismic events in accordance with local building code,

.2 resist vertical loading simultaneously with transverse or longitudinal seismic loading .

.2 Give special consideration to design for adjacent connections, insulation treatment, thermal movement, vibration isolation, and relation to building seismic joints.

.3 Building structure attachments;

.1 concrete construction:

(a) cast in place anchor
(b) drill-in wedge anchor

.2 steel construction:

(a) double sided beam clamp, loaded perpendicular to beam, or
(b) specifically designed welded or bolted connection.

.3 single sided "C" type beam clamps for support rods for piping, ductwork, conduit, bus duct, cable trays or other equipment are unacceptable as seismic restraint anchor points.

.4 Brace installation;

.1 install cable restraints snug,

.2 install solid braces only in rigidly supported situations,

.3 brace hanger rods forming a part of seismic restraint to accept resulting compressive loads,

.4 transverse and longitudinal braces to be no more than 45° above or below centerline of pipe, duct, or tray.

.5 Equipment;

.1 equipment secured rigidly to wall, floor, or housekeeping pad to have resilient neoprene bushings and washers between equipment and anchor bolts.

3.2 Selection of Bracing Details

.1 Select application type;

.1 single hanger or

.2 trapeze support.

.2 Determine required force level, based on weight of equipment and specified factors.

.3 With required force level, develop transverse and longitudinal brace spacing for single or trapeze hanger in accordance with;

.1 break length into separate straight runs, which are considered to be single straight section between any bends except where bend is at an offset of less than 610mm (2 ft),

.2 brace each straight run in transverse direction at both ends. Check required spacing for transverse bracing and compare it to the length of straight run. If length of straight run is greater than allowable distance for transverse bracing add transverse braces until spacing does not exceed allowable transverse brace distance,

.3 each straight run must have at least one longitudinal brace. Add longitudinal braces so that the spacing does not exceed allowable longitudinal brace spacing. Transverse brace may act as longitudinal brace for an adjacent run when it is located within 610mm (2 ft) of adjacent straight run,

.4 where several short runs occur one after other, each straight run requires longitudinal brace when adjacent short runs exceed offset length of 610mm (2 ft). When adjacent short runs do not exceed maximum offset length the longitudinal braces can act as transverse braces as long as allowable transverse brace spacing is not exceeded. Multiple offsets can be treated as single run when the total offset is less than maximum offset length,

.5 when flexible connection or swing joint is used, such as at pipe drop to mechanical equipment, pipe may cantilever at length equal to or less than half allowable transverse brace spacing. When

pipe drop cantilever is greater than half allowable transverse brace spacing, support to floor is required.

.4 Select brace anchorage detail.

.5 Calculate hanger rod load and select rod attachment to structure to suit.

.6 Check if rod stiffeners are required to prevent hanger rod from buckling under compressive load.

3.3 Installation

.1 Install seismic restraint devices in accordance with manufacturer's instructions.

.2 Install snubber devices only after equipment is installed and operating, to ensure no metal-to-metal contact.

.3 Seismic restraint manufacturer to provide training to the installation contractor on installation methods.

.4 Anchors on piping systems used for thermal expansion may be used as both a lateral and longitudinal restraint where they are designed for concurrent thermal and seismic loadings.

.5 Pipe and duct penetrations through floors are acceptable as lateral restraints, provided sleeves and fire stopping materials are installed correctly.

.6 Racked piping systems may have the rack braced (laterally, longitudinally, or combination thereof), provided each pipe supported by the rack is restrained to the rack.

.7 Each lateral or longitudinal brace must be secured to the building structure, and not any other building service.

.8 Pipe and duct penetrations through masonry and poured concrete wall partitions are acceptable as a lateral restraint, provided sleeves and fire stopping materials are installed correctly.

.1 Drywall partitions, including demountable partitions, are not to be used for lateral restraint.

3.4 Equipment Restraints - Floor Mounted Vibration Isolated Equipment

.1 Select basic vibration isolator as per Section 20 05 48.

.2 Select seismic restraint for each piece of equipment either:

.1 integrated seismic vibration restraint type 2-S, 3-S or 4-S, or

.2 vibration isolator as per 20 05 48 combined with seismic snubbers SS1, SS2 or SS3.

.3 Do not mix type of restraint on the same piece of equipment.

3.5 Equipment Restraints - Suspended Vibration Isolated Equipment

.1 Select basic vibration isolator as per Section 20 05 48.

.2 Provide hanger rod reinforcement.

.3 Provide SCR restraints in longitudinal and lateral directions.

.4 Do not include ductwork or piping restraints to restrain equipment.

3.6 Equipment Restraints - Rigidly Floor Mounted Equipment

.1 Anchor all floor mounted equipment with anchor bolts, minimum four bolts for rectangular equipment bases, and three bolts for circular equipment bases.

.2 For round equipment, such as expansion tanks with floor-support ring without mounting flanges, use type SS3 snubbers or custom seismic snubbers.

.3 Provide resilient neoprene bushings and washers between equipment and anchor bolt.

3.7 Equipment Restraints - Surface wall-mounted Equipment and Panels

.1 Select bolts for concurrent shear dead-weight without deduction for uplift load, and tension restraint load.

.2 In block-wall;

.1 up to three bolts, each bolt rated for 2.0 times estimated restraint load, or

.2 for four bolts or more, each bolt is rated for 1.0 times estimated concurrent load.

.3 In dry-wall;

.1 minimum of four self-tapping screws drilled into the studs, with each screw rated for 1.0 times estimated restraint load.

3.8 Equipment Restraints - Recessed wall-mounted Equipment and Panels

.1 Same as for surface mounted equipment, except fasten through top bottom and sides of panels to adjacent block wall or wall studs.

3.9 Piping, Ductwork and Conduit

.1 Provide restraint in accordance with the SMACNA guideline and manufacturers' instructions.

.2 Do not mix cable restraints and rigid bar restraints on the same piping or duct system, except:

.1 On piping or ductwork which is suspended on vibration isolators, use cable type SCR restraints and provide a small amount of slack in the cable to prevent vibration short-circuiting.

3.10 Manufacturer’s Services

.1 Review design drawings and specifications, and shop drawings.

.2 Provide design and selection of seismic restraints, and preparation of shop and installation drawings.

.3 Provide training of contractor personnel for the installation of seismic restraints.

.4 Conduct site inspections of the Work in progress, and to conduct a final inspection of the work. Provide a copy of the final inspection report to the Consultant for review, including photographs of representative installations of each type of restraint used in the Work.

END OF SECTION

IDENTIFICATION
20 05 53

1 GENERAL

1.1 Scope

.1 Provide equipment nameplates, piping and duct identification, and valve tags.

1.2 Shop Drawings

.1 Submit list of nameplates, with proposed wording, prior to engraving.

.2 Submit sample board with pipe and duct identification materials.

2 PRODUCTS

2.1 General

.1 Manufactured identification systems:

.1 laminated vinyl or polyester,

.2 resistant to chemical, ultraviolet,

.3 minimum operating temperature: -25 C (-12 F)

.4 maximum operating temperature: 121 C (250 F)

Standard of Acceptance

- Brady - identification tapes, bands, and markers.
- Seton - Setmark Pipe Markers.
- Smillie McAdams Summerlin.
- Craftmark Identification Systems.

2.2 Equipment Identification Nameplates

.1 Identification plates are in addition to manufacturers plates.

.2 Identification plates:

.1 provided for equipment identified with number designations in schedules and equipment selection sheets.

.2 marked with equipment ID, service and power source using wording and numbering used in contract documents.

.3 Fabrication:

.1 laminated plastic,

.2 black lettering on white background for “Normal” power equipment

.3 white lettering on red background for “Emergency” power equipment

.4 minimum size 90 x 40 x 2.5 mm (3 x 1½ x 1/8 in),

.5 engraved with 10 mm (7/16 in) high lettering.

2.3 Piping Identification

.1 Flexible coil-wrap manufactured markers:

.1 plastic coated markers with integral printing, or plastic cover with field applied self-adhesive markers,

.2 applicable WHIMS pictogram for identification of material hazard.

.2 Self-adhesive manufactured pipe markers and colour bands:

.1 50 mm (2 in) wide tape wrapped around pipe or covering with ends overlapping one pipe diameter but not less than 25mm (1 in) for colour bands,

.2 minimum 20 mm (3/4") high lettering,

.3 colour band tape with flow direction arrows,

.4 waterproof and heat resistant plastic marker tags for pipes and tubing 20mm (¾ in) nominal and smaller.

.5 applicable WHIMS pictogram for identification of material hazard.

.3 Stenciled pipe markers:

.1 stenciled letters and numbers: 12 mm (½ in) high lettering on pipes NPS 2 and smaller, and 25mm (1 in) high for pipes NPS 2 ½ and larger, showing pipe service, pipe size and arrows showing direction of flow.

.2 colour bands: 50mm (2 in) wide, using primary and secondary colours conforming to Pipe and Valve Identification Table. Paint to conform to CGSB 1-GP-60M.

.3 direction arrows:

(a) 150mm (6 in) long by 50mm (2 in) wide for piping 75mm (3 in) nominal or larger outside diameter including insulation,
(b) 100mm (4 in) long by 20mm (¾ in) wide for smaller diameters.

.4 applicable WHIMS pictogram for identification of material hazard

2.4 Buried Piping

.1 Materials:

.1 Stretchable polyethylene or mellized ribbon, labeled with name of service, at maximum 800 mm intervals.

2.5 Ductwork Identification

.1 Paint stencilled letters 25mm (1 in) high showing;

.1 duct service,

.2 fan number, and

.3 arrows showing direction of flow,

2.6 Valve and Steam Trap Identification

.1 Brass valve tags or plastic lamacoid:

.1 brass with stamped numbers and letters filled with black enamel,

.2 plastic lamacoid with black lettering on a white background,

.3 brass or stainless steel chain or S-hook,

3 EXECUTION

3.1 Equipment Identification

.1 Locate nameplates to be easily read.

.2 Do not paint over equipment manufacturer or field installed nameplates.

.3 Fasten securely with mechanical fasteners.

.4 Provide standoffs on insulated equipment.

.5 Examples:

.1 at equipment (fan, pump, etc):

F-1
Auditorium Supply Fan

.2 at motor starter, adjustable frequency drive, and separate local disconnect:

P-3
Condenser Water Pump
Fed from PDP-12-1

3.2 Piping Identification - Except for Non-Medical Gas Systems

.1 Provide manufactured tape markers:

.1 self-adhesive type:

(a) indoor uninsulated piping,
(b) indoor insulated piping with PVC or smooth metal jackets,

.2 flexible coil-wrap:

(a) outdoor piping,
(b) indoor insulated piping with canvas or embossed metal jackets.

.3 Install markers on cleaned and prepared surfaces free of dirt and oil.

.2 Provide stencil markers:

.1 Paint stenciled letters and numbers identification marks showing pipe service, pipe size and showing direction of flow.

.2 Paint flow direction arrows adjacent to each identification mark.

.3 Paint colour bands adjacent to each identification mark.

.3 Locations:

.1 maximum every 15 m (50 ft) along length of pipe, except for medical gas, natural gas and fuel oil,

.2 maximum every 6 m (20 ft) along length of pipe for natural gas and fuel oil,

.3 within 1 m (3 ft) of each side of barriers, floors and walls,

.4 within 1 m (3 ft) of and behind access doors ,

.5 within 1 m (3 ft) of piping termination point.

3.3 Piping Identification - Medical Gas Systems

.1 Provided identification markings on medical gas systems:

.1 maximum every 6 m (20 ft) along length of pipe,

.2 before and after barriers, floors and walls,

.3 at each valve,

.4 behind access doors ,

.5 inlet and outlet points including vents.

3.4 Piping Identification - Buried Piping

.1 Provide tracer tape along entire length of pipe at a depth of:

.1 600 mm (2 ft) mm below top of grade for water piping,

.2 150 mm (6 in) above top of natural gas, propane, or fuel oil piping, and medical gas piping.

.2 This tape is in addition to any required electrical tracing wire that may be required under other sections.

3.5 Ductwork identification

.1 Paint stenciled letters 25mm (1 in) high showing;

.1 duct service,

.2 fan number, and

.3 arrows showing direction of flow,

.2 Locations:

.1 exposed ducts,

.2 concealed ducts next to access doors, and

.3 throughout length of ducts at intervals not exceeding 15m (50 ft).

.3 Stencil indication on prepared surfaces, and locate on both sides of any penetration.

3.6 Valve Identification

.1 Provide every valve on job with a numbered tag showing valve type and size, attached to valve stem or wheel handle with nonferrous chain or S-hook.

.1 Valve identification is not required at the following valves:

(a) inside fire hose cabinets,
(b) radiation heating units, unit heaters, or fixture stops,
(c) within sight of equipment or apparatus they control provided there is no branch piping between valve and equipment served.

.2 Identification information:

.1 indicating service, sequential valve number by service or specific equipment ID for control valves, location identifier, purpose of valve, valve type and size.

.2 valve type designation:

(a) **B** (ball valve), **GT** (gate valve), **GL** (globe valve), **CBV** (circuit balancing valve), **BF** (butterfly valve).

.3 valve size:

(a) for valve size, use NPS designation.

.4 examples:

(a) domestic cold water riser isolating valve, sequence number 12, located near column C-1, NPS 2 ball valve:

Domestic Cold Water #12
Riser C-1
Service Valve - B2

(b) hot water terminal reheat supply valve, sequence number 57, located in a corridor and not in site of equipment served, circuit balancing valve NPS 3/4:

Reheat Supply #57
Room 2-254
Balancing Valve - CBV ¾

(c) automatic control valve used for pressure balancing the system, with an equipment schedule ID of CV-15, and is globe style NPS 3:

Constant Pressure Differential Valve
CV-15
Automatic Control Valve - GL 3

.3 Provide a tag schedule for each system, designating number, service, function, size, and location of each tagged item and normal operating position of each valve.

.4 Submit two copies of valve tag schedules, encased in clear plastic, bound in vinyl covered, hardbacked 210mm x 297mm (8½ in x 11 in) three ring binders.

.5 Prepare flow diagrams for each system showing pumps, heat transfer equipment, schematic piping and tagged valves.

3.7 Pipe and Valve Identification Classification

.1 Colour coding and service identifiers to be in accordance with CGSB-24.3-92 Identification of Piping Systems.

.1 Use colour coding system schedule as follows:

Primary Classification	Secondary Classification	Legend Type and Direction Arrows
Yellow 505-101	Orange 508-102	Black 512-101
Green 503-107	Purple 511-101	White 513-101

Blue 202-101	Black 512-101	
Red 509-102	Yellow 505-101	
White 513-101		

Pipe and Valve Identification				
Pipe Marker Legend	Valve Tag Legend	CGSB Hazard Classification	Background Colour	Legend Colour
Raw Water	RAW	Low	Green	White
River Water	RIV.W	Low	Green	White
City Water	CI.W	Low	Green	White
Cold Water	C.W.	Low	Green	White
Distilled Water	DI.W	Low	Green	White
Demineralized Water	DE.W	Low	Green	White
Condenser Water Supply	COND.W.S.	Low	Green	White
Condenser Water Return	COND.W.R.	Low	Green	White
Chilled Water Supply	CH.W.S.	Low	Green	White
Chilled Water Return	CH.W.R.	Low	Green	White
Chilled Water	CH.W.	Low	Green	White
Domestic Cold Water Supply	D.W.S.	Low	Green	White
Dom Hot Water Supply	D.H.W.S.	Low	Green	White
Dom Hot Water Recirc	D.H.W.R.	Low	Green	White
Hot Water Heating Supply (up to 120°C)	H.W.H.S.	Hazardous	Yellow	Black
Hot Water Heating Return (up to 120°C)	H.W.H.R	Hazardous	Yellow	Black
High Temp Hot Water Heating Supply (above 120°C)	H.T.W.S.	Hazardous	Yellow	Black

Pipe and Valve Identification				
Pipe Marker Legend	Valve Tag Legend	CGSB Hazard Classification	Background Colour	Legend Colour
High Temp Hot Water Heating Return (above 120ºC)	H.T.W.R	Hazardous	Yellow	Black
Make-up Water	M.U.W.	Low	Green	White
Boiler Feed Water	B.F.W.	Hazardous	Yellow	Black
Condensate Return - Gravity	C.R.G	Hazardous	Yellow	Black
Condensate Return - Pumped	C.R.P.	Hazardous	Yellow	Black
Blow Off	B.O.	Hazardous	Yellow	Black
Treated Water	T.W.	Low	Green	None
Refrigerant Suction (include refrigerant No.)	REF.S. (No.)	Hazardous	Yellow	Black
Engine Exhaust	E.E.	Hazardous	Yellow	Black
Fuel Oil (show type No.)	F.P. (No.)	Hazardous	Yellow	Black
Steam (indicate pressure)	S. kPa (psig)	Hazardous	Yellow	Black
Lube Oil	L.O.	Hazardous	Yellow	Black
Hydraulic Oil	H.O.	Hazardous	Yellow	Black
Gasoline	G.	Hazardous	Yellow	Black
L.P. Gas	L.P.G.	Hazardous	Yellow	Black
Natural Gas	N.G.	Hazardous	Yellow	Black
Nitrogen Pressure 700 kPa and lower	NIT.	Low	Green	White
Oxygen (not med gas)	OXY.	Hazardous	Yellow	Black
Vacuum (not med gas)	VAC.	Low	Green	White
Fire Protection Water	F.P.W.	Fire Protection	Red	White

Pipe and Valve Identification				
Pipe Marker Legend	Valve Tag Legend	CGSB Hazard Classification	Background Colour	Legend Colour
Sprinkler Water	S.W.	Fire Protection	Red	White
Carbon Dioxide (fire protection)	CO	Fire Protection	Red	White
Vent (plumbing)	V.P.	Low	Green	White
Vent	V.	Hazardous	Yellow	Black

END OF SECTION

EQUIPMENT INSULATION
20 07 13

1 GENERAL

1.1 Scope

.1 Insulate and finish heating and cooling equipment;

.1 provide insulation, sealer coatings, finishes, and mechanical protection.

.2 insulation is not required on factory insulated equipment except as otherwise noted.

1.2 Quality

.1 Manufacturers and products are listed in this Section to establish quality and manufacturing standards. Products from other manufacturers with explicitly similar characteristics may be acceptable but must be submitted as an alternative product submission.

1.3 Qualifications

.1 Provide insulation and covering by recognized specialist applicator with an established reputation for this type of work.

1.4 Sample Boards

.1 Submit sample assembly of each type of insulation and covering. Mount samples on PVC coroplast board with typewritten label beneath each sample indicating service and material specification.

.2 Include samples of vapor barrier installation including coatings (indoors), mastics (outdoors), and reinforcing membranes, on a round surface sample minimum 300 mm x 300 mm (12 in x 12 in).

1.5 Material test criteria

.1 Insulation, adhesives, coatings, finishes, sealers, and tapes:

.1 maximum flame spread rating of 25 to CAN/ULC-S102,

.2 maximum smoke developed rating of 50 to CAN/ULC-S102.

.2 Exception: vapor barrier mastics installed outside of building.

1.6 Applicable codes and standards

.1 Material and method of application to comply with or be tested in accordance with following Standards;

.1 Thermal Insulation Association of Canada (TIAC) National Insulation Standard, excluding section 12

.2 NFPA 90-A Installation of Air-Conditioning and Ventilating Systems

.3 ASHRAE/IES 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings

.4 NFPA 255 Test of Surface Burning Characteristics of Building Materials

.5 CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies

.6 ASTM C411 Standard Test Method for Hot Surface Performance of High Temperature Thermal Insulation

.7 ASTM C518 Standard Test Method for Steady State Thermal Transmission Properties by Means of Heat Flo Meter Apparatus

.8 ASTM C533 Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation

.9 ASTM C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

.10 ASTM C552 Standard Specification for Cellular Glass Thermal Insulation

.11 ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

.12 ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation

.13 ASTM C1126 (Gr.1) Standard Specification for Faced and Unfaced Rigid Cellular Phenolic Thermal Insulation

.14 CGSB 51-GP-52MA Vapour Barrier, Jacket and Facing Material for Pipe, Duct, and Equipment Thermal Insulation.

.15 CGSB 51.53-95 Polyvinyl Chloride) Jacket Sheeting, for Insulated Pipes Vessels and Round Ducts.

1.7 Definitions

.1 In this Section;

.1 “**Ambient”**: as applied to temperatures means outdoor design temperature.

.2 "**Concealed**": as applied to mechanical services and equipment located in space above opaque suspended ceilings, and within trenches not in boiler rooms, pipe and/or duct shafts, and non-accessible chases and furred spaces.

.3 "**Exposed"**: as applied to remainder of mechanical services and equipment which are not "concealed" as defined above. For greater certainty, the following locations are Exposed:

(a) Services in tunnels,
(b) Services in space beneath raised floors,
(c) Trenches located in boiler rooms.

.4 “**Conditioned air**”: air supplied from air handling units which heats, cools, dehumidifies, or humidifies the air.

.5 “**Unconditioned space**”: rooms or spaces that are not supplied with conditioned air, including ceiling spaces which are not part of a ceiling return plenum system

.6 “**Outdoor**”: mechanical services and equipment located outside of the building envelope including services located beneath overhangs and soffits, and exposed to any outdoor condition including temperature, sun exposure, or precipitation.

.7 “**Mastic**”: heavy-consistency waterproof compound for outdoor applications used in conjunction with reinforcing fabric, which remains adhesive and generally pliable with age, to provide either a breathable or vapour barrier finish to insulation.

.8 “**Coating**”: light-consistency compound for indoor applications used in conjunction with reinforcing fabric, to provide either a breathable or vapour barrier finish to insulation.

.9 **“Finish Jacket”**: final finish protective layer for insulation, including lagging fabric, PVC, metal, and adhesive films; that provides weather-protective finish depending on application.

.10 “**Service temperature”**: for purpose of equipment temperature, is equal to the maximum heating or maximum cooling gas or vapour design operating temperature or the liquid supply operating temperature associated with the equipment.

2 PRODUCTS

2.1 Adhesives, Fasteners, and Tape

.1 Contact bond cement:

.1 for quick setting for metal surfaces.

.2 Volatile Organic Content: maximum 80 g/L

Standard of Acceptance
- Bakor - No. 220-05
- Foster – Drion 85-75

.2 Adhesive for flexible closed cell foam insulation:

.1 Volatile Organic Content: maximum 80 g/L.

Standard of Acceptance
- Armaflex 520BLV
- Armaflex Low VOC Spray Contact Adhesive

.3 Lap seal adhesive:

.1 for joints and lap sealing of vapour barriers.

.2 Volatile Organic Content: maximum 250 g/L

Standard of Acceptance
- Bakor 220-05
- Childers CHIL-STIX FRN CP-82
- Foster 85-70

.4 Fibrous insulation adhesive:

.1 Volatile Organic Content: maximum 250 g/L

Standard of Acceptance
- Childers CHIL-STIX FRN CP-82
- Foster No. 85-70

.5 Vapour barrier tape:

.1 colour matched and foil faced

.2 UL 181A listed.

Standard of Acceptance
- Johns Manville - Zeston Z-Tape
- MacTac Canada Limited - Vinyl Scrim or Foil Scrim Kraft
- Compac Corp.
- Fattal Canvas Inc. - Insultape

.6 Weld Pins, Studs and Clips

Standard of Acceptance
- Midwest Fasteners
- Continental Studwelding

.7 Staples

.1 Monel, flare type, minimum size 12 mm (½ in).

.8 Tie Wire

.1 1.6 mm (16 ga) stainless steel with twisted ends.

.9 Caulking for equipment jackets (outdoor use only)

.1 fast-drying, aluminum colour finish, flexible butyl elastomer based vapour barrier sealant.

Standard of Acceptance.
° Foster 95-44

2.2 Coatings and Membranes

.1 Reinforcing Membrane:

.1 synthetic fibre:

(a) Leno weave,
(b) indoor and outdoor use.

Standard of Acceptance
° Foster Mast-A-Fab

.2 glass-fibre fabric:

(a) indoor use.

Standard of Acceptance
° Childers Chil-Glas #5/#10

.3 glass-fibre fabric for use with elastomeric closed cell foam:

(a) indoor use.

Standard of Acceptance
° Childers Chil-Glass #10

.2 Breather Coating - Indoors:

.1 for breather coatings and lagging adhesive,

.2 Volatile Organic Content: maximum 50 g/L

.3 white in colour,

.4 for insulation except elastomeric closed cell foam.

Standard of Acceptance
° Childers CP-50A HV2
° Foster 30-36

.3 Breather Mastic - Outdoors:

.1 for breather coatings and lagging adhesive,

.2 abrasion resistive, flexible,

.3 UV stabile,

.4 grey in colour.

Standard of Acceptance

- Childers Vi-Cryl CP-10/11
- Foster 35-00 / 45-00
- Bakor 120-10

.4 Vapor Barrier Coatings - Indoors:

.1 Volatile Organic Content: maximum 50 g/L.

.2 for vapor barrier coatings and lagging adhesive except for elastomeric closed cell foam,

(a) permeance rating 0.02 perms maximum,
(b) white in colour

Standard of Acceptance
- Childers Chil Perm CP-34/35
- Foster 30-80, 30-90

.3 for use with elastomeric closed cell foam.

Standard of Acceptance
- Childers CHIL-SPRAY WB CP-56 Adhesive

.5 Vapor Barrier Mastic - Outdoors:

.1 for vapor barrier coatings and lagging adhesive,

.2 asphalt cutback,

.3 permeance rating 0.02 perms maximum,

.4 grey in colour.

.5 for outdoor use only; not rated to meet fire/smoke rating of 25/50.

Standard of Acceptance
- Childers Chil-Pruf CP-22
- Foster 60-25/60-26

2.3 Insulation Cement

.1 Hydraulic-setting finishing type.

2.4 Field Applied Finishes

.1 PVC (Polyvinyl Chloride) finish jacket:

.1 minimum 20 mil thickness with permeability not more than 0.09 perms,

.2 flexible flat-sheet,

Standard of Acceptance
- Johns Manville - Manville Zeston 2000
- ACWIL Insulations
- Sure Fit Systems
- Proto PVC - LoSMOKE

.3 pressure sensitive, colour matching vinyl tape.

.2 Fabric finish jacket:

.1 ULC listed plain weave cotton fabric at 220 g/m2 (6 oz/sq yd), treated with fire retardant lagging adhesive, or

.2 re-wetable fiberglass lagging fabric with water activated self-adhesive.

.3 suitable for field painting.

Standard of Acceptance
- Fattal's Thermocanvas
- Alpha-Maritex 3451-RW
- Clairmont Diplag 60
- Glass-Cell FR
- Newtex - Zetex Rewettable

.3 Metal finish jacket:

.1 equipment:

(a) stucco embossed aluminum not less than 0.45 mm (0.016 in) thick sheet or,
(b) corrugated stainless steel not less than 0.25 mm (0.010 in) thick sheet.

.2 fittings:

(a) Custom made swaged ring or lobster back covers on bends and die shaped fitting covers over fitting, valves, strainers, flanges, and grooved couplings.

.3 bands:

(a) 12 mm (½ in) wide stainless steel with mechanical fasteners.

Standard of Acceptance
- Alcan Canada Products - Thermaclad Type 1
- Childers Products Inc. - Fab Straps

.4 Protective finish for elastomeric cellular foam insulation

.1 indoors and outdoors:

Standard of Acceptance
- Armaflex WB Finish

2.5 Equipment Insulation

.1 Type E-1 low temperature glass semi-rigid board:

.1 to ASTM C795,

.2 service temperature: up to jacket surface temperature (air contact) of 66 C (150 F) and un-jacketed surface temperature (equipment contact) up to 232 C (450 F).

.3 semi-rigid or scored and folded board,

.4 FSK jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn, maximum 0.02 perms to ASTM E96 Procedure A.

.5 noncombustible,

.6 thermal performance: 0.050 W/m/C @ 93 C (0.35 btu/hr/in/sq ft/F @ 200 F)

.7 vapor transmission : maximum 0.02 perms

Standard of Acceptance
- John Manville Spin-Glas 813
- Owens Corning Pipe and Tank
- Knauf Fibreglass Pipe and Tank

.2 Type E-2 glass fibre board:

.1 to ASTM C612,

.2 service temperature: up to jacket surface temperature (air contact) up to 66 C (150 F) and un-jacketed surface temperature (equipment contact) up to 232 C (450 F).

.3 rigid for flat surfaces or,

.4 scored board for curved surfaces 250 mm (10 in) dia and over,

.5 jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn,

.6 thermal performance: 0.033 W/m/C @ 24 C (0.23 btu/hr/in/sq ft/F @ 75 F),

.7 vapor transmission: maximum 0.02 perms

.8 density: 48 kg/m3 (3.0 lb/cu ft),

.9 suitable for jacket surface temperature (air contact) up to 66 C (150 F) and un-jacketed surface temperature (equipment contact) up to 232 C (450 F).

Standard of Acceptance
- Johns Manville - Manville 814 Spin-Glas
- Owens Corning - 703 Board
- Knauf Fiberglass - Insulating Board

.3 Type E-3 flexible elastomeric closed cell foam:

.1 to ASTM C534,

.2 service temperature: up to 82 C (180 F).

.3 sheet self-adhering, roll type,

.4 thermal performance: 0.04 W/m/C @ 24 C (0.28 btu/hr/in/sq ft/F @ 75 F),

.5 manufacturer specific sealer/adhesive.

Standard of Acceptance
- Armstrong - AP Armaflex Self-Adhering Sheet Insulation
- Rubatex

.4 Type E-4 low temperature phenolic board:

.1 to ASTM C1126 (Gr.1),

.2 service temperature: -73ºC to+121 ºC (-100ºF to 250ºF).

.3 rigid for flat surfaces,

.4 meeting 25/50 flame spread/smoke development when tested to ASTM E84,

.5 thermal performance: 0.021 W/m/Cº@ 10ºC (0.145 btu/hr/in/sq ft/Fº @ 50ºF),

.6 density: 37 kg/m3 (2.3 lb/cuft),

Standard of Acceptance
- Kingspan - Koolphen K

.5 Type E-5 calcium silicate block:

.1 to ASTM C553,

.2 service temperature: up to 650°C (1200°F).

.3 density: 232 kg/m3 (14.5 lb/cu.ft)

.4 rigid block,

.5 asbestos free,

.6 thermal performance: 0.058 W/m/C @ 149 C (0.40 btu/hr/in/sq ft/F @ 300 F),

.7 hydraulic finishing cement

Standard of Acceptance
- Industrial Insulation Group - Thermo-12/Gold
-

.6 Type E-6 mineral wool fibre roll:

.1 to ASTM C553

.2 service temperature: up to 650°C (1200°F).

.3 flexible faced industrial blanket,

.4 FRK and black scrim facing,

.5 thermal performance: 0.04 W/m/C @ 50 C (0.25 btu/hr/in/sq ft/F @ 100 F),

.6 density: 128 kg/m3 (8.0 lb/cu ft),

Standard of Acceptance
- Roxul Enerwrap 80
- IIG MinWool-1200 Pipe and Tank

.7 Type E-8 molded mineral wool fibre high temperature:

.1 to ASTM C547,

.2 service temperature: up to 650°C (1200°F),

.3 rigid moulded type,

.4 thermal performance: 0.04 W/m/C @ 50 C (0.25 btu/hr/in/sq ft/F @ 100 F),

Standard of Acceptance
- Roxul Techton 1200
- IIG MinWool-1200 Pipe

.8 Type E-10 removable/reuseable high temperature insulation blankets:

.1 custom fabricated, removable insulation covers for hot surfaces,

.2 suitable for outdoor use,

.3 maximum touch-safe temperature protection : 95°C (203 F) to UL2200.

.4 insulation: high density, fire resistant mineral or fibreglass insulation suitable for system operating temperature.

.5 cover: silicone impregnated fibreglass cover, for temperatures up to 260°C (500 F).

.6 internal liner: silicone impregnated fibreglass fabric, or stainless steel knitted wire mesh.

.7 single piece construction

.8 metal identification tag, referenced equipment served.

.9 tie-straps with D-rings, or Velcro™ closures.

Standard of Acceptance
- Firwin Corporation
- Thermohelp Canada Inc.

3 EXECUTION

3.1 General Requirements

.1 Apply insulation after pressure and leakage testing is completed and accepted, and heat tracing is installed.

.2 Surfaces to be clean and dry before application of insulation.

.3 Store and use adhesives, mastics, and insulation cements at ambient temperatures and conditions recommended by product manufacturers.

.4 Do not apply insulation on chrome plated surfaces.

.5 Cut and bevel insulation around nameplates and pressure vessel stamps.

.6 Neatly finish insulation at supports, protrusions, and interruptions.

.7 Seal exposed insulation with reinforced vapor barrier or breather coating/mastic.

.8 Finish equipment with field installed finish jackets as specified herein.

3.2 Equipment Insulation Selection

.1 Insulate hot equipment where surface temperature of equipment in normal service is greater than 60°C (140 F) in accordance with Table 1 at the end of this Section.

.2 Insulate cold and dual temperature equipment where surface temperature of equipment in normal service is less than 14°C (60 F) in accordance with Table 2 at the end of this Section.

3.3 Insulation Application

.1 Place insulation with joints staggered and tightly butted,

.2 Secure insulation with:

- .1 stainless steel bands 300 mm (12 in) on centre, or
- .2 attach to equipment surfaces with adhesive, applied in strips 150 mm (6 in) wide at 300 mm (12 in) on centre.
- .3 do not use weld pins on plate-and-frame heat exchangers.

.3 Additional requirements for type E-5 (calcium silicate block) insulation:

- .1 apply using high temperature adhesive,
- .2 place insulation in double layers with joints tightly butted and staggered and fill voids and openings in assembly with insulating cement.
- .3 secure insulation with 1.6 mm (16 ga) stainless steel wire or bands 300 mm (12 in) on center. Use welded studs, clips, flanges or angles as anchors for wire and bands.
- .4 for irregular shaped portions of equipment, pipe couplings and flanged nozzles; use mitered segments of insulation secured with stainless wire or wrap with type E-4 (high temperature mineral fibre blanket) insulation to thickness equal to that of adjoining insulation.

.4 Curved surfaces with radius less than 250 mm (10 in):

- .1 insulate with type E-1, E-3, or E-6 insulation.

.5 Flat surfaces, and curved surfaces with radius 250 mm (10 in) and greater:

.1 insulate with type E-2, E-4, or E-5.

.2 provide metal corner beads to reinforce corners and edges.

.6 Irregular shaped surfaces (cold and dual temperature only):

.1 insulate with type E-1 or E-3,

.2 use preformed insulation fittings, mitered segments of board insulation, or flexible blanket insulation with portions built-up to specified thickness.

.7 Nozzles, manholes, and access doors:

.1 terminate insulation with straight cut with space of 25 mm (1 in) at connection,

.2 seal cut with insulation coatings/mastic beveled away from flanged or union connections; and

.3 cover flanged joint, union, manhole and access doors with removable and replaceable aluminum insulated box overlapping adjacent insulation by 50 mm (2 in) and secured with bands.

.8 Instruments and instrument sensor risers:

.1 tightly fit equipment insulation to instrument riser/piping,

.2 in addition for cold and dual temperature equipment, insulate the instrument sensor riser for a length equal to four (4) times the diameter of the riser pipe.

3.4 Cold and Dual Temperature Equipment - Additional Requirements

.1 Cold pumps:

.1 insulate pump casing with one layer of 25 mm (1in) type E-3 insulation adhered to clean oil-free metal surfaces by compression fit method with full coverage of adhesive.

.2 Centrifugal refrigeration machines:

.1 insulate evaporator shell with two staggered layers of 20 mm (¾ in) type E-3 insulation adhered to clean oil-free metal surfaces by compression fit method with full coverage of adhesive.

.2 insulate refrigeration lines, oil cooler piping, purge lines, and other parts subject to sweating with 20 mm (¾ in) type E-3 formed pipe type insulation.

.3 insulate evaporator heads and water boxes with removable, replaceable insulated boxes consisting of:

(a) 1.6 mm (16 ga) aluminum or stainless steel sheeting, with edges and corners caulked and sealed,,
(b) lined with two layers 25 mm (1 in) thick type E-3, or one layer 25 mm (1 in) thick E-4 insulation,
(c) vapour seal joints between adjacent casing sections after box is in place, and
(d) attach boxes so that they may be removed without disturbing casing insulation.

.3 Plate-and-Frame heat exchangers:

.1 insulate frame-heads with two staggered layers of 20 mm (¾ in) type E-3 insulation adhered to clean oil-free metal surfaces by compression fit method with full coverage of adhesive.

.2 insulate plates with removable, replaceable insulated boxes consisting of:

(a) 1.6 mm (16 ga) aluminum or stainless steel sheeting, with edges and corners caulked and sealed,,
(b) lined with two layers 20 mm (3/4 in) thick type E-3,

(c) vapour seal joints between adjacent casing sections after box is in place, and
(d) attach boxes so that they may be removed without disturbing casing insulation.

3.5 Sealing Insulation - Hot Equipment

.1 Indoor installation:

.1 no sealing of insulation is required prior to application of finish protection.

.2 Outdoor installation:

.1 apply breather mastic with reinforcing membrane over equipment insulation, regardless of final finish application.

.2 apply mastics when ambient temperature is above 4°C (40 F), unless manufacturer's instructions permit colder ambient installation conditions.

3.6 Sealing Insulation - Cold and Dual Temperature Equipment

.1 Type E1, E2, and E4 insulation - indoor and outdoor installation:

.1 apply vapor barrier coating/mastic with reinforcing membrane over equipment insulation, regardless of final finish application.

.2 only use mastics on outdoor installations.

.3 apply mastics and coatings when ambient temperature is above 4°C (40 F), unless manufacturer's instructions permit colder ambient installation conditions.

.4 at pipe connections, cut-back insulation and seal with coating/mastic; insulate pipe flanges in accordance with requirements for piping insulation.

.5 at instruments and instrumentation sensor riser, cut-back and seal insulation with coating/mastic at riser, and seal sensor riser insulation.

.2 Type E3 insulation - indoor installation:

.1 seal transverse and butt joints with sealer/adhesive.

3.7 Insulation Finish

.1 Install protective finish on insulation in accordance with Table 3 at the end of this Section, after breather and vapor barrier sealing is completed.

.2 Install finish jacket materials used for covering to allow 50 mm to 100 mm (2 in to 4 in) overlap on longitudinal and circumferential edges.

.1 on vertical tanks, vessels, etc arrange circumferential overlap on adjacent sheets outside of sheet below and under sheet above.

.3 PVC sheeting:

.1 Hot Equipment:

(a) overlap longitudinal edges and adjacent sheets by minimum of 50 mm (2 in) and staple fasten the sheets.
(b) secure sheeting with colour matched tape around circumference, at least two places per section of sheet, and by stapling longitudinal and circumferential edges.
(c) do not seal edges with vapour barrier tape.

.2 Cold and Dual Temperature Equipment:

(a) overlap longitudinal edges and adjacent sheets by minimum of 50 mm (2 in) and seal longitudinal edges with vapor barrier coating adhesive for full depth and 100% coverage of overlap,
(b) seal circumferential edges of PVC fitting covers with reinforced vapour barrier coating adhesive extending over adjacent pipe insulation section with an overlap of at least 50 mm (2 in).
(c) seal PVC fitting covers at throat and heel seams by solvent bonding and secured over insulation with reinforced vapor barrier coating/mastic overlapping adjacent pipe insulation a minimum of 50 mm (2 in).

.4 Metal:

.1 Use lock-on systems or secure sheeting with bands 450 mm (18 in) apart.

.2 Joint sealing:

(a) Hot equipment: do not seal joints.
(b) Cold and Dual Temperature equipment: seal joints with caulking.

.3 Curved surfaces: custom made swaged ring or lobster back covers.

.4 On outdoor hot and cold/dual temperature equipment, caulk overlapping metal joints to permit expansion of metal jacket.

.5 Fabric:

.1 Cotton lagging:

(a) apply cotton lagging with minimum two coatings of breather or vapor barrier coating adhesive as applicable to the piping system, and finish to provide a smooth surface free of wrinkles and sags.
(b) where cotton lagging with appropriate coating is used this satisfies the requirements of a sealer coating for Hot or Cold/Dual temperature piping systems.

.2 Fibreglass lagging:

(a) apply re-wetable fibreglass lagging in accordance with manufacturer instructions. Finish to provide a smooth surface free of wrinkles and sags.
(b) where re-wetable fiberglass lagging is used this satisfies the requirements of a sealer coating for Hot piping systems.

.6 E-3 (flexible elastomeric closed cell foam) insulation:

.1 apply thin coat of lagging adhesive, and apply glass mesh,

.2 when dry apply indoor or outdoor finish at 400 square feet per gallon,

.3 apply second coat of same material, at same rate of application, after four hours.

3.8 Mechanical Damage Protection - Indoors

.1 Protect exposed insulated equipment floor supports with 1.2 mm (18 ga) stainless steel jacket approximately 100 mm (4 in) high, secured to floor slab. Conceal fastenings by floor plate.

3.9 Field Quality Control

.1 The Consultant reserves the right to have protective finish coverings removed on up to 5% of all fittings, flanges, couplings, valves, and pipeline accessories to review the sealing of the insulation, at no change in cost.

.2 If insulation sealing is found to be incorrect at any one location, remove the protective finish on all fittings, flanges, couplings, valves, and pipeline accessories for review.

.3 Repair defective sealing and replace protective coverings at no change in cost.

3.10 Insulating and Finishes Tables

.1 Tables 1, 2, and 3 follows:

Table 1 : Hot Equipment, Insulation Type and Thickness mm (in)			
Nominal Surface Temperature	**Equipment Description**	**Insulation Type**	**Insulation Thickness**
Between 400°C (750°F) and up to 650 °C (1200°F)	Diesel Engine exhaust piping	E-8,	2 layers each 50 (2)
	Diesel Engine exhaust silencer	E-6	2 layers each 50 (2)
	Selective Catalytic Reduction (SCR) emission control system	E-10	as required for touch safe
	Engine exhaust gas heat exchanger	E-6	2 layers each 50 (2)
Between 150°C (300°F) and up to 400°C (750°F)	Boiler Breeching/Chimney Connectors	E-6,	50 (2)
	Boiler stacks and chimneys inside of building	E-6,	50 (2)
	Boiler stacks and chimneys outside of building	None	---
	Any other equipment	E-6, E-7, E-8	50 (2)
≤ 150°C (300°F)	Shell-and-Tube Heat exchangers Flash tanks Expansion tanks	E-1, E-6	50 (2)
	Plate-and-frame Heat exchangers	E-2,	25 (1)
	Domestic hot water tank & heaters	E-1, E-6	40 (1½)
	Radiant ceiling panels	E-1	50 (2)
	Boilers	E-3 to E-8	50 (2)
	Any other equipment	E-1, E-2 E-6,	40 (1½)

Table 2 : Cold and Dual Temperature Equipment, Insulation Type and Thickness mm (in)			
Nominal Surface Temperature	**Equipment Description**	**Insulation Type**	**Insulation Thickness**
< 14°C (60F)	Equipment not otherwise identified.	E1, E2, E4	25 (1)
	Heat exchangers, plate-and-frame	E2	2 layers each 20 (3/4)
	Chilled water pumps	E-3	20 (3/4) direct contact
	Cooling tower/condenser water pumps for winter free-cooling	E-3	2 layers each 25 (3/4) removable box
	Cold water booster pumps	E-4	25 (1) removable box
	Chilled water expansion tanks	E-3	25 (1)
	Refrigeration equipment: evaporator shell	E-3	2 layers each 25 (1)
	Refrigeration equipment : evaporator heads	E-3	2 layers each 25 (3/4) removable box
		E-4	25 (1) removable box
	Refrigeration equipment : liquid refrigerant piping and accessories	E-3	25 (1)
	Cold water meter assembly	E-3	25 (1)
	Chilled water storage tank	E-3	2 layers each 50 (2)
		E-4	25 (1)
	Water dealkalizer	E-1, E-3	25 (1)

Table 2 : Cold and Dual Temperature Equipment, Insulation Type and Thickness mm (in)			
Nominal Surface Temperature	**Equipment Description**	**Insulation Type**	**Insulation Thickness**
	Water softener	E-2, E-3	25 (1)
	Indoor cooling tower water basin	E-3, E-4	25 (1)
	Glycol cooling system expansion tanks	E-3	25 (1)
	Evaporative cooling unit sumps	E-3, E-4	25 (1)

Table 3 : Equipment Insulation Protective Finishes			
Location	**Weather Exposure**	**Piping System**	**Finish**
Concealed	Indoors	All	None
Exposed	Indoors	All except steam over 860 kPa (125 psig)	PVC
	Indoors	Steam over 860 kPa (125 psig)	Fabric
	Outdoors	All	Metal

END OF SECTION

PIPING INSULATION
20 07 19

1 GENERAL

1.1 Scope

.1 Insulate and finish piping, valves, fittings, and pipeline accessories.

.1 provide insulation, coatings, finishes, and mechanical protection.

.2 Provide fire rated insulation on piping as required, including fire protection standpipes.

.1 coordinate with the contractor under Division 21 for location and extent of standpipes to be protected.

1.2 Related Work

.1 The following Work is specified in other Section of Division 20:

.1 supply of insulation shields for cold and dual temperature piping:

.2 provision of welded saddles for hot piping.

.2 Insulation of underground piping: Section 20 07 21.

1.3 Quality

.1 Manufacturers and products are listed in this Section to establish quality and manufacturing standards. Products from other manufacturers with explicitly similar characteristics may be acceptable but must be submitted as an alternative product submission.

1.4 Qualifications

.1 Provide insulation and covering by recognized specialist applicator with an established reputation for this type of work.

1.5 Sample Boards

.1 Submit sample assembly of each type of insulation and covering. Mount samples on PVC coroplast board with typewritten label beneath each sample indicating service and material specification.

.2 Include samples of vapor barrier installation including coatings (indoors), mastics (outdoors), reinforcing membranes, on a sample of a pipe butt joint and one elbow.

1.6 Material test criteria

.1 Insulation, adhesives, coatings, finishes, sealers, and tapes:

.1 maximum flame spread rating of 25 to CAN/ULC-S102,

.2 maximum smoke developed rating of 50 to CAN/ULC-S102..

.2 Exception: vapor barrier mastics installed outside of building.

1.7 Applicable codes and standards

.1 Material and method of application to comply with or be tested in accordance with following Standards;

.1 Thermal Insulation Association of Canada (TIAC) National Insulation Standard, excluding section 12

.2 NFPA 90-A Installation of Air-Conditioning and Ventilating Systems

.3 ASHRAE/IES 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings

.4 NFPA 255 Test of Surface Burning Characteristics of Building Materials

.5 CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies

.6 ASTM C411 Standard Test Method for Hot Surface Performance of High Temperature Thermal Insulation

.7 ASTM C518 Standard Test Method for Steady State Thermal Transmission Properties by Means of Heat Flo Meter Apparatus

.8 ASTM C533 Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation

.9 ASTM C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

.10 ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation

.11 ASTM C552 Standard Specification for Cellular Glass Thermal Insulation

.12 ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

.13 ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation

.14 ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

.15 ASTM C1126 (Gr.1) Standard Specification for Faced and Unfaced Rigid Cellular Phenolic Thermal Insulation

.16 CGSB 51-GP-52MA Vapour Barrier, Jacket and Facing Material for Pipe, Duct, and Equipment Thermal Insulation.

.17 CGSB 51.53-95 Poly(Vinyl Chloride) Jacket Sheeting, for Insulated Pipes Vessels and Round Ducts.

1.8 Definitions

.1 In this Section;

.1 “**Ambient”** : as applied to temperatures means outdoor design temperature.

.2 "**Concealed**" : as applied to mechanical services and equipment located in space above opaque suspended ceilings, and within trenches not in boiler rooms, pipe and/or duct shafts, and non-accessible chases and furred spaces.

.3 "**Exposed"** : as applied to remainder of mechanical services and equipment which are not "concealed" as defined above. For greater certainty, the following locations are Exposed:

(a) Services in tunnels,
(b) Services in space beneath raised floors.
(c) Trenches located in boiler rooms.

.4 "**Conditioned air**": air supplied from air handling units which heats, cools, dehumidifies, or humidifies the air.

.5 "**Unconditioned space**": rooms or spaces that are not supplied with conditioned air, including ceiling spaces which are not part of a ceiling return plenum system

.6 "**Outdoor**": mechanical services and equipment located outside of the building envelope including services located beneath overhangs and soffits, and exposed to any outdoor condition including temperature, sun exposure, or precipitation.

.7 "**Mastic**": heavy-consistency waterproof compound for outdoor applications used in conjunction with reinforcing fabric, which remains adhesive and generally pliable with age, to provide either a breathable or vapour barrier finish to insulation.

.8 "**Coating**": light-consistency compound for indoor applications used in conjunction with reinforcing fabric, to provide either a breathable or vapour barrier finish to insulation.

.9 **"Finish Jacket"**: final finish protective layer for insulation, including lagging fabric, PVC, metal, and adhesive films; that provides weather-protective finish depending on application.

.10 "**Service temperature"**: for purpose of piping temperature, is equal to the gas or vapour design operating temperature, or the liquid supply operating temperature.

.11 "**Pure water"** ; water which has been treated with filtration equipment, including but not limited to reverse osmosis, deionization, ultra-filtration, ultra-violet, distillation or any combination of such or similar equipment, to achieve water quality significantly free of impurities.

2 PRODUCTS

2.1 Adhesives, Fasteners, and Tape

.1 Contact bond cement:

.1 for quick setting for metal surfaces.

.2 Volatile Organic Content: maximum 80 g/L.

Standard of Acceptance
° Bakor - No. 220-05
° Foster – Drion 85-75

.2 Adhesive for flexible closed cell foam insulation:

.1 Volatile Organic Content: maximum 80 g/L.

Standard of Acceptance
° Armaflex 520 BLV
° Armaflex Low VOC Spray Contact Adhesive
°

.3 Lap seal adhesive:

.1 for joints and lap sealing of vapour barriers.

.2 Volatile Organic Content: maximum 250 g/L.

Standard of Acceptance
° Bakor 220-05
° Childers CHIL-STIX FRN CP-82

.4 Fibrous insulation adhesive:

.1 Volatile Organic Content: maximum 250 g/L

Standard of Acceptance
- Childers CHIL-STIX FRN CP-82
- Foster No. 85-70

.5 Vapour barrier tape:

.1 colour matched and foil faced

.2 UL 181A listed.

Standard of Acceptance
- Johns Manville - Zeston Z-Tape
- MacTac Canada Limited - Vinyl Scrim or Foil Scrim Kraft
- Compac Corp.
- Fattal Canvas Inc. - Insultape

.6 Weld Pins, Studs and Clips:

Standard of Acceptance
- Midwest Fasteners
- Continental Studwelding

.7 Staples:

.1 Monel, flare type, minimum size 12 mm (½ in).

.8 Tie Wire:

.1 1.6 mm (16 ga) stainless steel with twisted ends.

.9 Caulking for sheetmetal jackets (outdoor use only)

.1 fast-drying, aluminum colour finish, flexible butyl elastomer based vapour barrier sealant.

Standard of Acceptance.
- Foster 95-44

2.2 Coatings and Membranes

.1 Reinforcing Membrane:

.1 synthetic fibre:

(a) Leno weave,
(b) indoor and outdoor use.

Standard of Acceptance
- Foster Mast-A-Fab

.2 glass-fibre fabric:

(a) indoor use.

Standard of Acceptance
- Childers Chil-Glas #5/#10

.3 glass-fibre fabric for use with elastomeric closed cell foam:

(a) indoor use.

Standard of Acceptance

° Childers Chil-Glass #10

.2 Breather Coating - Indoors:

.1 for breather coatings and lagging adhesive,

.2 Volatile Organic Content: maximum 50 g/L

.3 white in colour,

Standard of Acceptance
° Childers CP-50A HV2
° Foster 30-36

.3 Breather Mastic - Outdoors:

.1 for breather coatings and lagging adhesive,

.2 abrasion resistive, flexible,

.3 UV stable,

.4 grey in colour.

Standard of Acceptance
° Childers Vi-Cryl CP-10/11
° Foster 35-00 / 45-00
° Bakor 120-10

.4 Vapor Barrier Coatings - Indoors:

.1 Volatile Organic Content: maximum 50 g/L.

.2 for vapor barrier coatings and lagging adhesive except for elastomeric closed cell foam,

(a) permeance rating 0.02 perms maximum,
(b) white in colour

Standard of Acceptance
° Childers Chil Perm CP-34/35
° Foster 30-80, 30-90

.3 for use with elastomeric closed cell foam.

Standard of Acceptance
° Childers CHIL-SPRAY WB CP-56 Adhesive

.5 Vapor Barrier Mastic - Outdoors:

.1 for vapor barrier coatings and lagging adhesive,

.2 asphalt cutback,

.3 rermeance rating 0.02 perms maximum,

.4 grey in colour.

.5 for outdoor use only; not rated to meet fire/smoke rating of 25/50.

Standard of Acceptance
° Childers Chil-Pruf CP-22
° Foster 60-25/60-26

2.3 Insulation Cement

.1 Hydraulic-setting finishing type.

2.4 Field Applied Finishes

.1 PVC (Polyvinyl Chloride) finish jacket:

.1 minimum 20 mil thickness with permeability not more than 0.09 perms,

.2 fitting covers, one or two piece, pre moulded,

.3 glass-fibre insulation inserts for elbows, tees, valves, end-caps, mechanical pipe couplings,

.4 self sealing longitudinal joints.

Standard of Acceptance
- Johns Manville - Manville Zeston 2000
- ACWIL Insulations
- Sure Fit Systems
- Proto PVC - LoSMOKE

.5 pressure sensitive, colour matching vinyl tape.

.2 Fabric finish jacket:

.1 ULC listed plain weave cotton fabric at 220 g/m2 (6 oz/sq yd), treated with fire retardant lagging adhesive, or

.2 re-wetable fiberglass lagging fabric with water activated self-adhesive.

.3 suitable for field painting.

Standard of Acceptance
- Fattal's Thermocanvas
- Alpha-Maritex 3451-RW
- Clairmont Diplag 60
- Glass-Cell FR
- Newtex - Zetex Rewettable

.3 Metal finish jacket:

.1 straight pipe, duct or plenum:

(a) stucco embossed aluminum not less than 0.45 mm (0.016 in) thick sheet or,
(b) corrugated stainless steel not less than 0.25 mm (0.010 in) thick sheet.

.2 fittings:

(a) Custom made swaged ring or lobster back covers on bends and die shaped fitting covers over fitting, valves, strainers, flanges, and grooved couplings.

.3 bands:

(a) 12 mm (½ in) wide stainless steel with mechanical fasteners.

Standard of Acceptance
- Alcan Canada Products - Thermaclad Type 1
- Childers Products Inc. - Fab Straps

.4 Protective finish for elastomeric cellular foam insulation

.1 indoors and outdoors:

Standard of Acceptance
° Armaflex WB Finish

2.5 Pipe Insulation

.1 Type P-1 molded glass fibre:

.1 to ASTM C547,

.2 pipe size application: up to and including NPS 24:

.3 service temperature: -18°C (0 F) to jacket surface temperature (air contact) of 66 C (150 F) and un-jacketed surface temperature (equipment contact) up to 232 C (450 F).

.4 factory molded rigid pipe insulation,

.5 ASJ jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn, maximum 0.02 perms to ASTM E96 Procedure A.

.6 self sealing longitudinal jacket with integral vapour barrier, and matching butt joint sealer strips.

.7 noncombustible,

.8 thermal performance: 0.033 W/m/C @ 24 C (0.23 btu/hr/in/sq ft/F @ 75 F)____

.9 vapor transmission : maximum 0.02 perms

.10 reduced environmental impact feature of either: bio-based binders, 25% minimum recycled glass content, and/or paper-free ASJ jacket material.

Standard of Acceptance
° John Manville Micro-Lok HP (25% recycled content)
° Owens Corning Fiberglas Evolution (paper-free ASJ)
° Knauf Fiberglass Redi-Klad 1000 Ecose (bio-based binders)

.2 Type P-2 glass fibre semi-rigid board:

.1 to ASTM C795,

.2 pipe size application: NPS 16 and larger:

.3 service temperature: up to 454°C (850 F)

.4 scored and folded board,

.5 ASJ jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn, maximum 0.02 perms to ASTM E96 Procedure A.

.6 noncombustible,

.7 thermal performance: 0.050 W/m/C @ 93 C (0.35 btu/hr/in/sq ft/F @ 200 F)___

.8 vapor transmission : maximum 0.02 perms

Standard of Acceptance
° John Manville Spin-Glas 813
° Owens Corning Pipe and Tank
° Knauf Fibreglass Pipe and Tank

.3 Type P-3 flexible elastomeric closed cell foam:

.1 to ASTM C534,

.2 pipe size application: up to and including NPS 1-1/2

.3 service temperature: -183°C (-297 F) to 82°C (183 F)

.4 tubular with self sealing seams,

.5 thermal performance: 0.04 W/m/C @ 24 C (0.28 btu/hr/in/sq ft/F @ 75 F),

.6 manufacturer specific sealer/adhesive.

Standard of Acceptance
- ARMACELL - AP Armaflex SS Pipe Insulation
- Rubatex

.4 Type P-4 molded phenolic rigid:

.1 to ASTM C1126 (Gr.1),

.2 pipe size application: up to and including NPS 16

.3 service temperature: -73ºC to+121 ºC (-100ºF to 250ºF).

.4 molded pipe, fitting, and hanger supports,

.5 meeting 25/50 flame spread/smoke developed when tested to ASTM E84,

.6 thermal performance: 0.019 W/m/Cº@ 24ºC (0.13 btu/hr/in/sq ft/Fº @ 75ºF),

Standard of Acceptance
- Kingspan - Kooltherm K/Kooltherm

.5 Type P-5 cellular glass :

.1 to ASTM C552,

.2 pipe size application: up to and including NPS 16

.3 service temperature: -268°C (-450 F) to 480 C (900 F)

.4 density 120 kg/m3 (7.5 lb/cu ft),

.5 molded or block type,

.6 thermal performance: 0.043 W/m/C @ 0 C (0.32 btu/hr/in/sq ft/F @ 75 F).

Standard of Acceptance
- Pittsburgh Corning Foamglas

.6 Type P-6 calcium silicate:

.1 to ASTM C533,

.2 pipe size application: up to and including NPS 16

.3 service temperature: to 649 C (1200 F).

.4 density 232 kg/m3 (14.5 lb/cu ft),

.5 molded or block type,

.6 asbestos-free,

.7 thermal performance: 0.058 W/m/C @ 149 C (0.40 btu/hr/in/sq ft/F @ 300 F),

Standard of Acceptance
- Industrial Insulation Group - Thermo-12/Blue

.7 Type P-7 molded mineral wool fibre:

.1 to ASTM C547,

.2 pipe size application: up to and including NPS 30,

.3 service temperature: up to 650°C (1200 F),

.4 rigid molded type,

.5 thermal performance: 0.04 W/m/C @ 50 C (0.25 btu/hr/in/sq ft/F @ 100 F),

Standard of Acceptance
- Roxul Techton 1200
- Fibrex Coreplus 1200 Pipe Insulation

.8 Type P-8 molded mineral wool fibre high temperature:

.1 to ASTM C547,

.2 pipe size application: up to and including NPS 30

.3 service temperature: up to 730°C (1350 F),

.4 rigid moulded type,

.5 thermal performance: 0.04 W/m/C @ 50 C (0.25 btu/hr/in/sq ft/F @ 100 F),

Standard of Acceptance
- Roxul SturdiRock
- Fibrex Dura K Pipe Insulation

.9 Type P-9 removable/reuseable high temperature insulated jackets:

.1 custom fabricated, removable insulation covers for hot surfaces,

.2 suitable for outdoor use,

.3 maximum touch-safe temperature protection : 95°C (203 F) to UL2200.

.4 insulation: high density, fire resistant mineral or fibreglass insulation suitable for system operating temperature.

.5 cover: silicone impregnated fibreglass cover, for temperatures up to 260°C (500 F).

.6 internal liner: silicone impregnated fibreglass fabric, or stainless steel knitted wire mesh.

.7 single piece construction

.8 metal identification tag, referenced equipment served.

.9 tie-straps with D-rings, or Velcro™ closures.

Standard of Acceptance
- Firwin Corporation
- Thermohelp Canada Inc.

.10 Type P-10 fire-rated pipe insulation:

.1 WH, ULC, or UL classified inorganic material, non-combustible, listed for protection of metallic piping,

.2 meeting ASTM C518,

.3 flexible blanket, 2 hour fire rating,

.4 foil encapsulated,

.5 suitable for service between:-173 C to 1260 C (-280 F to 2300 F).

Standard of Acceptance
- Eastern Wire & Conduit (Royal Quickstop Quickwrap)

.11 Type P-11 molded phenolic rigid pipe support inserts:

.1 molded pipe hanger supports on cold and dual temperature piping,

.2 to ASTM C1126 (Gr.1),

.3 pipe size application: up to NPS 24

.4 service temperature: -73ºC to+121 ºC (-100ºF to 250ºF).

.5 meeting 25/50 flame spread/smoke developed when tested to ASTM E84,

.6 density: 120 kg/m^3 (7.5 lb/ft^3)

Standard of Acceptance
° Kingspan - Kooltherm K/Kooltherm High Density
°

3 EXECUTION

3.1 General Requirements

.1 Apply insulation after pressure and leakage testing is completed and accepted, and heat tracing is installed.

.2 Surfaces to be clean and dry before application of insulation.

.3 Store and use adhesives, mastics, and insulation cements at ambient temperatures and conditions recommended by product manufacturers.

.4 Do not apply insulation on chrome plated surfaces of piping, valves, fittings, and equipment.

.5 Cut and bevel insulation around nameplates and pressure vessel stamps.

.6 Neatly finish insulation at supports, protrusions, and interruptions.

.7 Seal exposed insulation with reinforced vapor barrier or breather coating or mastic.

.8 Finish piping with field installed finish jackets as specified herein.

3.2 Hot Piping Systems Insulation

.1 Insulate hot piping systems including pipe, valves, fittings, and pipeline accessories in accordance with Table 1 at the end of this Section.

.2 Insulate Condensate piping to the same criteria as its associated steam system.

.3 Insulate Safety Relief valve piping located between floor or elevated worksurface and up to 2400 mm (8 ft) above same, and passing within 1200 mm (4 ft) of a floor or elevated work surface.

3.3 Cold and Dual Temperature Piping Systems Insulation

.1 Insulate cold and dual temperature piping systems including pipe, valves, fittings, and pipeline accessories in accordance with Table 2 at the end of this Section.

.2 For drainage systems insulate:

.1 storm water roof drain body,

.2 storm water piping from roof drain body to the floor level of the story below the drain body

.1 sanitary piping in the following locations,

(a) horizontal sanitary drainage piping NPS 3 and larger in ceiling spaces,
(b) exposed sanitary drainage piping in service tunnels, and
(c) exposed sanitary drainage piping serving spaces located above a parking garage open to the outdoors.

.3 For greater clarity, domestic hot water, domestic hot water recirculating, non-potable hot water, and non-potable hot water recirculating piping systems are treated as “cold and dual temperature” for the purpose of application of vapor barriers to both hot and cold domestic and non-potable water piping.

3.4 Pure water piping without heat sanitization

.1 Insulation is not required on piping for pure water piping not equipped with heat sanitization equipment:

.1 boiler make-up water;

.2 pre-treatment systems for process cooling systems;

3.5 Piping

.1 Insulate straight pipe sections by staggering adjacent longitudinal seams 1/4 turn each butt joint.

.2 Secure insulation at centre of each section, at each end, and at not more than 600 mm (2 ft) intervals with:

.1 vapor barrier tape in addition to jackets with self-adhering lap joints for type P1 and P2 insulation on Cold and Dual Temperature piping,

.2 mechanical fastened (stapled) or jackets with self-adhering lap joints on type P1 and P2 insulation on Hot piping,

.3 bands or wire for type P4 to P8 insulation,

.4 self-adhered or provide 100% coverage of contact adhesive for type P3 insulation,

.5 in accordance with listing requirements for type P10 insulation.

3.6 Fittings, Flanges, Couplings, and Strainers

.1 Insulate fittings including elbows and tees:

.1 NPS 1 ½ and smaller:

(a) mitre cut insulation to create tight fit,
(b) for PVC cover, trim backside of insulation on elbows to suit cover but do not reduce total thickness less than that of adjacent pipe insulation.

.2 NPS 2 and larger:

(a) use matching preformed insulation inserts, or fabricate mitred insulation segments made from same material as pipe insulation,
(b) number of mitred segments to be sufficient to maintain thickness of insulation around throat of elbow,
(c) secure inserts and fabricated segments with wire prior to application of coatings or finishes.

.2 Insulate flanges and grooved joint couplings:

.1 Insulate with preformed inserts or build-up insulation with same material as on adjacent pipe:

(a) butt pipe insulation to each side of flange, coupling, valve, or strainer,
(b) build up rigid insulation blocking on each side of fitting, coupling, valve or strainer, with a width dimension same as pipe insulation thickness, and

(c) apply insulation layer over outside of flange, coupling, valve or strainer to a thickness equal to pipe insulation thickness.
(d) provide removable insulation section on strainer head.

.2 Where phenolic insulation is used;

(a) same as above except use factory made insulation inserts, or fabricate inserts to suit fixture.

.3 Where elastomeric insulation is used;

(a) same as above except adhere insulation to flange, coupling, or strainer with full coverage of °C adhesive,
(b) do not adhere insulation across bolted connections - insulate on each side of connection and add additional insulation layer across connection and fix in place with bands.

3.7 Pipeline Accessories

.1 Insulate pipeline accessories:

.1 valves

.2 strainers

.3 pressure reducing valves

.4 safety valves

.5 meters

.6 steam separators

.2 Insulate accessories for Hot Piping systems with design temperatures greater than 93°C (200 F):

.3 No insulation is required on pipeline accessories for Hot Piping systems with design temperatures of 93°C (200 F) or less.

.4 Insulate accessories for Cold and Dual Temperature Piping systems for chilled water and liquid refrigerant piping:

.1 detachable insulated box type with embossed aluminum or stainless steel jacket, with vapor barrier tape applied to seams when installed,

(a) lined with two layers of 25 mm (1 in) P3 elastomeric blanket or one layer of 25 mm (1 in) thick P-4 phenolic insulation, with no voids at corners or joints,

.2 at locations requiring access, extend insulation to create collar around bolted connection, and install a compression fit piece of insulation to cover equipment.

.5 Insulate accessories for all other Cold and Dual Temperature Piping systems:

.1 insulate with flexible blanket of same material and thickness of adjacent piping and seal with reinforced vapor barrier sealer.

.2 at locations requiring access including valve handles, valve actuators, drain valves, etc, cut-back insulation and seal exposed edges.

3.8 Drainage Systems - Additional Requirements

.1 Insulate underside of roof drain hoppers with flexible blanket insulation of same type as pipe insulation.

3.9 Cold and Dual Temperature Pipe Insulation Systems - Additional Requirements

.1 Insulate pipe anchor plates and frames with flexible elastomeric closed cell foam insulation blanket of type P-3 insulation and seal with vapour barrier coating.

.2 Extend insulation along anchor steel a minimum distance of 150 mm (6 in) outside the piping insulation thickness.

3.10 Hangers and Supports

.1 Provide insulation protection in accordance with Table 3 at the end of this Section, based on pipe size and service process temperature.

.2 Pipe saddle insulation protection:

.1 insulate the interior void spaces of pipe saddles, of same material as adjacent pipe insulation,

.2 butt insulation up to sides and end of pipe saddle, and leave bottom surface of saddle exposed for direct contact with pipe support.

.3 Pipe shield insulation protection:

.1 install insulation shield between outside of insulation and pipe support; pipe support is sized for outside dimension of insulation.

.2 in accordance with pipe size, provide high density insulation insert of same thickness as adjacent pipeline material, fabricated from:

(a) cold and dual temperature piping: type P-11 (phenolic),
(b) hot piping: type P-11 (phenolic),.
(c) 300 mm (12") long for pipe size up to NPS 3, and
(d) 450 mm (18") long for pipe sizes NPS 4 and larger.

3.11 Floor and Wall Sleeves

.1 Extend pipe insulation including coatings and finishes through floor and wall sleeves.

.2 For penetrations through fire rated separations, provide finishes in accordance with fire stopping manufacturer's listing requirements.

.3 For outdoor piping passing through exterior walls or roof, terminate mastic lagging at outside face of sleeve and protected by storm flashing, caulked to lagging and to building structure.

3.12 Sealing Insulation

.1 Apply coatings and mastic in accordance with manufacturer requirements.

.1 Hot piping: breather coating/mastic

.2 Cold and Dual Temperature piping: vapor barrier coating/mastic

.2 Only use mastics on outdoor installations.

.3 Apply mastics and coatings when ambient temperature is above 4°C (40 F), unless manufacturer's instructions permit colder ambient installation conditions.

.4 Hot Piping;

.1 seal lap joints with self-adhesive lap joint, reinforced breather coat, or vapour barrier tape,

.2 seal butt joints with matching vapour barrier tape.

.5 Cold and Dual Temperature Piping;

.1 tightly seal insulation with factory applied all-purpose jacket using self-adhering or field applied adhesive on longitudinal laps and butt joint.

(a) where sealing strips are damaged, apply secondary layer of colour matched vapor barrier tape.

.2 seal insulation without factory applied jackets with 100% coverage of vapor barrier coating/mastic as applicable complete with reinforcing membrane.

.3 seal insulation butt ends with vapor barrier coating every four (4) lengths of insulation but not to exceed 2400 mm (8 ft) of pipe length.

.6 Hanger high-density insulation inserts:

.1 seal inserts with reinforced breather or vapour barrier coating as applicable, overlapping adjacent insulation a minimum of 50 mm (2 in).

.7 Elbows, tees, flanges, and fittings;

.1 Apply applicable breather or vapor barrier coating/mastic with reinforcing membrane over fitting insulation and overlap 50 mm (2 in) onto adjacent pipe insulation.

(a) for greater clarity, use of vapor barrier tape to seal insulation is not permitted.

.2 Apply coating/mastic and reinforcing membrane regardless of final finish application.

.8 Maintain integrity of vapor barrier through sleeves, around fittings and at hangers and supports.

3.13 Insulation Finish Coverings

.1 Install protective finish coverings on insulation in accordance with Table 4 at the end of this Section, after breather and vapor barrier sealing is completed.

.2 Cut finish jacket materials used for covering to allow 50 mm to 100 mm (2 in to 4 in) longitudinal overlap and similar circumferential overlap onto adjacent sheets.

.1 On vertical pipes arrange circumferential overlap on adjacent sheets outside of sheet below and under sheet above.

.3 PVC sheeting :

.1 Hot piping:

(a) overlap longitudinal edges and adjacent sheets by minimum of 50 mm (2 in) and staple fasten the sheets.
(b) secure sheeting with colour matched tape around circumference, at least two places per section of sheet, and by stapling longitudinal and circumferential edges.
(c) do not seal edges with vapour barrier tape.
(d) seal PVC fitting covers at throat and heel seams by stapling and secure over insulation by banding or taping ends to adjacent pipe finish covering with colour matched tape.

.2 Cold and Dual Temperature piping:

(a) overlap longitudinal edges and adjacent sheets by minimum of 50 mm (2 in) and seal longitudinal edges with vapor barrier coating adhesive for full depth and 100% coverage of overlap,
(b) seal circumferential edges of PVC fitting covers with reinforced vapour barrier coating adhesive extending over adjacent pipe insulation section with an overlap of at least 50 mm (2 in).

(c) seal PVC fitting covers at throat and heel seams by solvent bonding and secured over insulation with reinforced vapor barrier coating/mastic overlapping adjacent pipe insulation a minimum of 50 mm (2 in).

.4 Metal:

.1 Use lock-on systems or secure sheeting with bands 450 mm (18 in) apart.

.2 Joint sealing:

(a) Hot pipe: do not seal joints.
(b) Cold and dual temperature pipe: seal joints with caulking.

.3 Curved surfaces: custom made swaged ring or lobster back covers.

.4 On outdoor hot and cold/dual temperature piping, caulk overlapping metal joints to permit expansion of metal jacket.

.5 Fabric:

.1 Cotton lagging:

(a) apply cotton lagging with minimum two coatings of breather or vapor barrier coating adhesive as applicable to the piping system, and finish to provide a smooth surface free of wrinkles and sags.
(b) where cotton lagging with appropriate coating is used this satisfies the requirements of a sealer coating for Hot or Cold/Dual temperature piping systems.

.2 Fibreglass lagging:

(a) apply re-wetable figreglass lagging in accordance with manufacturer instructions. Finish to provide a smooth surface free of wrinkles and sags.
(b) where re-wetable fiberglass lagging is used this satisfies the requirements of a sealer coating for Hot piping systems.

.6 Protect exposed pipe insulation extending up through a floor sleeve at floor line with 1.2 mm (18 ga) stainless steel jacket approximately 100 mm (4 in) high, secured to floor slab. Conceal fastenings by floor plate.

.7 For piping systems using metal finishes, this protection cover replaces a portion of the specified pipe cover.

.8 For piping systems using other finishes, this protection cover is in addition to the specified pipe cover.

3.14 Fire rated pipe Insulation

.1 Provide two (2) hour rating of type P-10 insulation on tube or pipe, where shown.

.2 Install insulation, including pipe hangers, in accordance with fire-rated insulation manufacturer's listing requirements.

3.15 Field Quality Control

.1 The Consultant reserves the right to have protective finish coverings removed on up to 5% of all fittings, flanges, couplings, valves, and pipeline accessories to review the sealing of the insulation, at no change in cost.

.2 If insulation sealing is found to be incorrect at any one location, remove the protective finish on all fittings, flanges, couplings, valves, and pipeline accessories for review.

.3 Repair defective sealing and replace protective coverings at no change in cost.

3.16 Insulating and Finishes Tables

.1 Table 1, 2, 3, and 4 follows.

Table 1 : Hot Piping Systems, Insulation Type and Thickness mm (in)

System	Fluid Nominal Temp. °C (F)	Insulation Type	Nominal Pipe Size (NPS)				
			< 1	1 to 1¼	1½ to 3	4 to <8	≥ 8
			Insulation Thickness, mm (in)				
Steam and Condensate > 100 kPa (15 psi) and ≤ 860 kPa (125 psi) Boiler Feed Water Safety relief piping	122 to 176 (251 to 350)	P-1 P-2 P-6 P-7	50 (2)	65 (2½)	75 (3)	90 (3½)	90 (3½)
Steam and Condensate ≤ 100 kPa (15 psi) High temperature hot water heating	94 to 121 (201 to 250)	P-1 P-2 P-7	38 (1½)	38 1(½)	50 (2)	50 (2)	90 (3½)
		P-4	20 (3/4)	20 (3/4)	25 (1)	38 (1½)	38 (1½)
Hot Water Heating Glycol Heating Pumped Condensate	61 to 93 (141 to 200)	P-1 P-7	38 (1½)	38 (1½)	38 (1½)	38 (1½)	38 (1½)
		P-4	20 (3/4)	25 (1)	25 (1)	25 (1)	25 (1)
Pure Water (during heat sanitization)	50 to 93 (122 to 200)	P-1 P-7	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
Low Temperature Hot Water Heating Low Temperature Glycol Heating	40 to 60 (105 to 140)	P-1	25 (1)	25 (1)	25 (1)	38 (1½)	38 (1½)
		P-4	20 (3/4)	20 (3/4)	20 (3/4)	25 (1)	25 (1)
Condenser Water (outdoors)	26 to 39 (80 to 104)	P-1 P-5	25 (1)	25 (1)	25 (1)	38 (1½)	38 (1½)

Table 2 : Cold and Dual Temperature Piping Systems, Insulation Type and Thickness mm (in)

System	Fluid Nominal Temp. °C (°F)	Insulation Type	Nominal Pipe Size (NPS)				
			< 1	1 to 1¼	1½ to 3	4 to <8	≥ 8
			Insulation Thickness, mm (in)				
Dual Temperature Heating/Cooling	4.4 to 93 (40 to 200)	P-1	38 (1½)	38 (1½)	38 (1½)	38 (1½)	38 (1½)
Domestic Hot Water Domestic Hot Water Recirculation Not-Potable Hot Water Non-Portable Hot Water Recirculation	40.5 to 60 (105 to 140)	P-1	25 (1)	25 (1)	38 (1 ½)	38 (1 ½)	38 (1 ½)
Domestic Cold Water Non-potable Water Drainage	4.4 to 16 (40 to 60)	P-1	25 (1)	25 (1)	38 (1 ½)	38 (1 ½)	50 (2)
		P-4	---	---	---	25 (1)	25 (1)
Equipment Drains	4.4 to 16 (40 to 60)	P-3	13 (1/2)	20 (3/4)	25 (1)	---	---
Chilled Water Dual Temperature Heating/Cooling	4.4 to 16 (40 to 60)	P-1	25 (1)	25 (1)	38 (1 ½)	38 (1 ½)	50 (2)
		P-4	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)
Refrigerant Suction	< 4.4 (< 40)	P-3	25 (1)	25 (1)	25 (1)	---	---
		P-4	25 (1)	25 (1)	25 (1)	25 (1)	25 (1)

Table 3 : Insulation Hanger Protection				
Process Temperature °C (°F)	Pipe Size NPS	Pipe Saddle	Insulation Shield	High-Density Insert
> 93 (200)	≥ 1-1/2	•	---	---
	≤ 1-1/4		•	---
61 to 93 (141 to 200)	> 6	•	---	---
	≥ 1-1/2 and ≤ 6	---	•	•
	≤ 1-1/4	---	•	---
26 to 60 (80 to 140)	≥ 1-1/2	---	•	•
	≤ 1-1/4	---	•	---
Cold & Dual Temp	≥ 1-1/2	---	•	•
	≤ 1-1/4	---	•	---

Table 4 : Piping Insulation Protective Finishes			
Location	Weather Exposure	Piping System	Finish
Concealed	Indoors	All	None
Exposed	Indoors	All except steam over 860 kPa (125 psig)	PVC
	Indoors	Steam over 860 kPa (125 psig)	Fabric
	Indoors - painted pipe	All	Fabric
	Outdoors	All	Metal

END OF SECTION

START-UP AND PERFORMANCE TESTING REPORTING
20 08 01

1 GENERAL

1.1 Scope

.1 Performance testing and balancing of heating, ventilating, air conditioning and liquid systems.

.2 Survey of installed automatic controls and verification of functional performance.

.3 Measuring and reporting space acoustic (noise) levels.

.4 Rechecking of testing and balancing during the alternate (heating/cooling) season.

1.2 Related work in other sections

.1 Acoustic measurement: to section 20 08 06

.2 Factory testing, and calibrating of equipment or control systems.

1.3 Submittals

.1 Report Format:

.1 submit proposed format of initial report,

.2 include a complete list of instruments and tests for which they are to be used as they relate to this project, including date of last calibration

2 PRODUCTS

2.1 Not applicable.

3 REPORT FORMAT

3.1 General

.1 Include the following information for each test report:

.1 Owner Name

.2 Project Name

.3 Contractor Name

.4 Consultant Name

.5 Name of Test Report

.6 Name and signature of the person submitting the report

.7 Date of report

.2 Submit two (2) copies of test reports in hardcopy form in 3-“D” ring binders, indexed for each type of report, separately bound from the Operations and Maintenance manuals. Provide two (3) copies of the same reports in Adobe Acrobat version 7 PDF forma.

4 START-UP AND PERFORMANCE REPORTS

4.1 Required reports

.1 Provide the following Start-Up and Performance Testing reports:

.1 Equipment start-up report

.2 Authorities report

.3 Acoustic survey report

.4 Controls / BMS operation report

4.2 Equipment start-up report

.1 Provide a test report in spreadsheet format which summarizes the following data for each piece of equipment which is powered or has automatic controls:

.1 equipment ID and name,

.2 motor insulation megger test - result and initialed by contractor,

.3 motor rotation (bump test) - result and initialed by contractor,

.4 equipment Start-Up report status - status and initialed by contractor,

.5 M\manufacturer Start-Up report status – status and initialed by contractor,

.6 test completion date.

.2 Provide a test report in spreadsheet format which summarizes the following data for testing of piping systems:

.1 system name

.2 system limits (if system is not tested in its entirety),

.3 type of test (pneumatic, hydrostatic),

.4 pressure at start of test,

.5 pressure at end of test,

.6 duration of test,

.7 contractor dated and initialed,

.8 expansion tank initial pressure,

.9 expansion tank final pressure,

.10 backflow preventers have been tested - status and initialed by contractor,

.11 pressure relief valves installed – record setpoint and initialed by contractor.

.3 Equipment/System Start-Up Test Report

.1 Provide a separate start-up report for each piece of the following equipment. The SMACNA “Systems Ready to Balance Check List”, where applicable, may be used for this report.

(a) HVAC Units
(b) Duct Systems
(c) Pumps
(d) Boilers, and Boiler Auxiliaries
(e) Heat Exchangers
(f) Cooling Towers
(g) Refrigeration Equipment

(h) Hydronic piping systems
(i) Steam piping systems
(j) Sprinkler systems (to NFPA 13)
(k) Standpipe systems (to NFPA 14)

.4 Manufacturer's Start-Up Test

.1 Provide a separate start-up report for each piece of the following equipment, utilizing the manufacturer's start-up check list. This report may be prepared by the manufacturer's service representative:

(a) chemical water treatment - pipe cleaning,
(b) chemical water treatment - passivating and inhibition,
(c) refrigeration equipment,
(d) packaged AC equipment,
(e) heating boilers,
(f) steam boilers,
(g) deaerators,
(h) packaged humidity steam generators,
(i) domestic hot water heaters,
(j) air compressors,
(k) cooling towers,
(l) adjustable frequency drives,
(m) Building Automation Systems.

4.3 Authorities review

.1 Submit copies of authorities-having-jurisdiction inspection and test reports, including:

.1 Plumbing and drainage municipal inspector reports

.2 BC Safety Authority for pressure vessel and piping inspection reports

.3 ESA field certification reports

4.4 Acoustic survey

.1 Provide acoustic survey test report: to Section 20 08 06.

4.5 Controls / Building Management System

.1 Provide controls test reports: to Section 25 08 00.

5 SPECIFIC EQUIPMENT PERFORMANCE TESTS

5.1 Performance data

.1 In addition to tests specified elsewhere, perform the following equipment performance tests. If contractor's standard forms provide for additional data, also submit such additional data.

.1 Some equipment tests may need to be performed during the alternate season testing.

.2 Include nameplate data and as-tested results.

.2 Water Chillers:

.1 peak kW power at peak tonnage load – at design condenser water and evaporator water temperature conditions,

.2 NPLV kW power at 0, 25, 50, 75 and 100% load, at design condenser water and evaporater water temperature, as per ARI 550/590-1998,

.3 IPLV kW power at 0, 25, 50, 75 and 100% load, as per ARI 550/590-1998,

.4 surge control setpoint at design condenser and evaporator water temperatures and flow,

.5 condenser water pressure differential/flowrate fault setpoint,

.6 evaporator water pressure differential/flowrate fault setpoint.

6 REPORT SUBMISSIONS

6.1 Deficiencies

.1 Immediately report to Consultant, any deficiencies in the systems or equipment performance resulting in design requirements being unobtainable.

6.2 Draft report

.1 On completion of the start-up, testing, adjusting and balancing of all systems, submit to the Consultant, two (2) typewritten copies of a full report on all tests, adjustments, and balancing performed.

.2 Attachments including systems schematics with numbered terminals for referring to data above.

6.3 Spot checks

.1 After review of the Draft Report by the Consultant and at the Consultants direction, retest up to 30% of all measurements in locations as directed by the Consultant, at no cost extra to the contract.

.2 If results indicate unusual testing inaccuracy, omissions, or incomplete balancing/adjustment, in the opinion of the Consultant, re-balance entire affected system(s) at no increase in Contract Price.

6.4 Interim report

.1 After completion of any retesting described above, submit three (3) typewritten copies of the interim report, in a 3-hole “D” style binder, and two (2) CD or DVD electronic copies in pdf format.

6.5 Final report

.1 Submit to Consultant following completion of alternate season testing and balancing. Submit three (3) typewritten copies, and two (2) CD or DVD Adobe PDF in the same formats as the initial report specified above.

6.6 Additional testing

.1 The Consultant may request such additional testing in connection with this project as he deems necessary.

.2 Perform additional testing and balancing at the rates quoted. Costs will be deducted from the Mechanical Subcontractor's allowance for the additional Testing and Balancing work as approved by the Consultant.

END OF SECTION

ACOUSTIC TESTING
20 08 06

1 GENERAL

1.1 Scope

.1 Conduct acoustic (noise) measurements.

1.2 Qualifications

.1 Acoustic measurements and analysis to be performed under supervision of recognized expert with an established reputation in this field.

2 PRODUCTS

2.1 Not used

3 EXECUTION

3.1 Acoustic survey

.1 Provide acoustic performance testing in accordance with SOR 5.3.7.20.

3.2 Report format

.1 Reports to incorporate approved standard forms.

.2 Provide a one (1) page summary for each room/space test and include:

.1 date and time of test,

.2 background and operating test results,

.3 RC bandwidth results for 63 through 8000 Hz in both tabular and graphical formats.

.3 Include reduced architectural floor plan drawings, identifying test locations.

.4 Submit four hard copies of acoustic reports.

.5 Submit two soft copies of acoustic reports in Adobe Acrobat V7 PDF format.

3.3 Verification

.1 Reported measurements will be verified.

.2 Provide instrumentation and manpower to verify results of up to 10% of reported measurements.

.3 Number and location of verification measurements to be at discretion of Engineer.

.4 Where discrepancies are encountered repeat tests, and resubmit reports.

END OF SECTION

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MASTER PROJECT SPECIFICATIONS
DIVISION 22 MECHANICAL

Royal Columbian Hospital Redevelopment
Appendix 1B(i) Energy Centre Technical Specifications
Design-Build Agreement

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PLUMBING SPECIALTIES & ACCESSORIES
22 05 23

1 GENERAL

1.1 Scope

.1 Provide plumbing specialties and accessories.

1.2 Product data

.1 Submit product data sheets for;

.1 Copper Silver Ionization Potable Water Treatment System.

2 PRODUCTS

2.1 Copper Silver Ionization Potable Water Treatment System

.1 General

.1 Factory pre-manufactured system specific for controlling Legionella growth in potable hot water systems.

.2 The system must have no less than 10 comparable installations in the last 5 years – to be made available upon consultant request.

.3 Usage lifespan (warranty) of the ionization chamber cells must be associated to one (1) ion chamber cell only. Each ion chamber cell must be capable of treating no less than 20,000 US-GPD per day and last for a period of no less than 9 months based on water usage and chemistry. Replacement ion chamber cells “Spare cells” that extend the perceived usage life of an originally ion chamber cell will not be accepted. (Mandatory)

.4 US-EPA number when applicable to the installation geographical location.

.5 3rd party laboratory alloy report supplied by the manufacturer at all times as to demonstrate both the alloy purity and impurity presence within the alloy.

.6 Provide NSF61 documentation on all wetted parts.

.7 Supply and calibration of the copper silver ion controller. (Mandatory for single or multiple tank parameters)

.8 Letter of compliance to these performance specifications.

.2 Construction (Ion Chamber Cell):

.1 Ionization chamber cell shall be Schedule 40 stainless steel or powder coated aluminum to meet BCBC requirements,

.2 each chamber cell will have less than a 21 kPa (3 PSI) drop in water pressure,

.3 one (1) ion chamber cell per automated 10 amps / 0-100 VDC power drive or 10 amps / 0-180 VDC power drive,

.4 water flow capacity of up to 170 L/min (45) USGPM each ion chamber cell

.5 Internal electrode protection to prevent physical water related erosion when installed within the domestic hot water recirculation loop with continuous water circulation,

.6 internal electrodes will be composed of 99.99 % pure copper (Cu) and 99.99% silver (Ag).

.7 Cu and Ag alloy ratio will be no less than 90% Cu / 10% Ag and no more than 70% Cu / 30% Ag.

.8 minimum operational water pressures of between 138 kPa (20PSI) to 1379 kPa (200 PSI) in any liquid water temperature or 1°C (33°F) up to 99°C (211°F)C for a period of no less than 12 consecutive hours,

.9 Cut grooved couplings or flange type connections only,

.10 Safety activation flow switch or flow meter as proposed by the manufacturer's recommendation and application process.

.3 Construction (PLC Automated Ion Controller):

1. One Computer Control PLC Automated Ion Generator per application location,

2. Facility power source requirement will be 208/1/60 (15 amps) as to operate in all water conditions including low conductivity environments such as RO or surface lake water,

3. Output PLC/ software controller set-point capacity of 3 to 10 amps constant current for each individual ion chamber cell capable of being altered based on PLC data entry or water flow with a controller capacity maximum output of 10 amps

4. The copper silver ionization controller(s) must be able to generate via amperage set points between 0.2 – 0.4 ppm Cu and 0.02 – 0.04 ppm Ag within the domestic hot water loop over existing pre-startup Cu and Ag existing background values without going over the maximum acceptable limits of 1.0 ppm Cu (Canada),

5. 0 to 100 VDC or 180 VDC fully automated constant current set point variable power output drives for each ionization chamber cell to maintain controller amperage set point domestic hot water water conditions including high or low conductivity environments required,

6. One (1) variable power drives individually controlled by the PLC for each ion chamber cell(s). If multiple ion chamber cells are required, each cell will have its own individually controlled variable power drive that will all be controlled from either multiple controllers or one (1) common PLC having independent ionization cell control features. Ion chamber cells must have their own independent automated VDC drive controlled by one PLC. PLC controllers can be connected to multiple VDC power drives yet demonstrate independent control.

7. NEMA 4 or 12 Enclosure,

8. Panel mounted electrical circuit breakers to each chamber cell: electrical fuses not permitted

9. User and Administrative level Password Protected PLC Controls,

10. Front mounted UL/CSA listed load bearing PLC electrical breakers (electrical fuses not permitted),

11. Front mounted UL/CSA listed load bearing ion chamber cell electrical breakers (electrical fuses not permitted),

12. UL listed 10 amp / 600 V capacity electrical connectors,

13. PLC with touch screen or membrane type HMI interface, the use of remote tablet type wireless HMI interface is also acceptable

14. PLC/HMI or Tablet/HMI display of ionization process variables in real time,

15. Real time operational status LED Safety Light,

16. Real time operational status alarm feature to BMS via volt free contact, normally closed,

17. Proper labeling of all front panel controller parts,

18. External Safety power interruption,

19. Provide a Windows® based (or other), computer software for remote HMI login and management,

20. Remote PLC monitoring & management via TCP/IP connection,

21. Must be UL 508 and CSA certified based on geographical installation location,

22. Must be CE certified based on geographical installation location,

23. Must include no less than 5 year warranty or more on controller(s) from date of commissioning / startup,

Standard of Acceptance
- AquaLyse (CSI Defender) by Procare Water Treatment Inc (Canada)
- Liquitech Inc

3 EXECUTION

3.1 Installation general

.1 Install to conform to Canadian Plumbing Code, provincial codes, and local authority having jurisdiction.

3.2 Copper Silver Ionization Potable Water Treatment System

1. Ion Chamber Cells should be installed in a vertical orientation and at an accessible height from finished floor (between 1200mm (4') to 1800mm (6').

2. Include bypass piping adjacent to equipment as per manufacturer's instructions to allow equipment isolation for monthly service, maintenance and yearly replacement,

3. Perform the following field tests and inspections and prepare test reports for:
   .1 Leak test – After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist,
   .2 Operational test – After electrical circuitry has been energized, start units to confirm proper unit operation,
   .3 Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

.4 Remove and replace malfunctioning copper silver ion generators that do not pass tests and inspections and retest as specified above,

.5 Engage a factory certified service representative to perform startup service. Complete installation and startup checks according to manufacturer's written instructions.

.6 On-site training by a manufacturer-authorized service representative for facility engineers on the operations, maintenance and on-going documentation requirements associated to the technology.

Owner's maintenance personnel will be capable of: troubleshooting operational issues, proceed with water test for copper values, adjusting, operate, and maintain the copper silver ion generator(s), consult the manufacturing company at all times by email or by phone without any charges imposed to the technology owners.

END OF SECTION

DOMESTIC WATER HEATERS
22 33 13

1 GENERAL

1.1 Scope

.1 Provide domestic hot water heaters.

1.2 Shop drawings

.1 Submit shop drawings for each heater with model number, outline dimensions, fuel or power requirements, inlet and outlet connection details and capacity.

1.3 Applicable codes and standards

.1 CSA C22.2 No. 110 Construction and Test of Electric Storage-Tank Water Heaters

.2 CSA B-51 Part 1 Boiler, Pressure Vessel and Pressure Piping Code

2 PRODUCTS

2.1 General

.1 Design conditions:
- .1 design pressure: 1035 kPa (150 psi)
- .2 design temperature: 71 C (160 F).

.2 Piping connections:
- .1 Up to NPS 3: threaded
- .2 NPS 3 and over: flanged.

.3 Fittings, all heaters:
- .1 replaceable magnesium anode,
- .2 50 mm (2 in) mineral wool insulation,
- .3 enamelled steel jacket,
- .4 hose threaded drain valve,
- .5 ASME rated temperature and pressure relief valve

Standard of Acceptance
- Rheem
- John Wood
- PVI

2.2 "Dual Fired" Steam and boiler hot water domestic water heaters

.1 Tube bundle in tank type.

.2 Tank:
- .1 vertical on steel legs

.2 fabricated from type 316L stainless steel to provincial regulations with nozzle for tube bundle and inlet, outlet, and instrument connections, and

.3 280 mm x 380 mm (11 in x 15 in) manhole in tanks 600 mm (24 in) diameter or larger.

.3 Boiler Hot Water Heater:

.1 Provide separate skid mounted plate and frame exchanger and circulating pumps as the primary heat source of DHW heating.

.2 Designed for 1035 kPa (150 psi) working pressure on both sides of the heat exchanger.

.3 Plate and Frame heat exchanger sized for capacity shown on schedule

Standard of Acceptance
- Aerco
- PVI

.4 Steam Heater:

.1 removable U-tube bundle of NPS ¾ seamless stainless steel tubing and stainless steel construction,

.2 designed for 1035 kPa (150 psi) steam pressure in tubes and head with no atmospheric pressure in tank.

.3 heating surfaces sized for capacity shown to heat water in tank from 54.4 C (130 F) to 71 C (160 F) with 0 kPa (0 psig) steam in tubes.

Standard of Acceptance
- Aerco
- PVI

.5 Control valve:

.1 self actuating modulating type with cast iron 860 kPa (125 psi) body, two ply thermostatic bellows, copper capillary tubing and bulb for insertion in well, renewable composition disc and temperature adjustment,

.2 sized for capacity shown with 0 kPa (0 psig) steam in tubes and operating steam pressure ahead of temperature regulating valves at 70 kPa (10 psig).

Standard of Acceptance
- Powers
- Leslie
- Watts

.6 Accessories;

.1 ASME rated temperature, pressure relief valve.

.2 Heater bundle vacuum breaker.

.3 Thermometer.

2.3 Domestic hot water storage tanks:

.1 Construction:

.1 Vertical on steel legs

.2 Fabricated from type 316L stainless steel to provincial regulations with inlet outlet and instrument connections, and

.3 280 mm x 380 mm (11 in x 15 in) manhole in tanks 600 mm (24 in) diameter or larger.

Standard of Acceptance
- S.A. Armstrong
- Drummond Welding & Steel Works
- GILFAB-ASI
- Clemmer

3 EXECUTION

3.1 Installation

.1 Isolate tanks from ground. For horizontal tanks provide dielectric pads between tank and saddles, and for vertical tanks with legs, provide dielectric pads under feet, and isolation washers and sleeves at each anchor bolt.

.2 Connect up to cold water supply lines and domestic hot water distribution piping with 300mm (12 in) long, line size flexible connections.

.3 Instruments with external electric wiring to be isolated from heaters and tanks with dielectric bushings or dielectric unions

.4 Provide temperature and pressure relief valve for water side of each heater piped to nearest funnel or hub drain.

.5 Provide valved drain from each tank piped to nearest funnel or hub drain.

.6 On each steam heating bundle provide;

.1 12 mm (NPS ½) vacuum breaker on steam space,

.2 low pressure steam trap assembly on condensate return connection, and

.3 shut off valve on connection from steam line.

.7 Galvanic isolation to be provided on all connections from domestic hot water tank which transition from stainless steel to other metals.

.8 Provide bypass ahead of isolation valves on primary side of plate and frame heat exchangers. Flush system fully with heat exchangers isolated prior to commissioning.

END OF SECTION

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MASTER PROJECT SPECIFICATIONS
DIVISION 23 MECHANICAL

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HEATING AND COOLING PIPING SYSTEMS GENERAL
23 05 01

1 GENERAL

1.1 Scope

.1 Provide heating and cooling piping systems.

1.2 Steam service

.1 Steam traps on high pressure steam piping ahead of pressure reducing valves to be selected for operation between 700 - 1400 kPa (100 - 200 psi).

1.3 Registration and Inspection

.1 Before commencing work, make arrangements and pay for registration and inspection by BC Safety Authority for the following pressure piping systems:

.1 steam, including condensate piping, at pressures over 100 kPa (15 psig),

.2 compressed air, greater than NPS 3/4, at pressures over 100 kPa (15 psig),

.3 service water piping for heating or cooling a building, at design temperatures above 121°C (250°F) or at design pressures above 1070 kPa (160 psig),

.4 process water systems, for liquids no more hazardous than water, at design temperatures above 65°C (150°F) or design pressures above 1717 kPa (250psig).

.2 At the start of the Work, obtain existing pressure piping system registration numbers, if available, from the Owner and/or authority having jurisdiction.

1.4 Steam and condensate systems

.1 Piping design code, design pressure greater than 100 kPa (15 psig):

.1 to ASME B31.1 Power Piping

.2 Piping design code, design pressure less than 100 kPa (15 psig):

.1 to ASME B31.9 Building Service Piping

.3 System include:

.1 high pressure steam boilers,

.2 low pressure steam boilers,

.3 condensate receivers with pumping sets,

.4 de-aerator,

.5 make-up water heaters,

.6 boiler feed system,

.7 blow down tanks,

.8 steam metering,

.9 pressure reducing valve assemblies,

.10 flash tanks,

.11 trap assemblies,

.12 heat exchangers,

.13 controls,

.14 water treatment.

.4 System design criteria:

.1 Design steam pressure (saturated steam, no superheat):

(a) High pressure: 1034 kPa (150 psi)
(b) Intermediate pressure: 500 kPa (75 psi)
(c) Low pressure: 100 kPa (15 psi)

.2 Operating steam pressure:

(a) High pressure: 862 kPa (125 psi)
(b) Intermediate pressure: 450 kPa (65 psi)
(c) Low pressure: 70 kPa (10 psi)

1.5 Hot water heating system

.1 Piping design code:

.1 to ASME B31.9 Building Service Piping

.2 System includes:

.1 Boilers,

.2 Heat exchangers.,

.3 Pumps,

.4 Expansion tanks,

.5 Radiant panels,

.6 Unit heaters,

.7 Heating coils,

.8 Controls,

.9 Water treatment.

.3 System design criteria.

.1 Constant temperature system:

(a) Supply temperature: 71 °C (160 °F)
(b) Return temperature: 49 °C (120 °F)
(c) Maximum working pressure: 862 kPa (125 psi)
(d) Design pressure: 1034 kPa (150 psi)

.2 Scheduled temperature systems:

Outdoor Temperature	Supply Water Temperature	Return Water Temperature
For Radiant Ceiling Panels		
-9 °C (16 °F)	71 °C (160 °F)	60 °C (140 °F)
16 °C (60 °F)	39 °C (102 °F)	---

(a) Maximum working pressure: 900 kPa (125 psi)
(b) Design pressure: 1030 kPa (150 psi)

.3 Low temperature system (Condenser water heat recovery):

(a) Supply temperature: 57.2 °C (135 °F)
(b) Return temperature: 43.3 °C (110 °F)
(c) Maximum working pressure: 900 kPa (125 psi)
(d) Design pressure: 1030 kPa (150 psi)

1.6 Cooling water systems

.1 Piping design code:

.1 to ASME B31.9 Building Service Piping

.2 System includes:

.1 Refrigeration machines,
.2 Thermal storage tanks,
.3 Circulating pumps,
.4 Plate heat exchangers,
.5 Expansion tank,
.6 Cooling towers,
.7 Indoor condenser water basin,
.8 Condenser water filters,
.9 Cooling coils,
.10 Fan coil units,
.11 Server room cooling units,
.12 Controls,
.13 Water treatment.

.3 System design criteria:

.1 Primary chilled water system:

(a) Supply temperature: 6.7° C (44° F)
(b) Return temperature: 14.4° C (58° F)
(c) Maximum working pressure: 900 kPa (125 psi)
(d) Design pressure: 1030 kPa (150 psi)

.2 Process chilled water system:

(a) Supply temperature: 9 °C (48 °F)

(b) Maximum working pressure: 900 kPa (125 psi)
(c) Design pressure: 1030 kPa (125 psi)]

.3 Condenser water system:

(a) Supply temperature - Summer: 29.5°C (85°F)
(b) Return temperature - Summer: 35 °C (95 °F)
(c) Maximum working pressure: 700 kPa (100 psi)
(d) Design pressure: 1030 kPa (150 psi)

2 EXECUTION

2.1 Pipe installation

.1 General layout of mains, risers, run-outs and connection details of piping systems are shown.

.2 Provide bends, expansion loops, hoses or joints to compensate for pipe expansion and contraction.

.3 Anchor, guide and laterally support vertical and horizontal piping to support filled weight and absorb thrust under operating conditions.

.1 For steam, gas and vapour piping, provide temporary intermediate supports when hydrostatically piping.

.4 Erect piping so that expansion forces, gravity forces and thrust from changes in direction do not stress connections to apparatus.

.5 Mechanical grooved pipe, couplings, fittings and valves may be used for water and glycol piping systems in place of welded, flanged or threaded pipe jointing methods, where operating temperature conditions are in range -30°C through 110°C (-30°F through 230°F).]

.6 Separate copper pipe and fitting materials from contact with ferrous material with di-electric couplings.

.7 Install drain valves at low points in water piping systems and in valved run-outs from risers so that system or isolated parts of system can be drained.

.8 Do not use galvanized materials in contact with glycols.

2.2 Filling of glycol systems:

.1 Deliver glycol to site in manufacturer's sealed containers.

.2 After system has been cleaned and tested for leaks, fill with water through temporary water meter to obtain total system volume.

.3 Drain water from system and either fill with pre-mixed glycol solution, or first with calculated volume of concentrated glycol and then make up to system volume with water.

.4 Circulate solution for one week and then take samples for testing for percentage concentration by specific gravity method, in glycol supplier's laboratory.

.5 Submit results of analysis.

.6 If correction of concentration is required, amount of mixture to be drawn from system to be calculated and drained into original containers. To this add water or glycol in calculated amounts to correct concentration in system, and recharged system.

.7 Provide 24 hours' notice before draining and refilling to correct concentration.

.8 Circulate after correcting concentration for a further 24 hours and retest concentration. Submit final report with historical data showing dates and times, results of each analysis, calculations and corrections made, and final concentration.

.9 Supply two 170 litre drums of 100% inhibited glycol.

END OF SECTION

FUEL OIL PIPING AND ACCESSORIES
23 11 13

1 GENERAL

1.1 Scope

.1 Provide aboveground fuel oil piping and accessories for steam boilers, heating boilers, and diesel generators.

1.2 Related Sections

.1 23 11 15 Buried Fuel Oil Piping and Accessories

.2 23 13 13 Oil Storage Tanks

.3 23 13 15 Fuel Oil Pumps

.4 23 13 19 Fuel Filtration Systems

.5 23 15 13 Fuel Management Systems

1.3 Definitions

.1 In this section,

.1 *Product Piping*: means all piping except tank vent piping. For greater certainty, a tank overflow pipe is a product pipe.

.2 *Carrier Piping*: means the secondary non-product piping in a double wall piping system which encloses the product piping. *Containment piping* has the same meaning.

.3 *Vent Piping*: means the piping that provides positive and negative pressure relief for a tank which is piped directly to atmosphere, but does not include tank overflow piping used to vent an auxiliary tank.

1.4 Submittals

.1 Submit manufacturer's data sheets for valves, oil specialties, instrumentation and controls with model numbers, performance and design data, outline dimensions and power requirements.

1.5 Applicable Codes and Standards

.1 Installation standards and codes:

.1 B.C. Safety Authority

.2 CSA B139 Installation Code for Oil Burning Code.

.3 Canadian Council of Ministers of the Environment (CCME) EPC-LST-61E Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products.

.2 Product standards:

.1 ASTM A53 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless.

.2 ASTM A106 Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service

.3	ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
.4	ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
.5	ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both
.6	ASME B16.3	Malleable Iron Threaded Fittings
.7	ASME B16.9	Factory Made Wrought Steel Buttwelding Fittings
.8	ASME B16.11	Forged Fittings, Socket-Welding and Threaded
.9	ASME B16.5	Pipe Flanges and Flanged Fittings
.10	ASME B18.2.1	Square and Hex Bolts and Screws
.11	ASME B18.2.2	Square and Hex Nuts
.12	ASME B16.21	Non-Metallic Flat Gaskets for Pipe Flanges
.13	ASME B16.20	Metallic Gaskets for Pipe Flange: Ring-Joint Spiral Wound and Jacketed
.14	ULC/ORD C536	Flexible Metallic Hose
.15	ULC/ORD C842	Guide for the investigation of valves for flammable and combustible liquids
.16	CAN/ULC S661	Standard for Overfill Protection Devices for Flammable and Combustible Liquide Storage
.17	CAN/ULC S663	Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks.
.18	UL 842	Valves for Flammable Liquids
.19	FM Class 7440	Approval Standard for Liquid and Gas Safety Shut-off Valves.

1.6 Authority Field Approvals

.1 Submit application and arrange and pay for field inspection of the installation by Authority Having Jurisdiction.

.2 The Engineer has submitted an application for approval with the Authority Having Jursidiction for the following alternative solutions. Contractor shall submit an application, and arrange and pay for field inspection by Authority Having Jurisdiction.

.1 supply tank with static pressure of 25 meters (35 psig),

.2 venting of auxiliary (day) tank to atmosphere,

.3 use of FM approved fusible link valves,

.4 auxiliary (day) tank capacity exceeding 2500 litres above the lowest level

1.7 Quality Control

.1 Installation contractor:

.1 Installation and on site testing of fuel oil systems to be performed in accordance with applicable regulations and standards by a specialist licensed firm with an established reputation in this field.

.2 Piping design code:

.1 to ASME B31.1 Power Piping Code for design pressure greater than 1100 kPa (160 psig

.2 to ASME B31.9 Building Service Piping Code for design pressure 1100 kPa (160 psi) and less.

.3 System design criteria:

.1 design pressure: 1030 kPa (150 psig)

.2 design temperature: 38°C (100°F)

2 PRODUCTS

2.1 Above ground - Steel pipe for oil suction, discharge, overflow, return and vent

.1 Pipe:

.1 NPS ½ to 10:

(a) ASTM A106 Gr B, schedule 40 Seamless, or
(b) ASTM A53 Gr B, schedule 40 Electric Resistance Weld (ERW).

.2 NPS 12 and over:

(a) ASTM A53 Gr B, 0.375 in wall, ERW.

.3 All of the above located outdoors:

(a) galvanized.

.2 Fittings:

.1 NPS 2 and under :

(a) steel socket welding type to ASME B 16.11, 2070 kPa (300 #) forged, wall thickness to match pipe,
(b) 1030 kPa (150 #) black malleable iron, bronze face, ground joint unions.
(c) vent piping, excluding overflow piping:
- threaded malleable iron fittings, Class 150 to ANSI B16.3

Standard of Acceptance
° Anvil

.2 NPS 2 and under - high pressure systems:

(a) steel socket welding type to ASME B 16.11, 2070 kPa (300 #) forged, wall thickness to match pipe,
(b) 2070 kPa (300 #) black malleable iron, bronze face, ground joint unions.

Standard of Acceptance
° Anvil

.3 NPS 2 ½ and over:

(a) welding fittings, wall thickness to match pipe,
(b) butt weld type to ASME 16.9 or socket weld type to ASME 16.11.,
(c) long radius elbows,
(d) tee fittings:
- prefabricated weld type where branch connections are same size as main,
- welded tee fittings or welded outlet fittings where branch connections are smaller than main and where main is NPS 2 ½ and over.

Standard of Acceptance
° Anvil

.3 Flanges:

.1 NPS ½ and over:

(a) forged steel, 1035 kPa (150 #) to ASME B16.5, weld neck with wall thickness to match pipe, or slip on type.
(b) gaskets to ASME B16.21, ASME B16.20 or ASME A21.11 of heavy duty graphite impregnated compressed sheet 1.6 mm (1/16 in) thick

Standard of Acceptance
° Chesterton 195

.2 Studs, bolts and nuts:

(a) "high strength" type to ASME B18.2.1 with ASME 18.2.2 or ASTM A307 with ASTM A563 or ASTM A194.

2.2 Flexible Hose Connectors for Combustible Liquids

.1 All metal construction flexible connector:
.1 UL/ULC listed to ULC/ORD C536
.2 pipe size NPS 3/4 to NPS 3,
.3 inner hose: corrugated T304 stainless steel,
.4 outer jacket: braided T304 stainless steel wire mesh,
.5 end fitting: NPT with wrench lands
.6 maximum working pressure: 1034 kPa (150 psi)
.7 minimum working pressure: full vacuum
.8 maximum working temperature: 66°C (150°F)
.9 live length: 400 mm (16 in) not including end fittings.
.10 UL tag

Standard of Acceptance
° Flex-Pression Ltd – UFP

2.3 Remote tank fill station – Aboveground

.1 Remote spill containment device;
.1 ULC / ORD listed,
.2 aluminum, epoxy-powder coated steel, or type 304 stainless steel, welded construction,
.3 bottom outlet connection,
.4 lockable access lid and ground lug,
.5 floor mounting with adjustable support legs,
.6 NPS 2 tight-fill connections,
.7 instructions decal,
.8 minimum 5 litre (1 gal) capacity for tanks < 5000 litres, and 15 litre capacity for tanks > 5000 litres
.9 sump valved drain to fill line or external container,

Standard of Acceptance
° OPW 6211, 6221
° Clemmer SCAG100651XS

2.4 Truck fill connections

.1 Tight-fill connection, pressurized delivery, drain to main tank:

.1 Tank fill spout adaptor: Kamlok adaptor with center crossbar, and dust cap.

Standard of Acceptance
- OPW - model 633AST w/Crossbar and 634B dustcap

.2 Tanker fill hose coupler: matching Kamlok coupler.
- OPW – coupler: model 633BD

2.5 Vent terminals

.1 For continuous pressure and vacuum venting, aluminum body, 40-mesh brass insect screen.

Standard of Acceptance
- OPW - model series 23
- Franklin Fuels
- Preferred Utilities

2.6 Anti-siphon oil valve

.1 Pipe line size, spring loaded, two position angle valve;

.1 ULC/ORD-C842 listed,

.2 zinc plated cast iron body, machined seats and Buna-N seals,

.3 selected for the hydrostatic head measured from top of tank to fuel pump inlet,

.4 fitted with pressure relief trim.

Standard of Acceptance
- EBW (Franklin Fueling) series 600
- OPW 199ASV
- Morrison Brothers series 910

2.7 Pipe Vacuum Breaker

.1 Pipe mounted spring-loaded, retained ball type;

.1 brass body with NPT ends, male one end, female on the other end,

.2 stainless steel float ball and retention spring,

.3 maximum pressure: 2000 kPa (300 psi),

.4 minimum relieving vacuum: opens at less than7 kPa (2 in.Hg)

Standard of Acceptance
- Preferred Utilities - model VB
- OPW
- EBW

2.8 Backpressure Regulating Valve

.1 Sliding gate backpressure regulating valve;

.1 Carbon steel body with 303T stainless steel internal fittings,

.2 Internal or external sensing line based on valve size,

.3 Buna-N diaphragm,

.4 Shut-off: ANSI Class IV

.5 maximum pressure: 1000 kPa (150 psi)

Standard of Acceptance
- Jordan Valve – Mark 50
- Fisher

2.9 Fire Safe Emergency Shut-Off Valves

.1 Firesafe ball valve NPS 2 and under, flanged;

.1 firesafe ball valve for flammable liquid service, carbon steel body with 316 stainless steel trim, PTFE seats, flanged ends,

.2 Spring loaded, held-open actuator, with fusible set to release at 71°C (160°F).

.3 FM Class 7440 approved firesafe valve.

Standard of Acceptance
- Metso-Jamesbury - fig 1075
- Essex Fluid Controls - fig THR0001
- Cashco FL series

2.10 Motorized control valves

.1 Valve body:

.1 NPS ½ to NPS 10

(a) Class 150 cast steel body, flanged ends, split body design,
(b) chrome plated carbon steel ball,
(c) full ported solid ball,
(d) PTFE seats and seals,
(e) pressure rating (flammable liquid): 1000 kPa (150 psig)
(f) mounting pad for motorized operator,
(g) UL 842 listed

Standard of Acceptance
- Apollo fig 88A-200
- Velan fig SB-150

.2 Electric actuator:

.1 internal high-torque electric reversible motor, alloy steel reduction gearing,

.2 120 VAC power driven both directions, internal limit switches in each direction of rotation,

.3 two accessory end-switches, to prove valve closed and open,

.4 de-clutchable manual override operator.

.5 valve OPEN-CLOSE position visual indicator

.6 CSA Enclosure 4,

Standard of Acceptance
- Emerson Bettis - Torqplus model EM300F

2.11 Auxiliary Tank Solenoid Valves

.1 Construction:

.1 2-way brass body valve with FKM seals and disc,

.2 solenoid operator, 120 VAC with general purpose enclosure,

.3 size: NPS ½, Cv = 2.5

.4 on-off control,

.5 fail position: normally closed,

.6 UL 429 or 428B listed,

.7 CSA C22.2 No. 139 listed,

.8 FM approved Class 7400.

Standard of Acceptance
° ASCO fig 8266D085V

2.12 Oil pressure switches

.1 Bourdon tube or spring loaded bellows type

Standard of Acceptance
° Mercoid type DA
° United Electric

2.13 Pipeline Pressure Relief Valves

.1 Cast iron body with carbon or stainless steel internals;

.1 BUNA o-ring cap seal,

.2 threaded connections.

Standard of Acceptance
° Fulflo FV series

2.14 Leakage detection system - Tanks

.1 Type:

.1 monitoring instrument with temperature compensated solid state circuitry,

.2 power-on lamp,

.3 alarm lamp,

.4 test switch, and

.5 reset switch and isolated relay for remote alarm.

.2 Leak detection sensors:

.1 designed for NPS1 or NPS 2 access pipe or end cap opening,

.2 attached 4.5 m (16 ft) cable,

.3 detects presence of liquid in annular space surrounding sensor.

.3 Control cable:

.1 twisted pair of 20 AWG woven conductors with 300 V insulation and PVC jacket.

Standard of Acceptance
° Davis Controls - DMS series Leak Detector with SVP2 or DLP sensor

2.15 Leak detection system - floors and piping

.1 Type:
- .1 continuous hydrocarbon detection cable, with oil / water discrimination,
- .2 CSA approved.

.2 Leak detection sensor cable:
- .1 radiation cross-linked, conductive-polymer cable jacket with fluoropolymer braid
- .2 two sensing wires, alarm signal wire, and continuity wire,
- .3 factory or field installed connector kits.

Standard of Acceptance
° Tyco Thermal Controls - TT5000

.3 Control unit:
- .1 single channel alarm module,
- .2 continuity fault test andindication,
- .3 LCD leak location display,
- .4 audible and visual alarm, with audible silence switch,
- .5 remote alarm contact, 1 Form C2A at 120 VAC.
- .6 NEMA 1 enclosure,
- .7 Modus communications over RS-485
- .8 120 VAC, 60 Hz,

Standard of Acceptance
° Tyco Thermal Controls - Tracetek TTA-SIM-2

3 EXECUTION

3.1 Piping installation

.1 Supply and return piping, inside and outside of building, except vent piping:
- .1 NPS 2 and smaller: socket weld fittings,
- .2 NPS 2-1/2 and larger: welded, with butt weld fittings,
- .3 Make connections to equipment with flanges where equipment is not isolated by valves,
- .4 Make connections to equipment with either flanges, threaded connections, or unions where equipment is isolated by a valve at the pipe connection.

.2 Above ground vent piping:
- .1 as above for supply and return piping or with threaded fittings,
- .2 for outdoor piping, use galvanized steel pipe and fittings.

.3 General requirements:

.1 Slope piping down in direction of tank.

.2 Locate fittings and joints in accessible chambers.

.3 Ream steel pipe after cutting to length, clean off scale and dirt inside and outside of pipe.

.4 Cap ends during construction to prevent entry of foreign matter.

.5 Use eccentric reducers at pipe size change installed FOT to provide positive drainage.

.4 Welded joints:

.1 Weld joints in accordance with contractors qualified weld procedures as applicable to the specified piping standard.

.2 Where saddle type branch welding fittings are used on steel pipe mains hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding.

.3 Direct welding of branch piping to main piping is permitted where:

(a) main is NPS 6 or larger and branch is at least 2 pipe trade sizes smaller than main,
(b) maximum branch size of NPS 3 on a NPS 6 main,
(c) cut openings in main true and beveled,
(d) do not project branch pipes inside main pipe,
(e) openings to be sized to prevent entry of welding metal and slag into pipes.

.4 If threaded fittings have been installed where the specification requires welded fittings, either cut-out and replace the fitting, or fully seal-weld the exposed threads.

.5 Where vent piping passes through pavement, sidewalk or concrete slab, protect the pipe with a PVC sleeve with a minimum clearance of 12mm (1/2 in) between vent pipe and sleeve. Sleeve to extend 50 mm (2 in) above the pavement, sidewalk or concrete slab. Fill void space with clean sand.

3.2 Fire rated pipe installation

.1 Protect fuel supply piping with double-wall piping protected with a listed fire-resistance rated insulation system:

.1 fire-resistance rating: 2 hrs

.2 fire rated insulation: to section 20 07 21.

.2 Install fuel supply piping in a double wall carrier pipe as specified above and in accordance with fire-rated insulation manufacturer listing, with the following minimum carrier pipe size:

Fuel Supply Pipe Size NPS	Carrier Pipe Size NPS
Up to and including NPS 6	8

.3 Protect fuel supply piping in the following locations;

.1 between the supply tank and the pump set where tank and pumpset are not in the same room,

.2 between the pump set and the associated auxiliary tank, except where the piping is located in either:

(a) the pump service room,
(b) the auxiliary tank room, or
(c) a fire rated vertical service space.

.3 For clarity, vent piping and overflow piping from the auxiliary tank to the main supply tank does not require fire protection.

3.3 Hanger installation

.1 To section 20 05 29.

3.4 Tank vent terminals

.1 Terminate tank vents as follows:

.1 Vertical vents above roof:

(a) NPS 2 and 3 vent pipes: manufactured vent terminal.
(b) NPS 4 and larger: 180° gooseneck fabricated from long radius welded fittings and a 40 mesh stainless steel insect screen welded to open end of pipe.

.2 Horizontal vents:

(a) NPS 3 and smaller: 90° elbow and union with 40 mesh stainless steel insert,
(b) NPS 4 and larger: 90° long radius elbow and a 40 mesh stainless steel insect screen welded to open end of pipe.

3.5 Miscellaneous pipeline material

.1 Install remote fill stations as required. Install remote high level alarm panel within 1000 mm (3 ft) of fill station. Fit fill pipe with tight fill connectors, and leave tanker hose adaptor fitting inside containment box at project hand-over.

.2 Install anti-siphon valves on suction line from main storage tank to pump as close to tank as possible.

.3 Install vacuum breakers as required.

.4 Install a fire-safe valve on generator supply pipe upstream of generator oil filter / water separators.

.5 For multiple auxiliary tanks served by a common pump, install two solenoid control valves in series on the supply line to each tank. Install a pressure relief valve between the two control valves, and connect the relief valve discharge to the supply pipe at a location between the second control valve and the tank connection.

3.6 Backpressure regulating valves

.1 Install backpressure regulating valves with inlet and outlet reducers and with minimum four (4) pipe diameters of valve connection size at inlet and outlet connections.

.2 Install pressure gauges at inlet and outlet of valve complete with isolation valves.

3.7 Leak detection system - tanks

.1 Install leak detection system to monitor interstitial space on tanks with integral containment tanks.

.2 Provide 120 VAC wiring and 15 A breaker from nearest power distribution panel.

3.8 Leak detection system - floors and piping

.1 Install leak detection cable at floor level around perimeters of oil tank storage rooms.

.1 terminate cable at each side of door,

.2 for multiple doors, loop cabling up and over doors to maintain single channel.

.2 Install alarm panel adjacent to door of room served, outside the room. Provide 120 VAC wiring and 15 A breaker from nearest power distribution panel.

3.9 Alarm monitoring

.1 Wire monitoring and alarm outputs from fuel inventory panels to the Building Automation System for each tank:

.1 oil low tank level alarm, discrete

.2 oil high tank level alarm, discrete

.3 water high tank level alarm, discrete

.4 low vacuum alarm (double wall tanks)

.5 interstitial space oil alarm (contained tanks)

.6 tank oil inventory level, 4- 20 mA

.2 Wire each alarm outputs for oil leak detection system to the Building Automation System.

3.10 Pressure testing

.1 General:

.1 use dry nitrogen gas for all pneumatic pressure tests,

.2 take pressure measurements using calibrated measuring instruments with graduations in increments not greater than;

(a) 44 kPa (0.5 psi) for test pressures up to 350 kPa (50 psi); and
(b) 8 kPa (1 psi) for test pressures exceeding 350 kPa (50psi),

.3 while conducting the piping pressure leak tests, isolate tanks from the pressure test by means of service valves or use of flange hydrotest paddle blinds.

.2 Piping aboveground and inside of building:

.1 temporarily install pressure gauges at test points or tapped fittings,

.2 for test pressures in excess of 175 kPa (25 psi), conduct an initial pressure test at 175 kPa (25 psi) to locate any major leaks. Correct leaks before commencing final pressure test.

.3 pneumatically pressure test piping at 28 kPa (4 psi) for the

(a) main supply tank vent piping;
(b) auxiliary tank vent piping to atmosphere.

.4 pneumatically pressure test piping at 350 kPa (50 psi) gauge for the

(a) main supply tank fill pipes;
(b) suction piping between the main supply tank and the system supply pump; and
(c) the supply and return piping between an auxiliary tank and a generator.

.5 pneumatically pressure test piping at 350 kPa (50 psi) or 120% of the piping design pressure, whichever is greater, for the

(a) supply piping after a transfer pump,
(b) auxiliary tank overflow piping between the auxiliary tank and the main supply tank(s), and
(c) heating oil return piping between the boiler plant and the main supply tank(s).

.6 when pressure tested to 120% of the design pressure, raise the pressure to 120% of design pressure for 10 minutes, then reduce the pressure to design pressure and hold at that pressure during leak checking.

.7 test joints by applying a leak-detection solution.

.8 acceptance criteria: piping is considered to be leaking when any pressure drop or volume loss is detected within a 2 h period after steady temperature conditions have been established and the source of pressure has been removed.

.9 if a leak is detected during the leakage test, correct the leak and retest until there are no further leaks.

.3 In service pressure test;

.1 after cleaning and flushing of the system and after the system has been filled with oil product, operate the system and conduct a final visual check of exposed piping joints at tanks, pumps and appliances. Make corrections to joints where leaks are discovered.

.2 for pressurized supply piping and piping risers, shut-off distribution pumps and check and record pump discharge oil pressure. Re-check discharge pressure after a 24 hour period and confirm no change in oil pressure.

.4 Test record:

.1 submit a completed test record to the Engineer and the Owner on completion of testing, signed by the supervisor responsible for conducting the test, and include the following information:

(a) date of test(s)
(b) name of person conducting the tests,
(c) license number of person conducting the test,
(d) start and end times of test, and total duration,
(e) applied test pressures, and
(f) description of location of each leakage point discovered, and remedial means taken to correct the leak.

3.11 Flushing and Cleaning

.1 After completion of pressure testing and correction of all leaks, provide 2000 litres (525 USG) of No.2 fuel oil for flushing and cleaning of piping. Only add product to one storage tank in each system.

.2 Circulate oil for 4 hours to flush out oil piping and drain or return oil to the same storage tank.

.3 The same oil may be used to test each system; provide temporary water separation and oil filtration systems to clean oil before being transferred to another tank.

.4 Clean pump strainers at completion of each flush.

.5 At completion of flushing and cleaning of the system, remove oil from tanks, clean tanks to remove debris and water, and dispose of flushing oil as contaminated waste. As an alternative to waste oil disposal, site filter the oil in the tanks to remove debris and water using temporary filtration equipment; take oil samples for laboratory analysis, and continue filtering until product sample meets CGSB standards for diesel fuel or No.2 heating oil as applicable.

3.12 System testing and commissioning

.1 Provide services of trained oil technicians to operate fuel oil systems during testing and commissioning of the fuel oil systems, until systems are accepted by the Owner.

.2 Provide supervision, instruction and operation of the fuel management system during initial filling operations, testing, and commissioning until the fuel oil systems are accepted by the Owner.

3.13 Initial tank fill for system testing

.1 In addition to the oil fill for flushing and cleaning, include in tender price and provide initial filling of all main supply tanks to 90% of tank gross volume capacity for purposes of testing and commissioning of fuel systems including the fuel management system, generators and heating boilers.

.2 During first fuel delivery, arrange and pay for delivery truck supplemental stand-by time to permit calibration of main fuel tank level controllers during tank fill.

.3 Include for any additional oil required for testing or commissioning.

3.14 Final tank fill

.1 At conclusion of testing and commissioning, refill the main supply tanks to capacity.

3.15 Authority having jurisdiction demonstration test of auxiliary tank high level limit control

.1 Refer to section 23 15 13 for temporary installation requirements for testing of auxiliary tank high level limit controls.

3.16 Inspection

.1 Provide to Owner and Engineer a copy of the pressure test reports, fuel distributor's inspection report and local authority inspection reports.

END OF SECTION

NATURAL GAS SYSTEMS
23 11 23

1 GENERAL

1.1 Scope

.1 Provide gas service, piping system and connect to appliances.

1.2 Definitions

.1 In this section,

.1 *Concealed* (as it applies to piping or tubing): piping or tubing that, when in place in a wall, floor, or ceiling of a finished building, is hidden from view and can only be exposed by use of a tool. The term does not apply to piping or tubing that passes directly through a wall or partition [ref. CSA B149.1]

.2 *Exposed* (as it applies to piping or tubing): piping or tubing that is not concealed, and includes piping or tubing installed above a false ceiling space as defined in CSA B149.1

1.3 Shop drawings

.1 Submit manufacturer's data sheets for valves. Submit shop drawings where pipe assemblies with fittings, elbows and flanges are shop prefabricated.

1.4 Applicable codes and standards

.1 Installation standards, codes and guidelines:

.1 CSA-B149.1. Natural Gas and Propane Installation Code

.2 Product standards:

.1	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated,Welded and Seamless.
.2	ASTM A106	Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service
.3	ASME B16.3	Malleable Iron Threaded Fittings
.4	ASME B16.5	Pipe Flanges and Flanged Fittings
.5	ASME B16.9	Factory Made Wrought Steel Buttwelding Fittings
.6	ASME B16.11	Forged Fittings, Socket-Welding and Threaded
.7	ASME B16.20	Metallic Gaskets for Pipe Flange: Ring-Joint Spiral Wound and Jacketed
.8	ASME B16.21	Non-Metallic Flat Gaskets for Pipe Flanges
.9	ASME B16.39	Malleable Iron Threaded Pipe Unions; Class 150, 250 and 300
.10	ASME B18.2.1	Square and Hex Bolts and Screws
.11	ASME B18.2.2	Square and Hex Nuts
.12	ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
.13	ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
.14	ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

.15 CAN/ULC-S642 Standard for Compounds and Tapes for Threaded Pipe Joints

.16 CSA-B137.4 Polyethylene Piping Systems for Gas Services,

.17 CSA-B137.4.1 Electrofusion-Type Polyethylene Fittings for Gas Services

.18 ANSI Z21.21/CSA 6.5 Automatic Valves for Gas Appliances

.19 ANSI Z21.80/CSA 6.22 Line pressure regulators

1.5 Permits and charges

.1 Make arrangements and pay charges for;

.1 new gas service into building,

.2 gas meter installation, including regulators and service valves,

.3 inspection of installation and appliances.

2 PRODUCTS

2.1 Steel pipe for natural gas or propane gas - Aboveground

.1 Pipe for design pressures less than 860 kPa (125 psig):

.1 NPS 10 and under:

(a) ASTM A106 Gr B, schedule 40 Seamless,
(b) ASTM A53 Gr B, schedule 40 Electric Resistance Weld (ERW) or seamless (S)

.2 NPS 12 and over:

(a) ASTM A53 Gr B, standard wall thickness, ERW.

.2 Joints and fittings:

.1 NPS 2 and under:

(a) socket weld fittings: Class 3000 forged steel to ASME B 16.11,
(b) threaded fittings: Class 150 malleable iron to ASME B16.3,
(c) unions: Class 150 malleable iron threaded unions to ASME B16.39

Standard of Acceptance
° Anvil
° Bonney Forge

.2 NPS 2 ½ and over:

(a) butt weld type: carbon steel with wall thickness to match adjoining pipe wall to ASME B16.9,
(b) socket weld fittings: Class 3000 forged steel to ASME B 16.11,
(c) welded outlet fittings: carbon steel to ASTM A105, MSS SP-97, and branch connections to
- ASME B1.20.1, Class 2000 for threaded joints;
- ASME B16.11, Class 3000 for socket joint;
- ASME B16.25, Standard class for buttweld connection

(d) elbows: long radius

Standard of Acceptance
° Anvil
° Bonney Forge
° Crane Supply

.3 Flanges, NPS 2 and over:

(a) forged steel, Class 150 to ASME B16.5, weld neck with wall thickness to match pipe or slip on type, with raised face.

.4 Gaskets:

(a) to ASME B16.21of heavy duty neoprene compressed sheet minimum 1.6 mm (1/16 in) thick

Standard of Acceptance
° Chesterton 122NN

.5 Studs, bolts and nuts:

(a) "high strength" type to ASME B18.2.1 with ASME 18.2.2 or ASTM A307 with ASTM A563 or ASTM A194.
°

.6 Thread compound and tape:

(a) to CAN/ULC-S642, double density PTFE tape (pink) or PTFE pipe dope.

2.2 Below ground piping

.1 Plastic pipe and tubing, NPS ½ to NPS 12:

(a) CSA B137.4 for polyethylene piping.
(b) CSA B137.4 or CSA 137.4.1 for fittings for polyethylene piping.

Standard of Acceptance
° Can-Con Industries Ltd
° Titeflex Corporation - Gastite
° Mueller Canada

.2 Coated steel piping, NPS ½ to NPS 24:

(a) ASTM A106 Gr B or A53 Gr B ERW or S, schedule 40, with factory applied polyethylene jacket ("Yellowjacket") with field applied coating at welded joints.

Standard of Acceptance
° Shaw Pipe

2.3 Line Pressure Regulators

.1 Regulator valve:

.1 Listed to ANSI Z21.80/CSA 6.22,

.2 Class I or Class II based on outlet gas pressure as required,

.3 body pressure rating: 860 kPa (125 psig),

.4 vent limiting device where;

(a) inlet gas pressure is 14 kPa (2 psig) or less.
(b) Inlet gas pressure is greater than 14 kPa (2psig) and monitoring regulator or overpressure shut-off device is required.

.2 Overpressure protection:

.1 Full internal relief, except where monitoring regulator, line relief valve or overpressure shut-off valve is provided.

.2 Monitoring regulator or overpressure shut-off device provided as part of a factory assembled unit with the pressure regulator.

.3 Line pressure relief valves:

.1 adjustable pressure relief setpoint, set in accordance with CSA B149.1,

.2 body pressure rating: 860 kPa (125 psig).

2.4 Gas Solenoid Valves

.1 Construction:

.1 2-way brass or aluminum body valve with BUNA-N seals and disc,

.2 Valve size range: NPS 3/8 to NPS 2

.3 solenoid operator, 120 VAC with general purpose enclosure,

.4 on-off control,

.5 fail position: normally closed,

.6 listed to CSA C22.2 No. 139,

.7 listed to ANSI Z21.21/CSA 6.5.

Standard of Acceptance
° ASCO fig 8210 series / 8042 series (based on size)

2.5 Gas Safety Valves

.1 Construction:

.1 Electrically reset gas safety stop and vent valves;

.2 Listed to ANSI Z21.21/CSA 6.5,

.3 Automatic electrically reset type,

.4 Fail Close on loss of power for stop valves

.5 Fail Open on loss of power for vent valves

.6 Cast iron or carbon steel bodies, with wetted parts suitable for natural gas,

.7 Overtravel position switches for open and closed position.

Standard of Acceptance
° Maxon – series SMA111 / SMA21

3 EXECUTION

3.1 Gas service

.1 [Meter and service regulator installation provided by gas utility company in accordance with the requirements of the local authority having jurisdiction.

.2 Clearly indicate gas service with permanent marking at or on outside of building.

.3 Extend service piping from meter installation.

3.2 Piping joints and fittings

.1 Exposed piping:

.1 NPS 2 and smaller: threaded fittings and joints, or socket welded.

.2 NPS 2 ½ and larger: welded with butt weld fittings, welded outlet fittings, or flanged.

.2 Concealed piping:

.1 NPS 2 and smaller: socket weld fittings,

.2 NPS 2 ½ and larger: butt weld fittings or welded outlet fittings.

3.3 Connections to appliances

.1 Connect to appliances with threaded unions up to NPS 2 and flanges NPS 2 ½ and above.

.2 Provide dirt trap and service valve at each appliance.

3.4 Piping installation

.1 Provide clearance and access for maintenance of appliances, valves and fittings.

.2 Ream pipe after cutting to length and clean off scale and dirt both inside and outside before assembly.

.3 Cap ends during construction to prevent entry of foreign matter.

.4 Make up threaded pipe with;

.1 couplings,

.2 caps and plugs,

.3 90Eand 45E elbows, and

.4 tee fittings.

.5 Make up welded pipe with;

.1 long radius elbows,

.2 tee fittings where branch connections are same size as main or smaller,

.3 welded outlet fittings where branch connections are smaller than main and where main is NPS 3 and larger,

.4 branches may be welded directly onto main provided main is NPS 6 and larger and branch is at least 2 pipe sizes smaller than main.

.5 where branch fitting is welded onto main;

(a) cut opening in main true and bevelled,
(b) hole saw or drill and ream main to maintain full inside diameter of branch line,
(c) opening to be sized to prevent branch pipe from projecting inside main, and
(d) to inhibit entry of welding metal and slag into pipes.

.6 Plastic piping:

.1 excavation and backfill for underground piping: to Section 20 05 25,

.2 used only for underground service,

.3 joints: made up using fusion butt-welding,

.4 provide anodeless risers up through ground protected with certified metallic shields and terminated with NPT steel pipe transition coupling,

.5 install a tracer wire above buried piping and bring up to grade level along pipe riser.

3.5 Hanger installation

.1 To section 20 05 29.

3.6 Valves

.1 To section 20 05 23.

.2 Install valves with stems upright or horizontal.

.3 Install valves at branch take-offs and to isolate each piece of appliances, and to isolate each pressure regulating valve.

3.7 Line pressure regulating valves

.1 Provide line pressure regulating valves with full internal relief except where monitoring regulator or overpressure shut-off device is provided, in which case provide line pressure regulator with vent limiting device.

.2 Install regulators in accessible and ventilated location.

.3 Set regulation control pressure in accordance with downstream pressure requirements.

3.8 Pressure control venting

.1 Pipe vents for pipeline pressure control devices and appliances pressure devices to the outdoors.

.2 Provide bleed vents and relief vents in accordance with manufacturer requirements or in their absence in accordance with CSA B149.1. Minimum tubing size for bleed vents to be 8 mm OD (NPS 3/8).

.3 Bleed vents may be combined where the common vent is sized in accordance with CSA B149.1 for vent size, length and inlet gas pressure.

.4 Relief vents for line pressure relief valves may be combined where the common vent is sized in accordance with CSA B149.1 for vent size, length and relief valve inlet and discharge gas pressures.

.1 For clarity, do not combine vents from line pressure regulators with internal relief with any other vent – run each regulator vent separately to the outdoors.

Terminate vents outdoors with a 180° gooseneck and finish with screening.

3.9 Identification

.1 To section 20 05 53.

3.10 Coordination of Inspection/Service Connection

.1 Submit to Gas Supply Authority list of natural gas appliances being installed showing type, quantity and rating.

.2 Make appliance fuel and vent connections before scheduling inspection, meter installation, and activation of service.

END OF SECTION

OIL STORAGE TANKS
23 13 13

1 GENERAL

1.1 Scope

.1 Provide fuel tanks and accessories for:

.1 aboveground steel main supply tanks

.2 aboveground steel auxiliary supply tanks.

1.2 Specialist sub-contractor

.1 Installation and on site testing of tanks to be performed in accordance with referenced standards by a specialist firm with an established reputation in this field.

1.3 Applicable codes and standards

.1 Installation standards and codes:

.1 BC Safety Authority

.2 CSA B139 Installation Code for Oil Burning Equipment.

.3 Canadian Council of Ministers of the Environment (CCME) EPC-LST-61E Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products.

.2 Product standards:

.1	CAN/ULC S601	Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids,
.2	CAN/ULC S602	Standard for Aboveground Steel Tanks for Fuel Oil and Lubricating Oil,
.3	ULC S615	Standard for Reinforced Plastic Underground Tanks for Flammable and Combustile Liquids
.4	CAN/ULC S653	Standard for Aboveground Steel Contained Tank Assemblies for Flammable and Combustible Liquids
.5	CAN/ULC S661	Standard for Overfill Protection Devices for Flammable and Combustible Liquide Storage
.6	CAN/ULC S663	Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks.
.7	ULC/ORD C80.1	Aboveground Non-metallic Tanks for Fuel Oil.

1.4 Shop drawings

.1 Submit shop drawings for each tank with model number and capacity, outline dimensions, support details, connection arrangements, and instrumentation.

.2 For tanks specified for a design static pressure exceeding 35 kPa (5 psig) at the bottom of the tank, submit shop drawings designed and sealed by a professional engineer licensed in the province of manufacture, with tanks designed in accordance with CSA B51 or ASME Boiler and Pressure Vessel Code,

1.5 Authority submittals

.1 For tanks specified for a design static pressure exceeding 35 kPa (5 psi) at the bottom of the tank, submit a copy of the shop drawings and a copy of the factory pressure test at the specified design pressure to BC Safety Authority

2 PRODUCTS

2.1 Above ground steel tank, indoor, horizontal double wall fire rated

.1 General:

.1 to ULC-S655

.2 double wall, vacuum monitored

.3 designed for storage of no. 2 diesel fuel,

.4 Specific gravity: 0.83 to 1.10

.5 Viscosity: 50 S.S.U at 41EF.

Standard of Acceptance

- Clemmer
- ASI - gilfab
- Domestic Tank and Equipment
- Drummond Welding and Steel Works
- Westeel - Rosco

.2 Construction:

.1 fabricated from minimum 2.5 mm (12 ga) carbon steel,

.2 factory pressure tested to 35 kPa (5 psi) for standard tanks, and 175 kPa (25 psi) for high pressure tanks.

.3 lifting lugs, anchor lugs, end support legs and support beams or support saddles,

.4 pipe connection fittings along top of tank:

(a) ASME carbon steel Class 150 flanges for tank fill, appliance/day tank oil return line, tank normal vent, and tank emergency vent,
(b) NPT half-couplings for tank suction (to pump), tank level control instrumentation and gauges,
(c) NPS 3 NPT half-coupling with plug for water removal suctioning,
(d) as required.

.5 internal drop-tube piping for level gauge, tank fill, appliance oil suction, and appliance oil return lines.

(a) appliance/auxiliary tank oil return drop tube drilled with a 6 mm (1/4 in) hole at approximately 25 mm (1 in) below underside of top of tank.

.6 double wall, vacuum monitored with;

(a) factory applied full vacuum,
(b) tank mounted vacuum gauge,
(c) tank mounted vacuum switch, 120 VAC, 2 A rated form C contacts.

.7 ground lug,

.8 marked with manufacturer's label,

.9 finish: two coats white epoxy.

.10 local sight glass to read level. Sight glass to incorporate isolation valves at both top and bottom tank outlet. Valves to remain isolated when glass not in use.

.3 Accessories:

.1 emergency vent cap for primary tank,

.2 low vacuum audible and visual alarm panel;

(a) 120 VAC,
(b) remote alarm form C contacts, rated for 120 VAC @ 2 A.

.3 overfill protection valve to CAN/ULC S661

.4 dipstick and gauge chart for tanks installed outdoors,,

.5 spill containment fill box to CAN/ULC S663 for tanks installed outdoors,

2.2 Auxiliary (Day) Tank - double wall, steel tanks

.1 General:

.1 to ULC-S602

.2 double wall, vacuum monitored,

.3 designed for storage of no. 2 diesel fuel,

.4 Specific gravity: 0.83 to 1.10

.5 Viscosity: 50 S.S.U at 41EF.

Standard of Acceptance
- Clemmer
- ASI - gilfab
- Domestic Tank and Equipment
- Drummond Welding and Steel Works
- Westeel - Rosco

.2 Construction:

.1 fabricated as double wall, vacuum monitored tank, from welded steel plate 2 mm (14 gauge) thick,

.2 factory pressure tested to 35 kPa (5 psi),

.3 lifting lugs, support legs,

.4 pipe connections with NPT half-couplings:

(a) along top of tank for tank fill, appliance oil suction, appliance oil return, combined normal and emergency vent, and level gauge,
(b) NPS 2 fitting for level control instrument,
(c) overflow drain connection on tank end at top,
(d) tank bottom drain outlet at same end of tank as overflow connection.

.5 internal drop-tube piping for level gauge, tank fill, appliance oil suction, and appliance oil return lines.

(a) tank fill and appliance oil return drop tubes drilled with a 6 mm (1/4 in) hole at approximately 25 mm (1 in) below underside of top of tank.

.6 double wall, vacuum monitored with;

(a) factory applied full vacuum,
(b) tank mounted vacuum gauge,

(c) tank mounted vacuum switch, 120 VAC, 2 A rated form C contacts. supplied with steel cradles and heavy duty handles.

.7 labelled by manufacturer,

.8 ground lug,

.9 finish: two coats white epoxy.

.10 local sight glass to read level. Sight glass to incorporate isolation valves at both top and bottom tank outlet. Valves to remain isolated when glass not in use.

.3 Accessories:

.1 low vacuum audible and visual alarm panel;

(a) 120 VAC,
(b) remote alarm form C contacts, rated for 120 VAC @ 2 A.

2.3 Main tank overfill protection valve

.1 Positive shut-off valve for pressurized or gravity fill delivery as applicable;

.1 single action shut-off valve, with internal drain vents

.2 integral to fill tube,

.3 adjustable fill height,

.4 Listed to CAN/ULC S661

Standard of Acceptance

- OPW - 61fstop-2000 (pressure fill)
- OPW - 61SO (gravity fill)
- Franklin Fuels – 709 Warden (pressure fill)
- Franklin Fuels – 708 Autolimiter 708 (gravity fill)

3 EXECUTION

3.1 Aboveground Steel Tanks

.1 Position tanks using lifting lugs, hooks and spreader bars. Do not use chains or slings.

.2 Provide reinforced concrete base slabs and set tank anchors and support beams, concrete around piping sumps and piping trenches.

.3 Secure tank to base.

.4 Extend vent lines from tank and terminate 2.5 m (8 ft) above local grade with vent terminals.

.5 Extend fill line from tank into fill box and terminate with fill adaptors.

.6 Install tank mounted spill containment device for outdoor tanks to fill drop tube.

3.2 Auxiliary (Day) tank

.1 Mount day tank on steel supports at height to suit diesel manufacturer's requirements. Provide a concrete base to elevate tanks.

.2 Vent day tank to atmosphere:

.1 install vent high level float switch in a 300 mm (12 in) long x NPS 4 size section of vent pipe, with a thread-o-let to match switch mounting.

.2 install vent switch at a maximum height of 4 m (13 ft) above bottom level of tank.

.3 where vent pipe passes through a roof, provide a Thaler roof flashing sleeve,

.4 where vent pipe passes through an exterior wall, sleeve the wall and seal sleeve and pipe with weatherproof sealant,

.5 terminate vent at 2100 mm (7 ft) above roof or away from nearest building opening.

.3 Vent day tank through overflow back to main tank:

.1 install vacuum breaker on overflow line, minimum 600 mm (2 ft) above top of tank,

.2 run overflow line back to drain to main tank, without dips or loops which can trap oil in the pipe,

.3 pitch horizontal pipes at 1:50 slope in direction of flow,

.4 at change of direction from vertical to horizontal, run pipe in horizontal direction a minimum of 600 mm (24 in) before changing direction.

3.3 Main supply tank level control

.1 Install main supply tank level control in accordance with section 23 11 13.

3.4 Testing

.1 Aboveground steel tank testing:

.1 Test above ground steel tanks for leaks with a 35 kPa (5 psi) air pressure test or other maximum pressure in accordance with manufacturers listing.

.2 Submit a test report to Owner and Engineer, complete with pre-installation photos of buried tanks, pressure test record results, and manufacturer installation report for buried tanks.

3.5 Fuel

.1 Refer to section 23 11 13 for initial and final filling requirements.

END OF SECTION

FUEL OIL PUMPS
23 13 15

1 GENERAL

1.1 Scope

.1 Provide fuel oil pumps for steam boilers, heating boilers, and diesel-engine drive equipment, including:

.1 diesel fuel pumpsets,

.2 heating fuel pumpsets,

.3 pump control panels,

.4 auxiliary tank control panels.

.2 Pumps and associated control panels are to be provided by one manufacturer as part of a coordinated system.

.3 Control panel manufacturer to coordinate with fuel storage tank manufacturer for mounting requirement of instrumentation.

1.2 Related sections

.1 23 13 13 Oil Storage Tanks

.2 23 15 13 Fuel Management Systems

1.3 Shop drawings

.1 Submit manufacturer's data sheets for pumps with model numbers, performance and design data, outline dimensions, and power requirements.

.2 Submit manufacturers shop drawings for control panels, including ladder logic diagram, terminal strip identification, and a coordinated control panel inter-wiring schematic drawing including field wiring termination details, and conductor size and quantity details.

1.4 Applicable codes and standards

.1 Installation standards:

.1 B.C. Safety Authority

.2 Product standards:

.1 ASTM A53 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless.

.2 ASME B16.3 Malleable Iron Threaded Fittings

.3 ASME B16.9 Factory Made Wrought Steel Butt welding Fittings

.4 ASME B16.11 Forged Fittings, Socket-Welding and Threaded

.5 ASME B16.5 Pipe Flanges and Flanged Fittings

.6 ASME B18.2.1 Square and Hex Bolts and Screws

.7 ASME B18.2.2 Square and Hex Nuts

.8 ASTM A106 Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service

.9 ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

.10 ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts

.11 ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

.12 ASME B16.21 Non-Metallic Flat Gaskets for Pipe Flanges

.13 ASME B16.20 Metallic Gaskets for Pipe Flange: Ring-Joint Spiral Wound and Jacketed

.14 UL 842 Valves for Flammable Liquids

2 PRODUCTS

2.1 General

.1 Fuel parameters:

.1 No. 2 diesel fuel.

.2 Specific gravity: 0.83 to 0.88

.3 Viscosity: 50 S.S.U at 10°C (50°F)

.4 Suction lift: 430 mm.Hg. (17 in. Hg)

2.2 Basemount fuel pumps

.1 Construction:

.1 base mount type pumpset,

.2 pre-piped units mounted on a fabricated steel baseplate in an integral drip pan,

.3 gear type pumps direct coupled to totally enclosed fan cooled motors,

.4 pump arrangement:

(a) diesel fuel pumps: duplex pumpset
(b) heating fuel pumps: duplex pumpset

.5 compound oil suction pressure gauge to 30 in Hg,

.6 oil discharge pressure gauge,

.7 relief valve for each pump with stainless steel trim sized for pump capacity,

.8 duplex basket oil suction strainer,

.9 check valve in discharge of each pump,

.10 suction and discharge shut-off valves for each pump,

.11 combination high/low oil pressure switch mounted on common pump discharge pipe.

Standard of Acceptance

- Albany
- Viking
- Plad

2.3 Controls Panels

.1 Pump control panels and auxiliary tank control panels: to section 23 15 13.

2.4 Oil pressure switches

.1 Bourdon tube or spring loaded bellows type

Standard of Acceptance
- Mercoid type DA
- United Electric

2.5 Pressure Relief Valves

.1 Cast iron body with carbon or stainless steel internals;
  .1 BUNA O-ring cap seal,
  .2 threaded connections.

Standard of Acceptance
- Fulflo VJ series

3 EXECUTION

3.1 Base mount oil pump installation

.1 Place pumpset level on concrete base, dowel, shim and grout with minimum 12 mm (½ in) grout.

.2 Fill hollow portion of bases with concrete.

.3 Align couplings before and after piping connections have been made.

.4 Bleed air from pump suction piping.

.5 Heating fuel pumps – Simplex Pump Operation:
  .1 Sequence of Operation

.6 Diesel fuel pumps – Duplex Pump Operation:
  .1 Sequence of Operation –Pumpset serving two Auxiliary Tanks

Heating Fuel Pump Control Panel

Applicable Systems: Heating Fuel Pumps

General: Each fuel pumps is controlled by its own control panel.

System Start: When hand-off-auto (HOA) switch is in Auto position, a call for oil from the Building Management System starts the pumpset.

When HOA switch in in Hand position, pump starts.

System Stop: When in Auto position, BMS commands pump to stop.

Pressure Limit shut-down

Pump discharge high pressure switch shuts-down pump when discharge pressure exceeds 95% of pressure relief valve setpoint.

Pump discharge low pressure switch shuts-down pump when discharge pressure decreases below 95% of pump normal static head pressure when pump is OFF.

Fire Alarm shut-down

On a signal from the BMS as a result of fire alarm operation, pump shuts-down.

Alarms: Local alarm indication at panel

Pump overload
Pump discharge high oil pressure
Pump discharge low oil pressure

BAS Integration Hard-wired I/O:

- BAS Run command
- Pump Run Status
- Starter Not-in-Auto Alarm
- Pump Low Pressure Alarm
- Pump High Pressure Alarm
- Pump Overload Alarm

Diesel Fuel Pump Control Panel

Applicable Systems: Diesel Fuel Pumps

General: Each diesel fuel pumpset is controlled by one auxiliary tank level controller.

Functionality: ***Generator Run Interlock***

Associated generator run signal is monitored by the PLC as a permissive for fuel pump operation in Auto mode.

Lead Pump Selection

When the P1-Auto-P2 switch is in Auto position, the pumps will alternate Lead-Lag designation at each pump run command. When placed in P1 or P2, only that pump will operate automatically on pump run command.

Automatic Level Control

When pump Hand-Off-Auto (H-O-A) switch in pump control panel is selected for Auto, when Generator Run signal indicates generator is running, pumps are started and stopped automatically from auxiliary tank level switch controller.

- Lead Pump Start-Stop switch: Start at 50% tank level, Stop at 85% tank level.
- Lag Pump Start-Stop switch: Start at 35% tank level, Stop at 85% tank level.

Automatic Tank Top-up

When Generator Run signal changes from On to Off;

- if the pump is already running, it continues to run until auxiliary tank is filled and pump is commanded Off by tank level controller (Lead Pump and/or Lag Pump).
- if the pumps are Off, the lead pump is automatically started and runs until auxiliary tank is filled and pump is commanded Off by tank level controller (All Pumps Off). This function occurs automatically only once immediately after Generator Run signal changes to Off.

In both cases, the pump only runs for a maximum of 30 minutes after the Generator Run signal changes to Off.

Manual Tank Top-up

The operator may initiate a manual tank top-up through a momentary switch. Lead pump operates as above for automatic tank top-up. This function only operates if pumps are Off at the time of the command initiation.

High Limit Operating Control

If All Pumps Stop level switch opens, pumps shut-down.

Pressure Limit shutdown

Pump discharge high pressure switch shuts-down pump when discharge pressure exceeds 95% of pressure relief valve setpoint.

Pump discharge low pressure switch shuts-down pump when discharge pressure decreases below 95% of normal static head pressure.

FMS Network Control: Diesel Fuel Pump Control Panel communicates to FMS Main Control Panel over ProfiNet.

Alarms: Local alarm indication at panel

- Pump P1 overload
- Pump P2 overload
- Pump discharge high oil pressure
- Pump discharge low oil pressure
- Auxiliary Tank High Level

BMS Integration: Hard-wired I/O:

- Pump P-1 On
- Pump P-2 On
- High Pressure Alarm
- Low Pressure Alarm
- Pump P-1 Overload
- Pump P-2 Overload
- Auxiliary Tank High Level Alarm
- Pump P-1 Not-in-Auto
- Pump P-2 Not-in-Auto
- Generator Running

Auxiliary Tank Control Panel

Applicable Systems: Diesel Fuel Auxiliary Tanks

General: Auxiliary Tanks level control system operates the diesel fuel transfer pumps.

System Start: System is normally on at all times.

Pump Level Control

Auxiliary tank four point level switch cycles lead and lag pumps:

Actual tank level is monitored through the integral level transmitter.

Auxiliary Tank High Level Interlock

Auxiliary tank four-point level-switch level alarm is hardwired directly to the pump control panel, through a momentary normally-closed test button mounted on the Auxiliary Tank control panel.

Auxiliary Tank Vent Critical High Level Interlock

Auxiliary tank vent single-point level-switch level alarm is hardwired directly to the pump control panel, through a momentary normally-closed test button mounted on the Auxiliary Tank control panel.

Auxiliary Tank High Level Alarm

Auxiliary tank high level alarm annunciates on high level signal from pump control panel. Alarm lock-in until alarm state clears and Reset button is depressed.

Auxiliary Tank Critical Low Level

Auxiliary tank single point level switch Critical Low level alarm is monitored by the PLC controller and provides permissive run interlock to the associated generator control panel.

Alarms: Local alarm indication at panel:

- Auxiliary Tank High Level Alarm
- Auxiliary Tank Low Level Alarm

BMS

Integration Hard-wired I/O:

- Auxiliary tank level
- Auxiliary tank critical low level alarm

Diesel Fuel Pump Control Panel – for Two Auxiliary Tanks

Applicable Systems: Diesel Fuel Pumps

General: Each diesel fuel pumpset is controlled by two auxiliary tank level controllers.

System Start:

Generator Run Interlock

Associated generator run signal is monitored by the PLC as a permissive for fuel pump operation in Auto mode.

Lead Pump Selection

When the P1-Auto-P2 switch is in Auto position, the pumps will alternate Lead-Lag designation at each pump run command. When placed in P1 or P2, only that pump will operate automatically on pump run command.

Automatic Level Control

Either auxiliary tank level controller can command a pump to start.

When pump Hand-Off-Auto (H-O-A) switch in pump control panel is selected for Auto, when Generator Run signal indicates generator is running, pumps are started and stopped automatically from associated auxiliary tank level switch controller.

- Lead Pump Start-Stop switch: Start at 50% tank level, Stop at 85% tank level.
- Lag Pump Start-Stop switch: Start at 35% tank level, Stop at 85% tank level and alarm sounds.

Pump(s) continue to run until both auxiliary tank level controllers signal Off.

Automatic Tank Top-up

When Generator Run signal changes from On to Off;

- if the pump is already running, it continues to run until auxiliary tank is filled and pump is commanded Off by tank level controller (Lead Pump and/or Lag Pump).
- if the pumps are Off, the lead pump is automatically started and runs until auxiliary tank is filled and pump is commanded Off by tank level controller (All Pumps Stop). This function occurs automatically only once immediately after Generator Run signal changes to Off.

In both cases, the pump only runs for a maximum of 30 minutes after the Generator Run signal changes to Off.

Manual Tank Top-up

The operator may initiate a manual tank top-up through a momentary switch. Lead pump operates as above for automatic tank top-up. This function only operates if pumps are Off at the time of the command initiation.

System Stop:

High Limit Operating Control

If All Pumps Stop level switch opens, pumps shut-down.

Pressure Limit shutdown

Pump discharge high pressure switch shuts-down pump when discharge pressure exceeds 95% of pressure relief valve setpoint.

Pump discharge low pressure switch shuts-down pump when discharge pressure decreases below 95% of normal static head pressure.

FMS Network Control: Diesel Fuel Pump Control Panel communicates to FMS Main Control Panel over ProfiNet.

Alarms: Local alarm indication at panel

- Pump P1 overload
- Pump P2 overload
- Pump discharge high oil pressure
- Pump discharge low oil pressure
- Auxiliary Tank High Level

BMS Integration: Hard-wired I/O:

- Pump P-1 On
- Pump P-2 On
- High Pressure Alarm
- Low Pressure Alarm
- Pump P-1 Overload
- Pump P-2 Overload
- Auxiliary Tank High Level Alarm
- Pump P-1 Not-in-Auto
- Pump P-2 Not-in-Auto
- Generator Running

Auxiliary Tank Control Panel

Applicable Systems: Diesel Fuel Auxiliary Tanks

General: Auxiliary Tanks level control system operates the diesel fuel transfer pumps.

System Start: System is normally on at all times.

Auxiliary Tank Valve Control and Pump Control

Auxiliary tank four point level switch cycles redundant fill valves and lead and lag pumps:

- Switch No. 1 High-High Level — Both fill valves close, pumps turned off and alarm at 95%
- Switch No. 2 High Level at 90% level — Both fill valves close, pumps turned off (operating control)
- Switch No. 3 Lead Pump stops at 85% — Both fill valves, open, Lead pump starts when tank = 50%,
- Switch No. 4 Lag Pump stops at 85%, and alarm sounds. — Both fill valves open, Lag pump starts when tank = 35%,

Actual tank level is monitored through the integral level transmitter.

Auxiliary Tank High Level Interlock

Auxiliary tank four-point level-switch No. 1 “High-High” level alarm is hardwired directly to the auxiliary tank control panel, through a momentary normally-closed test button mounted on the Auxiliary Tank control panel.

Auxiliary Tank Vent Critical High Level Interlock

Auxiliary tank vent single-point level-switch “Critical High” level alarm is hardwired directly to the auxiliary tank control panel, through a momentary normally-closed test button mounted on the Auxiliary Tank control panel.

Auxiliary Tank High Level Alarm

Auxiliary tank high level alarm annunciates on high level signal from pump control panel. Alarm lock-in until alarm state clears and Reset button is depressed.

Auxiliary Tank Critical Low Level

Auxiliary tank single point level switch Critical Low level alarm is monitored by the PLC controller and provides permissive run interlock to the associated generator control panel.

Alarms: Local alarm indication at panel:

- Auxiliary Tank High Level Alarm
- Auxiliary Tank Low Level Alarm

BMS Integration Hard-wired I/O:

- Auxiliary tank level
- Auxiliary tank critical low level alarm

END OF SECTION

FUEL FILTRATION SYSTEMS
23 13 19

1 GENERAL

1.1 Scope

.1 Provide fuel oil filtration systems for diesel fuel and heating oil supply tanks.

1.2 Submittals

.1 Submit manufacturer's data sheets for packaged fuel filtration system including instrumentation, piping diagrams, wiring diagrams and model numbers, performance and design data, outline dimensions and power requirements.

1.3 Applicable Codes and Standards

.1 Installation standards and codes:

.1 B.C. Safety Authority

.2 CSA B139 Installation Code for Oil Burning Code.

.2 Product standards:

.1	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated,Welded and Seamless.
.2	ASME B16.3	Malleable Iron Threaded Fittings
.3	ASME B16.9	Factory Made Wrought Steel Buttwelding Fittings
.4	ASME B16.11	Forged Fittings, Socket-Welding and Threaded
.5	ASME B16.5	Pipe Flanges and Flanged Fittings
.6	ASME B18.2.1	Square and Hex Bolts and Screws
.7	ASME B18.2.2	Square and Hex Nuts
.8	ASTM A106	Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service
.9	ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
.10	ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
.11	ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both
.12	ASME B16.21	Non-Metallic Flat Gaskets for Pipe Flanges
.13	ASME B16.20	Metallic Gaskets for Pipe Flange: Ring-Joint Spiral Wound and Jacketed
.14	UL 842	Valves for Flammable Liquids
.15	FM Class 7440	Approval Standard for Liquid and Gas Safety Shut-off Valves.

1.4 Quality Control

.1 System design criteria:

.1 design pressure: 1030 kPa (150 psig)

.2 design temperature: 38°C (100°F)

2 PRODUCTS

2.1 Automatic Fuel Oil Filtration System

.1 Type:

.1 Automatic side-stream fuel filters and water separators for removal of water and particulate material

.2 Construction:

.1 factory piped and wired,

.2 flow range: 810 to 5400 lph (180 to 1200 gph)

.3 positive displacement pump and motor,

.4 isolating service valves,

.5 five stage filtration and de-watering:

(a) fuel straining - large contaminants
(b) primary filtration
(c) centrifuge separation
(d) coalescing separation
(e) secondary filtration to 2 microns.

.6 120 VAC 60 Hz power

.3 Controls:

.1 microprocessor based controls, with LCD display and keypad access,

.2 differential pressure gauge and switch to monitor filter units,

.3 alarm and safety shut-down for high water filter level, filter saturated, and unit leak detection.

.4 adjustable run-time period

Standard of Acceptance

° Preferred Utilities model PF-30X
° Algae-X model STS 6000
° Albany Pumps model AF-L series

.4 Waste water holding and removal system:

.1 automatic gear pump to transfer water from secondary filter to holding tank,

.2 automatic isolating valves when not in service,

.3 waste water holding tank with high level alarm switch and shutdown interlock.

Standard of Acceptance

° Preferred Utilities - model WR-01

3 EXECUTION

3.1 Automatic fuel filtration system

.1 Install filter system across suction and return lines to main storage tank.

.2 Provide power wiring and control wiring.

.3 Install a FM approved fire safe valve on inlet connection to unit.

.4 Start-up and test unit in accordance with manufacturer instructions.

3.2 System testing and commissioning

.1 Provide services of trained oil technicians to operate fuel filtration systems during testing and commissioning of the fuel oil systems, until systems are accepted by the Owner.

.2 Provide supervision, instruction and operation of the fuel filtration system during initial filling operations, testing, and commissioning until the fuel oil systems are accepted by the Owner.

END OF SECTION

FUEL MANAGEMENT SYSTEM
23 15 13

1 GENERAL

1.1 Scope

.1 Provide an integrated programmable logic control ("PLC") based fuel management system ("FMS") for control and monitoring of diesel fuel and heating fuel oil systems serving heating appliances and diesel-generators including:

.1 main system control panels,

.2 remote fill control panels,

.3 fuel pump control panels,

.4 auxiliary tank control panels,

.5 instrumentation,

.6 network wiring and interlock power wiring.

.2 Provide the FMS from one vendor as part of a coordinated and integrated Fuel Management System.

.3 FMS vendor to coordinate with fuel storage tank manufacturer for mounting requirement of instrumentation.

1.2 Related sections

.1 20 05 13 Motor Starters and Wiring

.2 23 11 13 Fuel Oil Piping and Accessories

.3 23 12 13 Fuel Oil Pumps

.4 23 13 13 Oil Storage Tanks

1.3 Submittals

.1 Submit one completely engineered and coordinated shop drawing package. Partial or incomplete submission of data and/or drawings will be returned without review.

.2 Submit project specific shop drawings for designed elements as follows:

.1 list of materials of equipment to be used indicating manufacturer, model number, and other relevant technical data,

.2 network single line diagram showing equipment controllers, network switches, and network wiring,

.3 control panel internal wiring diagrams, showing power, I/O, and communications wiring, and dry-contacts for B.A.S. integration, with full line and terminal numbering,

.4 written Sequence of Operations to cover normal operation and operation under various alarm conditions applicable to that system.

.3 Submit catalogue cut-sheets for;

.1 manufacturer's standard description and technical data, such as product specification sheets, for equipment and hardware items as follows;

(a) controllers
(b) transducers/Transmitters and Sensors with
- accuracy data, range and scale information,
- one sheet for each device marked with applicable options. (Where several devices of same type are to be used, submit one sheet for each device, individually marked.)

(c) actuators
(d) valves
(e) relays/switches
(f) panels
(g) power Supplies
(h) batteries
(i) HMI
(j) wiring and wiring accessories

1.4 Applicable codes and standards

.1 Legislation:

.1 Refer to section 23 11 13.

.2 Installation standards:

.1 Refer to section 23 11 13.

.3 Product standards:

.1 CSA C22.2 No. 14 Industrial Control Equipment.

1.5 Quality Control

.1 Installation and on site testing of fuel oil systems to be performed in accordance with referenced regulations and standards by a specialist firm with an established reputation in this field.

2 PRODUCTS

2.1 General

.1 Programmable Logic Controller (“PLC”) based Fuel Management System communicating over Industrial Ethernet.

.2 Provide equipment which functions and meets detailed performance criteria when operating in following minimum ambient condition ranges:

.1 Temperature - 0° to 32.2°C (32° to 90°F)

.2 Relative Humidity 10% to 90% non -condensing

.3 Electrical power service of single phase, 120 VAC +/- 10%, 60 Hz nominal

2.2 Programmable Logic Controllers

.1 General:

.1 Modular, compact, scalable, panel mounted control units, with expansion communications, minimum 2 MB memory, and I/O block elements.

Standard of Acceptance
- Siemens Simatic S7-1200
- Allan Bradley
- Schneider Electric

.2 Network communications:

(a) Primary: integrated Industrial Ethernet for ProfiNet TCP/IP, MODBUS TCP/IP or Ethernet TCP/IP.
(b) Secondary: gateway for Modbus RTU Master to BACnet/IP, supporting BACnet COV Subscriptions, for connection to the Building Automation System
(c) 8 port managed Industrial Ethernet network switch, for token ring or star topology.

.2 I/O modules:

.1 Local, direct coupled or expanded I/O modules,

.2 Built-in removable terminal blocks with finger safe cover over connections,

.3 Input filtering and output surge suppression,

.4 Digital (discrete) and analog inputs and outputs as required,

.5 Additional power supplies for expansion modules, and interconnecting cables.

.3 Control Logic:

.1 Control logic: software decisions are made based on field inputs rather than memory of the previous decision.

.2 Control system capability: discrete control, boolean logic control, and proportional/integral/derivative (PID) mode control.

.3 PID control strategies: provided in software program only.

.4 Set points entered through and retained by internal program registers. Provide a set point and indicators showing unit performances.

.4 HMI interface

2.3 Main Fuel Control Panel

.1 Function:

.1 Control and supervision of main supply tank fill valves, tank suction valve, and return oil valves.

.2 Main supply tank fuel inventory,

.3 Network communication management,

.4 Building Automation System communications integration.

.2 General:

.1 NEMA 4 control panel, with lockable front panel door,

.2 Control transformer with fused secondary,

.3 Numbered terminals for connection of external power and control wiring.

.4 Programmable logic controller as specified above and with HMI interface,

.5 8 port Ethernet switch,

.6 Main On-Off switch

.7 120 VAC pilot indicating lights:

(a) White: panel energized

.8 High decibel alarm horn:

(a) continuous: summary alarm.

.3 Building Automation System Interface:

.1 Modbus RTU Master to BACNet/IP gateway.

.4 HMI interface:

.1 Nominal 150 mm mm (6 in) TFT display screen, 256 colours, with touch screen function, with 6 assignable function keys.

.2 Graphical display configured for:

(a) main screen: supply tank inventory level; graphic, percent, and actual volume – all tanks, select sub-screens.
(b) sub-screens: selected tank inventory level; graphic, percent and actual volume, and associated control valves (x3) status
(c) sub-screens: tank high level alarm, red background, report tank level in percent and volume,
(d) sub-screens: fuel transfer pump and associated auxiliary tank current level.

.3 Six assignable functions keys programmed for:

(a) F1: alarm acknowledge
(b) F2: alarm cancel
(c) F3: move forward to next tank
(d) F4: move backward to previous tank
(e) F5: select tank to fill
(f) F6: start clear fill line program

Standard of Acceptance

° Siemens KTP600 Basic Color
° Allan Bradley
° Schneider Electric

2.4 Remote Fill Point Control Panel

.1 Function

.1 Remote control and supervision of main supply tank fill valves, tank suction valve, return oil valves, and tank level control indication.

.2 Supply tank high level alarm annunciation.

.2 General:

.1 NEMA 4 control panel, with non-locking front panel door,

(a) for exterior installation,
(b) HMI mounted on internal hinged and ventilated mounting panel located behind front access door,
(c) front access door provided with viewing window located in front of HMI,
(d) remote keypad and pilot lights mounted on front access door.

.2 Control transformer with fused secondary,

.3 Numbered terminal strip for connection of external power and control wiring.

.4 Programmable logic controller as specified above and with HMI interface.

.5 8 port Ethernet switch,

.6 Main On-Off switch

.7 120 VAC pilot indicating lights:

(a) White: panel energized
(b) Green: selected tank ready to fill
(c) Blue: selected tank at 85% fill level
(d) Yellow: selected tank at 100% high level
(e) Red: selected tank high level alarm

.8 Remote high level fill alarm:

(a) To section 23 11 13.

.9 Direct communications capability with Tank Room. Tank Room communications control shall be located such that it is readily accessed by person reading local tank levels.

.3 Panel heater:

.1 Electric panel heater, to maintain minimum internal panel operating temperature required for the components when ambient temperature is at -30°C (-22°F).

.4 HMI interface:

.1 Nominal 150 mm (6 in) TFT display screen, 256 colours, with touch screen function, with 6 assignable function keys.

.2 Graphical display configured for:

(a) main screen: supply tank inventory level; graphic, percent, and actual volume – all tanks; select sub-screens,
(b) sub-screens: selected tank inventory level; graphic, percent and actual volume, and associated control valves (x3) status; select tank for filling.
(c) sub-screens: tank high level alarm, red background, report tank level in percent and volume,
(d) sub-screens: fuel transfer pump and associated auxiliary tank current level.

.3 Six assignable functions keys programmed for:

(a) F1: alarm acknowledge
(b) F2: alarm cancel
(c) F3: move forward to next tank
(d) F4: move backward to previous tank
(e) F5: select tank to fill
(f) F6: start clear fill line program.

Standard of Acceptance
° Siemens KTP600 Basic Colour
° Allan Bradley
° Schneider Electric
°

2.5 Diesel Fuel Pump Control Panel

.1 To section 23 13 15.

2.6 Auxiliary Tank Control Panel

.1 General:

.1 To section 23 13 15 and with the following additional requirements.

.2 Programmable logic controller as specified herein to provide operational controls.

.3 HMI interface:

.1 nominal 100 mm (4 in) 4 grey scale mono display screen with touch screen function,

.2 graphical display configured for:

(a) pump run status
(b) auxiliary tank current level
(c) auxiliary tank setpoints (x4)
(d) connected main supply tank current level

.3 4 assignable functions keys programmed for:

(a) F1: alarm acknowledge
(b) F2: alarm cancel
(c) F3: auxiliary tank top-up initiate
(d) F4: spare

.4 Profinet TCP/IP connection

Standard of Acceptance
° Siemens KTP400 Basic Mono
° Allan Bradley
° Schneider Electric

2.7 Main supply tank level transmitter

.1 Level transmitter:

.1 RF capacitance type,

.2 4-20 mA output for continuous measured level,

.3 LCD display,

.4 teflon or stainless steel insulation shield for low dielectric materials,

.5 CSA listed explosion proof

.6 120 VAC, 60 Hz power.

Standard of Acceptance
° Magnetrol – Kotron model 805

2.8 Tank water level transmitter

.1 Level transmitter:

.1 Magnetorestrictive type, for detection of water level in diesel fuel and No. 2 heating oil storage tanks,

.2 4-20 mA output for continuous measured level,

.3 stainless steel probe tube, length to suit tank diameter

.4 resolution: minimum 0.1 mm (0.004 in) depth

.5 temperature compensated,

.6 float suitable for discriminating water at SG=1.0 layer beneath oil layer at SG=0.9,

.7 NPS 1-1/2 threaded mounting type,

.8 operating temperature: 20°C (70°F) nominal,

.9 CSA listed explosion proof

.10 10 to 30 VDC power.

Standard of Acceptance
° Gems – XT-1000 series

2.9 Wiring

.1 Instrumentation and control wiring:
.1 to section 20 05 13.

3 EXECUTION

3.1 Control Panels

.1 Mount control panels with top of panel approximately 1800 mm (6 ft) above floor level.

.2 Mount and wire level switches and pressure switches and connect to system control panels.

.3 Provide control and interlock wiring between pump control panel, auxiliary tank control panels, and main and remote control panels and other field installed devices.

.4 Provide 120 VAC power supply to panels. Provide field wiring installed in conduit for instrumentation and controlled devices. Use liquid-tight flexible conduit for last 300 mm (12 in) at instrument and controlled device.

.5 Program and configure software to suit sequence of operation for each panel. For control panels with graphic HMI displays, create graphics representing:
.1 tanks and current volume levels, including percent of volume and actual volume,
.2 pumps operating status, including associated generator run status.
.3 tank control valve open and closed positions.

3.2 Auxiliary tank high level switch interlocking

.1 Auxiliary tank High-High level switch and vent critical high level switch are hard-wired to the pump control or auxiliary tank control panel for redundant fill valve operation.

.2 For clarity, using PLC's and network wiring to provide pump or fill valve high-level interlock shut-down function is not permitted.

3.3 Tank instrumentation

.1 Coordinate with tank manufacturer for tank nozzle sizes for mounting requirements for each instrument.

.2 Calibrate level switches and transmitters, and convert levels to volumes based on tank geometry.

.3 Provide field installed mounting flanges as required to suit instrument.

3.4 Network wiring and configuration

.1 Run Ethernet cable in conduit.

.2 For panels connected on dedicated ring networks,
.1 run each section of the loop in dedicated conduits,

.2 limit each wire segment to be less than 90 meters. Provide intermediate network switches in a NEMA 4 locked enclosure to sub-divide long wire lengths to not exceed this length.

3.5 Alarm monitoring to BAS

.1 Coordinate with the BAS contractor for wiring of monitoring and alarm outputs from control panels to Building Automation System.

3.6 Testing

.1 Program and commission the Fuel Management System programmable controllers, including adjusting of time delays based on simulated power failure scenarios.

.2 Provide services of factory trained service representative to test and participate in commissioning of the Fuel Management System, until systems are accepted by the Owner.

.3 Test control system through all modes of operation:

.1 test auxiliary tank high level safety shut-down control, using auxiliary tank Test switch and by manually toggling vent Critical-High level switch,

.2 test automatic level control of pumps and valves for Lead and Lag pump operation,

.3 test alarm annunciation at local panels and at BMS.

.4 test all other control functions,

.5 submit a test report to the owner documenting the testing of all operating conditions including equipment fault and power failure fault operating functions.

3.7 Training and Instructions

.1 Provide control system training to Owner's operations staff on all control functions, including manual operations, and tank refilling operations.

.2 Provide written instructions for operations of the system.

.3 Provide laminated instruction sheets which includes both graphic and written instructions and post instructions in a permanent location adjacent each control panel. Instructions sheets to include:

.1 photo or graphic illustration of control panel,

.2 written step-by-step instructions for automatic operation, manual operation, and testing operations as applicable.

3.8 Control Sequence of Operation

.1 The sequence of operation for each panel follows:

.1 Main Control Panels

.2 Remote Fill Control Panels

Main Control Panels

Applicable Systems: Diesel Fuel System
Heating Oil Main Supply Tanks

General: Tank selection operations and system management are controlled as part of the Fuel Management System. Building Automation System ("BAS") interfaces at these control panels.

System Start: System is in service at all times, and operates on demand.

Normal Operation:

Low Tank Volume Notification

Only one main supply tank is in service at a time. When the oil level in the current in-service tank reaches 30%, an alarm notification is broadcast to the BMS as a change-tank request to the building Operator and the FMS provides the following information:

- current tank number,
- current level, and
- the next tank available with a fuel level greater than 75%.

The FMS does not automatically initiate tank change-over.

Tank-in-Service Change-over

Operator initiates tank changeover through access at any of: Main Control Panel, Remote Control Panel, Diesel Fuel Pump Control Panel, Auxiliary Tank Control Panel, or over the BMS.

Tank supply and return valves open in the following sequence, with each valve proved at its new state before the next valve changes position:

- Next tank supply valve and return valve opens, then
- Current tank supply valve and return valves close.

If any valve fails to be proved in its commanded state at 150% of its normal cycle time [field determined value], annunciate valve failure alarm, and broadcast alarm to BMS.

Tank Valve Position Confirmation

Annunciate alarm if in-service tank valves are not proved open. Check supply and return valve position status for tanks which are not in service. Annunciate alarm if not-in-service tank valves are not proved closed.

This alarm function is suspended during tank change-over.

Tank Level

Monitor the oil level and water level in each tank.

System Stop:

Pump Critical Low Level Trip

If current tank level reaches 10% of tank volume (note 2), shut-down the fuel pumps and generate alarm and tank change request.

Network Control:

Diesel Fuel Systems

Main Control Panel manages communications with Remote Control Panel, Diesel Fuel Pump Control Panel, and Auxiliary Tank Control Panel over Industrial Ethernet network components..

Heating Fuel System

Main Control Panel manages communications with Remote Control Panel over ProfiNet.

Alarms:

LX 001	Tank water level alarm: > 25 mm (1 in) in bottom of tank (each tank)
PLA 001	Tank low vacuum alarm (each tank)
AHA001	Oil detection in room alarm (each tank room)
VPOxxx	Current in-service tank valves not proved open
VPCxxx	Not-in-service tanks valves not proved closed
LHHA002	Tank high level alarm: > 95%
LX001	In-service tank low level notification: < 30% and change tank request
LX001	In-service tank low level alarm: < 15%, and pumps ready to shut-down
LX001	Pump critical low level trip: < 10% and pumps tripped.

BMS Integration: FMS is integrated to the BMS over Modbus RTU Mater to BACNet/IP.

BMS Read objects (from FMS):

- Tank current level (main and auxiliary tanks)
- Tank level setpoints (main and auxiliary tanks)
- Alarms as described under “Alarm” category above
- Pump run status (each pump)
- Pump high pressure status/alarm (each pump)
- Pump low pressure status/alarm (each pump)
- Valve position status

BMS Write Objects (to FMS)

- Tank selection command
- Heating fuel pump run command (Heating Fuel system only)
- Heating fuel pump fire alarm trip command (Heating Fuel system only)

Remote Fill Control Panel

Applicable Systems: Diesel Fuel System
Heating Oil System

General: Tank filling operations and inventory management are controlled as part of the Fuel Management System.

Operator access for filling operations is primarily provided through the Remote Control Panel, but can also be performed at the Main Control Panel.

System Start: System is in service at all times, and operates on demand.

All tank fill valves are closed.

Normal Operation:

Tank Fill Operation

Operator selects tanks and the tank-fill order based on current volume level, and then enters initiate command.

First selected tank fill valve opens and when proved open, annunciate status at HMI graphic and at pilot light (Green) on panel face (Selected Tank status is On). HMI graphic displays only selected tank with graphical fill level, percent fill level, and volume content.

During tank filling, when tank level reaches 85% (approaching high level), annunciate alarm at HMI and at pilot light (Blue) on panel face, and pulsed audible alarm is activated.

During tank filling, when tank level reaches 90% (at high level), annunciate alarm at HMI and at pilot light (Yellow) on panel face, and continuous audible alarm is activated. Tank fill valve starts closing (Selected Tank status is OFF), and concurrently next tank (note 1) valve starts opening. When next tank valve is fully open and previous tank valve is closed, annunciate status at HMI graphic and at pilot light (Green) on panel face (Selected Tank status is On). HMI changes displayed tank to new selected tank.

Tank High-High Level

During tank filling, if tank level reaches 95% at any tank (including selected tank), high level alarm annunciates at HMI and at pilot light (Red) on panel face and continuous audible alarm is activated. All tank fill valves are commanded closed including selected tank.

System Stop:

Purge Fill Lines Operation

At conclusion of selected tank filling, Operator initiates “purge fill lines” operation.

FMS selects tanks which are less than 92% filled (note 3), and opens all tank fill valves. When valves proved open, annunciate status at HMI and at pilot light (Green) on panel face.

After five (5) minutes (field determined), fill valves are closed.

Network Control: Remote Fuel Pump Control Panel communicates to FMS Main Control Panel over ProfiNet.

Alarms: All alarm report functions at the Main Control Panel are available at the Remote Control Panel.

Primary alarm functions at the Remote Control Panel include:

VPOxxx	Current in-service tank valves not proved open
VPCxxx	Not-in-service tanks valves not proved closed
LHHA002	Tank high level alarm: > 95%
LX001	In-service tank low level notification: < 30% and change tank request
LX001	In-service tank low level alarm: < 15%, and pumps ready to shut-down
LX001	Pump critical low level trip: < 10% and pumps tripped.

END OF SECTION

WATER SPECIALTIES - HEATING AND COOLING
23 21 11

1 GENERAL

1.1 Scope

.1 Provide water specialties in accordance with this Section for systems where working temperatures are in range of -12°C to 120°C (10°F to 248°F) and working pressure up to 1035 kPa (150 psi).

.2 This section covers specialties for:

.1 Hot water and low temperature heating system

.2 Exterior zone heating and cooling system

.3 Water system relief valve vents & overflows

.4 Glycol heating and cooling systems

.5 Condenser water system

.6 Chilled water system

1.2 Shop Drawings

.1 Submit manufacturers data sheets for:

.1 expansion tanks,

.2 air vents,

.3 separators,

.4 strainers,

.5 pressure reducing valves,

.6 pressure relief valves,

.7 water make-up assemblies,

.8 pump suction diffusers,

.9 glycol make-up unit and mixing tank.

2 PRODUCTS

2.1 Bladder type expansion tanks

.1 Construction:

.1 cylindrical, pressurized type with elastomer bladder, suitable for 115°C (240°F) operating temperature,

.2 welded construction conforming to ASME Section VIII for unfired Pressure Vessels, CSA B-51, and provincial regulations,

.3 manufactured from ASTM A516 pressure vessel carbon steel plate with dished ends,

.4 finish: primed on outside,

.5 ASME code rated for 860 kPa (125 psi) working pressure with ASME stamp and certification,

.6 annular base mount for vertical installation

(a) support base and hold-down bolt-holes designed for a horizontal seismic cycle load equal to 50% of tank and contents weight in shear, and each leg designed for 100% of the resulting bending moment, and
(b) safety factor of 4:1

.2 Nozzles and couplings:

.1 NPS 1 expansion line fitting at/near bottom.

.3 Accessories:

.1 Schraeder tank valve for compressed air located above bladder,

.2 air precharged to initial fill pressure of system.

Standard of Acceptance
- Amtrol Extrol
- Taco CBX
- ITT Bell & Gossett
- Conbraco

2.2 Automatic air vents

.1 Float operated with brass or cast iron body;

.1 design pressure: 1035 kPa (150 psi) working pressure.

Standard of Acceptance
- Maid-O-Mist No. 75
- Taco 418
- Amtrol No. 720
- Spirax Sarco - Fig. 13W
- Grinnell - Fig. 1401
- ITT Bell & Gossett - Model 107

2.3 Automatic radiator air vents

.1 Float operated with brass body;

.1 design pressure: 1035 kPa (150 psi)

Standard of Acceptance
- Maid-O-Mist No. 37
- Taco 417
- Braukman No. EA122
- Spirax Sarco - Fig. AE30

2.4 Air separator-boiler mounted

.1 Dip tube type;

.1 design pressure: 860 kPa (125 psi).
- Amstrong BMA
- ITT Bell & Gossett - Airtrol boiler fitting

2.5 Air separator (in-line)

.1 Coalescing removal separation type;

.1 design pressure: 860 kPa (125 psi).

- Spirotherm
- ITT Bell & Gossett - CRS
- Taco – Series 4900

.2 Centrifugal separation type;

.1 designed as unfired pressure vessel,

.2 design pressure: 860 kPa (125 psi).

Standard of Acceptance

- Taco - Air separator
- ITT Bell & Gossett - Rolairtrol
- Amtrol -Tangential air separator
- Armstrong - VA

2.6 Water make-up assemblies

.1 Iron body water pressure regulator with integral check, and fast fill /purge lever;

.1 stainless steel strainer, and

.2 iron body diaphragm operated relief valve

- Watts - No.1450F series
- A.W. Cash Valve - Type CBL

2.7 Hydronic system pressure safety relief valves

.1 Brass or iron body to ASME Section IV;

.1 adjustable pressure setting from 55 to 172 kPa (8 to 25 psi),

.2 operating differential pressure from open to close not more than 20 kPa (3 psi).

2.8 Strainers:

.1 "Y" pattern:

.1 NPS 3 and smaller, WOG service:

(a) bronze, cast iron or steel bodies,
(b) design pressure: 1030 kPa (Class 150)
(c) fittings: screwed or flanged to match specification for fittings in section of piping system where strainer is to be installed,
(d) basket: stainless steel, 0.8 mm ($^{1}/_{32}$ in) diameter perforations.

.2 NPS 4 and larger, WOG service:

(a) bronze, cast iron or steel bodies,
(b) design pressure: 1030 kPa (Class 150)
(c) fittings: flanged,
(d) basket: stainless steel, 3.2 mm (c in) diameter perforations,
(e) baskets with 3.2 mm (c in) diameter perforations: made from 0.9 mm (0.037 in) stock reinforced with 13 mm x 0.9 mm (½ in x 0.037 in) bands of same material spot welded to baskets.
(f) Blow-down NPS 3/4 threaded connection.

2.9 Suction diffusers:

.1 Construction:

.1 cast iron bodies,

.2 fittings: screwed or flanged to match specification for fittings in section of piping system where diffuser is to be installed,

.3 disposable fine mesh screen,

.4 screen blow down connection,

.5 permanent magnet particle trap,

.6 full length straightening vanes,

.7 pressure gauge tappings.

Standard of Acceptance
- ITT Bell & Gossett - FTP-screwed, FLG-flanged
- Taco - Series "SD"
- Armstrong - Suction Guide
- Victaulic - Suction Fitting

2.10 Water pressure reducing valves:

.1 Construction:

.1 self-contained hydraulic pilot controlled type,

.2 single seated with resilient disc in iron body.

.3 bronze seat for pressure drops below 480 kPa (70 psi), and

.4 stainless steel seat for 480 kPa (70 psi) and over,

.5 diaphragm suitable for 120°C (250°F) service.

Standard of Acceptance
- Singer Valve (Syntec)
- Cla-Val
- GA

2.11 Glycol make-up unit and mixing tank:

.1 Construction:

.1 210 litre (55 gallon) open cylindrical tank

.2 material: polyproplene, structurally formed tank or with channel reinforced bottom and support stand,

.3 enclosed, vented tank, or hinged gasketted cover with counterweight balanced hold-open mechanism.

.2 Fittings and accessories:

.1 overflow, inlet and suction connections,

.2 pump mounting arrangement.

.3 suction and discharge piping with isolation valves and check valves.

.3 Glycol transfer pump;

.1 single close-coupled iron fitted centrifugal feed pump with mechanical seal, mounted to mixing tank, and pre-piped to suction strainer,

.2 rated for 0.63 l/s at 210 kPa (10 gpm at 30 psi).

.3 low water level cut-out switch,

.4 high water level alarm,

.5 system low pressure pump start switch,

.6 remote annunciation contacts for low liquid level, high liquid level.

Standard of Acceptance
- Bell & Gossett - GMU
- Armstrong - GLA UHP1

3 EXECUTION

3.1 Water system expansion tank

.1 Provide Diaphragm type type tank(s).

.2 Install equalizer line from air separator in piping system to bottom of tank,

.3 Provide domestic cold water line with globe valve, strainer, and line size backflow preventer with isolating valves connected to equalizer line.

.4 Provide water make-up assembly on domestic water line on tank side of backflow preventer, with:

.1 code rated water safety relief valve, located in piping near bottom of tank with relief pressures set to maintain 70 kPa (10 psi) at highest point in system with pumps off.

.2 relief valve of minimum 20 mm (¾ in) size and of same model and size as relief valve used on heating convertor, if tank is connected to steam generated hot water system,.

.3 relief connection on backflow preventer, on make-up assembly, and safety relief valve piped to nearest open drain,

.4 pressure gauge to show pressure in tank,

.5 compressed air to each tank or group of tanks with globe valve and check valve, terminating 1200 mm (4 ft) above finished floor near tanks with 6 m (20 ft) length of hose and hose end fitting compatible with Schraeder connection on tank.

3.2 Air vents

.1 Provide isolating valves installed between unit and piping.

.2 Install air vents at high points, and in sections of piping subject to air binding, in both supply and return mains.

.3 Pipe vent outlets to discharge to drain, over janitors sinks, over floor drains in mechanical rooms and other similar visible locations.

3.3 Air vents for radiators

.1 Install radiator air vents on 20 mm (¾ in) by 50 mm (2 in) long air chambers on return side of hot water convector-radiators and wall fin heaters connected to top of flow risers. Pipe vent outlets to drain in visible locations.

.2 Fit other hot water convector-radiators with 20 mm (¾ in) by 150 mm (6 in) air chamber with screwdriver operated air vent piped through front or side of cabinet. Fit similar air chamber and screwdriver operated air vent, through front or side of cabinet, on high points of other wall-fin heating elements except that air chamber to be as long as is possible to install within wall-fin enclosure height.

.3 Install air vent assemblies clear of dampers within heating units.

3.4 Pressure safety relief valves

.1 Install on hot water boilers, expansion tanks and other pressure vessels in accordance with relevant codes

.2 Pipe outlets to drain.

3.5 Strainers

.1 Install strainers in horizontal or down flow lines with clearance for removal of basket.

.2 Up to NPS 2 size provide screwed blind caps.

.3 On water and glycol systems NPS 2½ and over provide NPS 1 valved blowout connection, consisting of ball valve with hose end and chained cap. Pipe valved blowout connections from strainers at pumps to open drain.

.4 Provide line size strainer in each of following locations

.1 On inlet side of water meters

.2 On inlet side of control valves (except at reheat coils with piping connections NPS ¾ or less, radiation, or radiant panels)

.3 On inlet side of pressure reducing valves

.4 On suction side of water circulating pumps

3.6 Pressure reducing valves

.1 Install pressure reducing valve stations with shut-off valve on either side of assembly and 115 mm (4½ in) pressure gauges on upstream and downstream sides of station.

END OF SECTION

STEEL PIPE AND FITTINGS - HEATING AND COOLING
23 21 13

1 GENERAL

1.1 Scope

.1 Provide steel pipe and fittings for systems where working temperatures are in range of -10°C to 120°C (14°F to 248°F) and working pressure is less than 860 kPa (125 psi).

1.2 Shop drawings

.1 Submit shop drawings where pipe assemblies with fittings, elbows and flanges are shop fabricated.

1.3 Applicable codes and standards;

.1 Provide materials to:

- .1 ASTM A47 Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- .3 ASTM A106 Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
- .4 ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts and Bolts for High-Pressure or High-Temperature Service, or Both.
- .5 ASTM A536 Standard Specification for Ductile Iron Castings.
- .6 ANSI A21.11 Rubber Gasket joints for Ductile-Iron Pressure Pipe and Fittings
- .7 ANSI B1.20.1 Pipe Threads, General Purpose (inch)
- .8 ANSI/ASME B16.1 Cast Iron Pipe Flanges And Flanged Fittings
- .9 ANSI/ASME B16.3 Malleable Iron Threaded Fittings.
- .10 ANSI/ASME B16.5 Pipe Flanges and Flanged Fittings
- .11 ANSI/ASME B16.9 Factory Made Wrought Steel Buttwelding Fittings
- .12 ANSI/ASME B16.20 Metallic Gaskets for Pipe Flanges: Ring Joint Spiral Wound and Jacketed.
- .13 ANSI/ASME B16.21 Nonmetallic Flat Gaskets for Pipe Flanges.
- .14 ANSI/ASME B18.2.1 Square and Hex Bolts and Screws,
- .15 ANSI/ASME B18.2.2 Square and Hex Nuts
- .16 CSA B242 Groove and Shoulder Type Mechanical Pipe Couplings
- .17 CSA W47.1 Certification of Companies for Fusion Welding of Steel.

.2 Install piping to:

- .1 AMSI/ASME B31.9 Building Service Piping
- .2 ANSI/ASME B31.1 Power Piping

.3 Install registered pressure piping to:

- .1 CSA B51 Pressure Piping Code
- .2 ANSI/ASME B31.1 Power Piping.

1.4 Pressure Piping Registration

.1 Make application and pay costs for registration and inspection of pressure piping systems with the BC Safety Authority;

.1 heating systems: design temperature greater than 121°C (250°F), or design pressures greater than 1100 kPa (160 psig).

.2 chilled water, condenser water, and other water systems: design pressures greater than 1700 kPa (250 psig) where design temperatures are less than 65°C (150°F).]

2 PRODUCTS

2.1 Steel pipe for heating and cooling water service

.1 Hydronic piping service, carbon steel:

.1 NPS 1/2 to 10:

(a) ASTM A106 Gr B, schedule 40 seamless, or
(b) ASTM A53 Gr B, schedule 40 Electric Resistance Weld (ERW).

.2 NPS 12 and over:

(a) ASTM A53 Gr B, 0.375 in wall, ERW.

2.2 Pipe joints for sizes NPS 2 and under

.1 Threaded:

.1 threaded malleable iron fittings, Class 150 to ANSI B16.3

.2 1030 kPa (Class 150) black malleable iron, bronze face, ground joint unions.

Standard of Acceptance
° Anvil

2.3 Pipe joints for sizes NPS 2 ½ and over

.1 Welding fittings:

.1 wall thickness to match pipe

.2 butt weld type to ANSI B16.9

.2 Flanges:

.1 raised face style to CSA W47.1

.2 cast iron Class 150 to ANSI B16.1.

.3 forged steel, 1035 kPa (150 #) to ANSI B16.5, weld neck with wall thickness to match pipe, or slip on type.

.4 studs, bolts and nuts to ANSI B18.2.1, ANSI 18.2.2 and ASTM A194, “high strength” type.

.5 gaskets to ANSI B16.21, ANSI B16.20 or ANSI A21.11 of red rubber sheet 1.6 mm ($^{1}/_{16}$ in) thick

Standard of Acceptance
° Chesterton 100
° Beldam Red Rubber

.3 Rolled or cut grooved standard or rigid fittings and couplings:

.1 to CSA B242 with dry lubricated EPDM gaskets,

.2 malleable iron to ASTM A47 or ductile iron to ASTM A536 for grooved piping in sizes NPS 2 ½ to 12,

.3 fabricated steel in sizes NPS 14 and over

.4 maximum working temperature is less than 100°C (210°F)

Standard of Acceptance
° Victaulic

2.4 Pipe Joints for sizes NPS 14 to 24

.1 Couplings:

.1 to CSA B242 with dry lubricated EPGM gaskets,

.2 operating temperatures : -34°C (-30°F) to 110°C (230°F),

.3 operating pressure, maximum: 2400 kPa (350 psig),

.4 coupling designed to comply as a rigid joint to ASME B31.1 and B31.9

Standard of Acceptance
° Victaulic - AGS

3 EXECUTION

3.1 Piping installation

.1 Pipe joints:

.1 [Piping NPS 2 and smaller: tapered pipe threads to ANSI B1.20.1and teflon tape or pipe thread sealant similar to Masters Pro-Dope

.2 Piping NPS 2½ and larger: welded with butt weld fittings or made up with grooved pipe and couplings.

.2 Equipment connections:

.1 NPS 2 and smaller: unions and threaded fittings

.2 NPS 2 ½ and larger: flanged connections.

.3 Install concealed pipes close to building structure to keep furring spaces to minimum and minimize obstruction to other services in ceiling spaces.

.4 Run exposed piping parallel to walls and conserve headroom and space. Group piping wherever practical.

.5 Slope main piping up in direction of flow 1:1000 (c in in 10 ft).

.1 Branch piping to have greater slope.

.6 Use eccentric reducers at pipe size changes arranged flat on bottom to assist venting.

.7 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.8 Ream pipe after cutting to length and clean off scale and dirt inside and outside of pipe before threading grooving or welding.

.9 Cap ends during construction to prevent entry of foreign matter.

.10 Branches may be welded directly into main provided main is more than NPS 4 and branch is at least 2 pipe sizes smaller than main. Cut openings in main true and beveled. Branch pipes are not to project inside main pipe. Openings to be sized to prevent entry of welding metal and slag into pipes.

.11 Where saddle type branch welding fittings are used on mains, hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding.

3.2 Groove joint piping

.1 Make pipe ends clean and free of indentations, projections and roll marks, between the end of the pipe and the groove.

.2 Verify gasket style and material grade with supplier for use with intended service.

.3 Provide for manufacturers' service representative to conduct on-site training prior to piping rough-in and installation.

.4 Retain manufacturer's service representative to sign off each individual coupling installation as correct.

3.3 Flushing and cleaning

.1 After hydraulic pressure test, flush to drain with clean water for minimum of four hours.

.2 Isolate system from other piping systems. Drain and fill with solution of water and non-foaming, phosphate free detergent, 3% by weight. Provide temporary pump for additions to existing systems and circulate solution for minimum of eight hours.

.3 Flush to drain with clean water for four hours. Remove and clean strainers.

.4 Drain and refill system with clean water and circulate for two hours. Inspect strainers, and repeat drain, fill and recirculate routine until strainers are free of debris.

END OF SECTION

PUMPS - HEATING AND COOLING
23 21 23

1 GENERAL

1.1 Scope

.1 Provide pumps as required.

1.2 Shop Drawings

.1 Submit shop drawings or manufacturers' product data sheets and pump curves. Indicate connection points, weights, loading points and electrical characteristics.

1.3 Applicable Codes and Standards

1.4 C820 - Energy Efficiency Test Methods for Small Pumps.

2 PRODUCTS

2.1 General

.1 Selected operating point for each pump to be in range between 30% below and 10% above flow at best efficiency point for chosen impeller diameter.

.2 Determine head, power and efficiency test data for small pumps in accordance with C820.

.3 Performance curve, showing head vs flow, to rise continuously from run out to shut-off.

.4 Actual impeller size to be equal to or less than 90% of maximum impeller diameter catalogued for chosen casing size.

.5 Select motors for continuous operation without motor overload at runout condition, for impeller size and rotational speed chosen.

.6 Pump motors: to Section 20 05 13 *Motors, Starters and Wiring,* unless otherwise specified.

2.2 Pump seals

.1 Pumps with suction pressures less than 700 kPa (100 psi) to be fitted with mechanical seals.

.2 Pumps with suction pressures greater than 700 kPa (100 psi) may be fitted with mechanical seals or packing glands.

.3 Fit pumps with packing gland with;

.1 stainless steel shaft, or

.2 stainless steel shaft sleeve for full length of stuffing box.

°

2.3 Single suction split coupled vertical-in-line centrifugal pump

.1 Pump:

.1 bronze fitted type,

.2 cast iron casing with motor mounting flange and drip rim and tapping for drain connection,

.3 alloy steel or stainless steel shaft,.

.4 bronze, cast iron, or stainless steel, enclosed, dynamically balanced impeller keyed to motor shaft and secured with locking nut or screw,.

.5 cast iron radially split end suction volute with flanged suction and discharge, drain plug, vent cock and suction and discharge pressure gauge tappings,.

.6 mechanical seal with positive seal flushing system consisting of valved copper piping from pump discharge to seal, ball type flow indicators and;

(a) cyclone separators for pump heads up to 2400 kPa (800 ft), or
(b) 50 micron filters on pumps subject to dynamic heads of less than 160 kPa (55 ft).

.7 split coupled motor mount with flexible self-aligning coupling.]

.2 Motor:

.1 ODP motor, rated for AFD application.

Standard of Acceptance
- S.A. Armstrong
- ITT Bell and Gossett
- Aurora
- Sulzer Paco
- Taco KS/KV

3 EXECUTION

3.1 General

.1 Pipe drain tapping to drain.

.2 Install gauges.

.3 Check pump rotation.

3.2 Installation of vertical in-line pumps

.1 Support pump from pipe elbow stanchions or hangers on suction and discharge piping.

.1 Support pump on underside of pump base where required by manufacturer's instructions.

.2 Install volute venting pet cock in accessible location.

END OF SECTION

STEAM SPECIALTIES
23 22 11

1 GENERAL

1.1 Scope

.1 Provide steam specialties as required and specified;

.2 Pressure ratings:

.1 low steam pressure: 0 to100 kPa (0 to 15 psi),

.2 intermediate steam pressure: 100 to 500 kPa (15 to 75 psi) and

.3 high steam pressure: 500 to 1035 kPa (75 to 150 psi)

1.2 Shop Drawings

.1 Submit manufacturers' product data sheets for: steam traps, vacuum breakers, pressure reducing valves, safety relief valves, drip pan elbows, flash tanks and boiler blow off tanks.

1.3 Applicable codes and standards

.1 CSA B51 Boiler, Pressure Vessel, and Pressure Piping Code

.2 ASME Boiler and Pressure Vessel Code

.3 ASME B18.2.1 Square and Hex Bolts and Screws, Inch Series

.4 ASME B18.2.2 Square and Hex Nuts

.5 ASTM A126 Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings

.6 ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.7 ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

.8 ASTM A276 Standard Specification for Stainless Steel Bars and Shapes

.9 ASTM A278 Standard Specification for Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650EF (350EC)

.10 ASTM A285 Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate Tensile Strength.

.11 ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.12 ASTM A351 Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts

.13 ASTM A516 Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service.

.14 ASTM A564 Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes

.15 ASTM B62 Standard Specification for Composition Bronze or Ounce Metal Castings.

2 PRODUCTS

2.1 General

.1 Listings:

.1 fittings installed in a registered piping system: listed with Canadian Registration Number (CRN).

.2 Materials:

.1 To CSA B51 with;

(a) cast iron to ASTM A278, Class 30 or ASTM A126 Class B.
(b) bronze to ASTM B62
(c) stainless steel: to ASTM A351, ASTM A167, ASTM A276 or ASTM A564.

.3 Bolting requirements:

.1 to ASTM A307

.2 studs, bolts and nuts to ASME B18.2.1, ASME B18.2.2 and ASTM A194, “high strength” type.

2.2 Float and thermostatic steam traps

.1 Construction:

.1 cast iron or semi-steel body suitable for 1035 kPa (150 psi) working pressure,

.2 bronze or stainless steel valve with stainless steel seat,

.3 stainless steel float and mechanism,

.4 phosphor bronze or stainless steel thermostatic type air vent.

.2 For steam inlet pressure between 0-100 kPa (0-15 psi)

Standard of Acceptance
- Armstrong "B" Series
- Spirax-Sarco "FT15" Series
- Watson McDaniel “FT-3"
- Yarway FT- L Series
- Hoffman F&T
- Colton CFT Series
- Gestra UNA Series

.3 For steam inlet pressure between 110-1035 kPa (16-150 psi),

.1 Selected with internals suitable for steam inlet pressure,

Standard of Acceptance
- Armstrong "J" or "L" Series
- Spirax-Sarco "FT" Series
- Watson McDaniel “FT” Series
- Yarway FT- M and H series up to 125 psi
- Hoffman F&T up to 125 psi

- Colton CFTH Series

2.3 Inverted bucket steam trap

.1 Construction:

.1 design pressure: 1035 kPa (150 psi)

.2 cast iron or semi-steel body suitable

.3 chrome steel or stainless steel valve with stainless steel seat,

.4 stainless steel or brass bucket and mechanism,

.5 bi-metal vent.

.6 selected with internals suitable for steam inlet pressure,

Standard of Acceptance

- Armstrong "800" Series
- Spirax-Sarco "B" Series
- Watson McDaniel “1031" Series
- Hoffman Series 600
- Colton CB Series

2.4 Thermostatic Steam Traps

.1 Construction:

.1 design pressure: steam inlet pressure 0-500 kPa (0-75 psi):

.2 forged steel or brass body and cap with union inlet,

.3 stainless steel valve seat,

.4 stainless steel bellows, or bi-metalic stack,

.5 integral strainer.

Standard of Acceptance

- Armstrong TT Series
- Spirax Sarco SM 24 H
- Watson McDaniel #TT-25B
- Yarway Series R
- Hoffman TB Series
- Colton CR Series
- Gestra MK Series]

2.5 Vacuum Breakers

.1 Construction:

.1 design pressure: steam inlet pressures of 1 - 70 kPa (0.1 - 10 psi).

.2 brass or stainless steel body and cap,

.3 stainless steel spring,

.4 brass or stainless steel stem and seat.

Standard of Acceptance

- Hoffman No. 62
- Watson McDaniel #WVB-SS
- Colton CVB Series

- Durabla BSSV
- Gestra RK Series
- Armstrong

2.6 Moisture Separators

.1 Construction:

.1 design pressure: code stamped for 1035kPa (150psi)

.2 baffle type with steel body

.3 constructed in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1

.4 NPS 2 and smaller inlet or outlet connections: threaded connections,

.5 NPS 2 ½ and larger inlet or outlet connections: ANSI Class 150 flanged connections,

.6 screwed bottom drain connection.

Standard of Acceptance
- Spirax Sarco - S4A
- Watson McDaniel - WDS Type T
- Colton - Type MSF

2.7 Pilot operated pressure reducing valves

.1 Construction:

.1 design pressure: code stamped for 1035kPa (150psi)

.2 self-operating, external pilot, single seat, diaphragm type with enclosed spring chamber, main and pilot valves,

.3 NPS 2 and smaller: threaded connections.

.4 NPS 2½ and over: flanged connections.

.5 cast iron body for both main and pilot valves, stainless steel diaphragm, stainless steel seat rings,

.6 stainless steel disc, stainless steel stem, carbon steel spring

.7 inlet Y-pattern strainer.

Standard of Acceptance.
- Armstrong GP-2000
- Fisher Governor 92C
- Worthington - Masonneilan Type 220-22
- Spence Type ED
- Spirax Sarco. Type 25P
- Watson McDaniel #DP
- Leslie Class LY
- Gestra Type 5801 Series

2.8 Pneumatic operated pressure reducing valves

.1 Construction:

.1 design pressure: code stamped for 1035kPa (150psi)

.2 wall mounted controller sensing steam discharge pressure, modulating pneumatically operated diaphragm valve with adjustment of set point, proportional band and automatic reset.

.3 bronze, cast iron, or cast steel body with stainless steel removable trim,

.4 NPS 1½ and smaller: threaded connections,

.5 NPS 2 and over: flanged connections.

.2 Accessories:

.1 equipped with special trim or silencer to maintain noise level below 80 dBA measured 1.5 m (5 ft) from pressure reducing valve in any direction.

Standard of Acceptance
- Armstrong
- Fisher Governor
- Worthington - Masonneilan
- Spence
- Spirax Sarco
- Leslie

2.9 Safety relief valves

.1 Construction:

.1 design pressure: code stamped for 1035kPa (150psi)

.2 re-seatable, spring loaded type,

.3 bronze, cast iron or cast steel body,

.4 cadmium plated steel spring, and

.5 brass or bronze trim.

Standard of Acceptance
- Spirax Sarco 6000 series
- Watson McDaniel WSVB Series
- Kunkle Valve
- Spence
- Conbraco

2.10 Drip pan elbows

.1 Construction:

.1 cast iron or steel,

.2 threaded or flanged inlet, and

.3 threaded drain connections.

Standard of Acceptance
- Kunkle Valve
- Spence
- Watson McDaniel WDPE
- Colton
- Conbraco

2.11 Strainers

.1 Construction:

.1 "Y" pattern with bronze, cast iron or steel bodies,

.2 threaded or flanged to match pressure class and size limitations specified for valves in section of piping system where strainer is to be installed,

.3 stainless steel baskets with 0.8 mm ($^1/_{32}$ in) diameter perforations.

2.12 Flash Tank

.1 Construction:

.1 design pressure: code stamped for 1035kPa (150psi)

.2 vertical or horizontal type of size as required, fabricated in accordance with ASME Boiler and Pressure Vessel Code.

.3 not used,

.4 NPS 2 and smaller: threaded couplings,

.5 NPS 2-1/2 and larger: flanges,

.6 prime coat finish,

.7 legs for vertical tank or saddles for horizontal tank.

Standard of Acceptance
- GILFAB - ASI
- Colton FT Series
- Clemmer
- Drummond Welding and Steel Works
- DTE
- Docal

2.13 Boiler blow-off tank

.1 Construction:

.1 design pressure: code stamped for 1380 kPa (200 psig),

.2 vertical type of size as specified in section 7.5.2.4(9) of SOR,, with legs, threaded or flanged connections, fabricated in accordance with ASME Boiler and Pressure Vessel Code.

.3 300 mm x 375 mm (12" x 15") manhole

.4 outlet connection with internal pipe and open tee at top of pipe

.5 shell and head material to ASTM A285C

.6 prime coat finish

.7 legs for vertical tank

Standard of Acceptance
- ASI - gilfab
- Colton BDT Series
- Clemmer
- Drummond Welding and Steel Works
- DTE

.8 heat recovery system for blowdown to recover at least 80% of available heat.

2.14 Boiler blowdown separator

.1 Construction:

.1 design pressure: code stamped for 1380 kPa (200 psig),

.2 vertical, instantaneous type, fabricated in accordance with with ASME Boiler and Pressure Vessel Code.

.3 NPS 2 and smaller inlet or outlet: threaded connections,

.4 NPS 2 ½ and larger inlet or outlet: ANSI Class 150 flanges,

.5 shell and head material to ASTM A285C,

.6 prime coat finish,

.7 legs for vertical tank,

.8 bottom outlet fitted with automatic water tempering aftercooler package suitable for a water pressure of 415 kPa (60 psig) with;

(a) aftercooler fitting,
(b) temperature regulating valve
(c) strainer, and
(d) thermometer

.9 drain connection sized to handle 70% boiler blowdown flow, as water,

.10 top outlet vent connection sized to handle 30% of boiler blowdown flow, as steam at atmospheric pressure.

Standard of Acceptance

- Penn Separator
- Hurst
- Bryan
- Allied Boiler

3 EXECUTION

3.1 Low pressure steam trap assemblies

.1 Provided for equipment with modulating control of steam flow.

.2 Float and thermostatic traps of appropriate pressure rating.

.3 Sized for twice maximum condensing rate of apparatus served and three times maximum condensing rate for fresh air coils and preheat coils.

.4 Capacities based on 3.5 kPa (½ psi) differential on trap.

.5 Line size dirt pocket not less than 250 mm (10 in) long.

.6 Socket weld blow-down connection, NPS 1 size with NPS 1 gate valve, nipple, and cap located at bottom of each dirt pocket.

.7 Trap line made up with gate valve, strainer, union, steam trap, union and gate valve, socket weld from dirt pocket to first nipple after upstream isolation valve.

.8 Test connection NPS ½ size with NPS ½ globe valve, nipple and cap, located after trap, and ahead of final gate valve in assembly.

3.2 Drip trap assemblies

.1 Located in low pressure steam lines; at base of risers, at low points in system, before automatic control valves and after pressure reducing valves and installed at intervals of not more than 90 m (300 ft) in horizontal runs.

.2 Sized for condensate rates as shown below for high pressure drip traps.

.3 Trap line made up as described above for low pressure trap assemblies with internals selected for inlet steam pressure.

.4 Blow-down connection, NPS 1 size with NPS 1 gate valve, nipple, and cap located at bottom of each drip assembly dirt pocket.

3.3 High pressure steam trap assemblies

.1 For dripping apparatus operating at steam pressures above 75 kPa (40 psi).

.2 Inverted bucket traps of appropriate pressure rating with capacities based on pressure differential across trap of not more than 25% of nominal working pressure.

.3 Sized for three times maximum condensing rate of apparatus served.

.4 Made-up with socket weld fittings and connections for trap line, dirt pocket, and blow down.

.5 Line size dirt pocket not less than 250 mm (10 in) long.

.6 Blow-down connection, NPS 1 size with NPS 1 gate valve, nipple, and cap located at bottom of each dirt pocket.

.7 Trap line made up with gate valve, strainer, union, steam trap, union and gate valve.

.8 Test connection NPS½ size with NPS½ globe valve, nipple and cap, located after trap, and ahead of final gate valve in assembly.

3.4 High pressure drip assemblies:

.1 Located in high pressure steam piping; at base of risers, before automatic control valves, before pressure reducing valves, at low points and at intervals of not more than 90 m (300 ft) in horizontal runs.

.2 Sized for condensate rates as shown in table below.

.3 Made up with;

- .1 socket weld fittings and connections for trap line, dirt pocket, and blow down,
- .2 thermodynamic traps for steam inlet pressure of 100-1725 kPa (15-250 psi),
- .3 thermostatic or thermodynamic traps where inlet steam pressures are 0-103 kPa (0-15 psi).

.4 Line size dirt pockets on lines up to NPS 4 and on larger main sizes, at least half of main diameter, but not less than NPS 4.

.5 Dirt pockets 1½ main diameters long, but not less than 250 mm (10 in).

.6 Blow-down connection, NPS 1 size with NPS 1 gate valve, nipple, and cap located at bottom of each drip assembly dirt pocket.

.7 Trap line made up with gate valve, strainer, union, steam trap, union and gate valve.

.8 Lift check valve in condensate discharge line at locations where drip assembly return is lifted above top of gravity return main.

3.5 Condensing rate for sizing steam main drip trap assemblies.

Steam main size NPS	Condensate rate lb/hr/ft	Condensate rate kg/hr/m
2	.16	.24
2½	.20	.30
3	.28	.41
4	.36	.54
5	.51	.76
6	.66	.98
8	.80	1.19
10	.92	1.37
12	1.03	1.53

3.6 Strainers

.1 Installed in horizontal or downflow lines with clearance for removal of basket.

.2 Threaded blind caps on strainers up to NPS 2 size.

.3 Install so that screen is in horizontal position.

.4 Valved blowout connection consisting of globe valve with nipple and cap on steam systems NPS 2½ and over.

.5 Provided in following locations;

.1 on inlet side of steam traps except at traps or ventilating coils,

.2 at inlet to steam control valves,

.3 at inlet to steam pressure reducing valves.

3.7 Vacuum breakers

.1 Provided on steam side of each piece of equipment fitted with automatic control valve or isolating valve on steam inlet.

.2 As shown on coil and apparatus connection drawings.

3.8 Moisture separators

.1 Sized for better than 99% separation efficiency

.2 Full size dirt pocket on bottom drain connection and float and thermostatic trap with components as specified for drip trap assembly, sized for 30% of separator steam flow

.3 Installed in following locations;

.1 at upstream side of each pressure reducing valve station,

.2 not used.

3.9 Safety relief valves

.1 Size, if shown, of safety relief vent piping on drawings is approximate only, unless identified as being based on a specific selection of pressure reducing valves and/or safety valves.

.1 Include in contract price for actual size requirements of safety relief valves, which is dependant on contractor-selected manufacturer.

.2 For unfired pressure vessels, and pressure reducing stations, size vents in accordance with ASME B31.1 and BPVC Section VIII, with an allowable maximum vent backpressure equal to 10% of valve release setpoint at full safety valve capacity.

.3 For steam, and high-temperature heating boilers with operating water temperature greater than 100°C (212EF), size vents in accordance with ASME BPVC Section I, or as required by safety valve manufacturer.

.4 Submit sizing calculations specific to the project with the safety valve shop drawing submission.

.2 Piped to atmosphere independent of other vents and in accordance with applicable codes.

.3 Provided with drip pan elbow on relief valve discharge and fitted with NPS ¾ drain line run from base of elbow and from pan, to nearest drain.

.4 Safety valve vent extended above building roof and supported independently.

.5 Terminate vent at minimum 1800 mm (6 ft) above roof, with 45E whistle cut.

3.10 Pressure reducing valves

.1 Installed in an assembly with gate valve at inlet, strainer, pressure reducing valve, gate valve on low pressure outlet, and bypass globe valve piped around assembly,

.2 120 mm (4½ in) pressure gauge with globe valve and syphon on low and high pressure sides, and code rated safety relief valve set for 55 kPa (8 lbs) above low pressure to be carried and sized for full capacity of pressure reducing valve.

.3 Bypass globe valve and valves and fittings ahead of pressure relief valve of same pressure rating as for high pressure steam.

.4 Inlet line into bypass globe valve sized for capacity of PRV at high pressure and globe valve to be one size smaller than inlet line.

.5 Discharge line from bypass globe valve sized for same capacity at low side pressure.

3.11 Special requirements for large PRV stations

.1 Where design steam capacity of reducing station exceeds 700 kg/hr (1500 lb/hr) provide two independent pressure reducing assemblies in parallel, one sized at one third of specified capacity and other sized for remaining two thirds.

.2 Where multiple PRV's are installed in a reducing station, size bypass for capacity of largest PRV in station.

3.12 Redundancy in trapping

.1 Trap assemblies at snow coils, process heating apparatus, and heating convertors to be installed with redundancy in accordance with following;

.1 minimum number of trap assemblies: 2

.2 capacity of each assembly in group: equal to required capacity divided by N-1. Where N is number of assemblies, and required capacity is as given above; two times condensing rate, three times condensing rate, etc.

.3 thus where two trap assemblies are installed each: sized for 100% of required trap capacity, and

.4 where six trap assemblies are installed each: sized for 20% of required trap capacity.

.5 each assembly to be made up with valves, strainer, unions, and test connection as specified above.

.6 provide one line size by-pass and globe valve around group of assemblies.

3.13 Flash tank

.1 Supported with steel brackets from wall or floor.

.2 Connected to high pressure drip piping, low pressure steam piping, safety relief vent, low pressure trap assembly and low pressure condensate piping.

3.14 Blow-off tank

.1 Supported from floor.

.2 Connected to valved blow-off line from boiler.

.3 Pipe outlet to drain and valved bottom drain.

.4 Extend vent line to atmosphere.

.5 Provide valved cold water inlet line connected to discharge temperature control valve.

END OF SECTION

STEEL PIPE AND FITTINGS - STEAM AND CONDENSATE
23 22 13

1 GENERAL

1.1 Scope

.1 Provide pipe and fittings for steam, condensate and related systems.

.2 Design pressures (all saturated steam):

.1 Low pressure: 0 - 100 kPa (0-15 psig)

.2 Medium pressure: 101 - 500 kPa (16-75 psig)

.3 High pressure: 501 - 1030 kPa (76 - 150 psig)

1.2 Shop drawings

.1 Submit shop drawings where headers and pipe assemblies with fittings, elbows and flanges are shop fabricated.

1.3 Applicable codes and standards

.1 Materials:

.1 ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

.2 ASTM B43 Standard Specification for Seamless Red Brass Pipe, Standard Sizes

.3 ASTM A106 Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service

.4 ASTM A312 Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

.5 ANSI/ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings

.6 ANSI/ASME B16.3 Malleable Iron Threaded Fittings

.7 ANSI/ASME B16.5 Pipe Flanges and Flanged Fittings: NPS ½ through 24

.8 ANSI/ASME B16.9 Factory Made Wrought Buttwelding Fittings

.9 ANSI/ASME B16.11Forged Fittings Socket Welding and Threaded

.10 ANSI/ASME B16.20 Metallic Gaskets for Pipe Flanges: Ring Joint Spiral Wound and Jacketed.

.11 ANSI/ASME B16.21 Nonmetallic Flat Gaskets for Pipe Flanges.

.12 ANSI/ASME B31.1 Power Piping

.13 ANSI/ASME B18.2.1 Square and Hex Bolts and Screws,

.14 ANSI/ASME B18.2.2 Square and Hex Nuts

.2 Piping code:

.1 ANSI/ASME B31.9 Building Services Piping

.3 Make application and pay costs for registration and inspection of pressure piping systems with the BC Safety Authority in accordance with:

.1 CSA B51 Boiler, Pressure Vessel, and Pressure Piping Code

2 PRODUCTS

2.1 Pipe for steam and condensate service

.1 Carbon steel:

.1 NPS ½ to 2:

(a) ASTM A106 Gr B, schedule 80 seamless

.2 NPS 2 ½ to 12:

(a) ASTM A106 Gr B, schedule 40 seamless, or
(b) ASTM A53 Gr B, schedule 40 Electric Resistance Weld (ERW).

.3 NPS 14 and over:

(a) ASTM A53 Gr B, 0.375 wall thickness, ERW

.2 Stainless steel:

.1 ASTM A312 TP304L Schedule 40 Seamless, stainless steel.

2.2 Pipe jointing

.1 NPS 2 and smaller:

.1 black steel, low and medium pressure piping;

(a) Threaded malleable iron fittings, Class 150 # to ANSI B16.3,
(b) 1030 kPa (150 #) black malleable iron, bronze face, ground joint unions.

Standard of Acceptance
° Anvil

.2 black steel, high pressure steam , boiler feed and high pressure drip lines;

(a) threaded malleable iron fittings, Class 300 # to ANSI B16.3
(b) Socket weld - steel socket welding type to ANSI B16.11, 2070 kPa (300 #) forged, wall thickness to match pipe.
(c) 2070 kPa (300 #) black malleable iron, bronze face, ground joint unions.

Standard of Acceptance
° Anvil

.3 stainless steel, low pressure and medium pressure piping;

(a) Socket weld - stainless steel welding type to ANSI B16.11, 2070 kPa (300#) forged, wall thickness to match pipe.

.2 NPS 2 ½ and over, flanges:

.1 black steel, low pressure and medium pressure piping;

(a) Cast iron, Class 125 to ANSI B16.1,
(b) Forged steel, Class 150 to ANSI B16.5, weld neck with wall thickness to match pipe, or slip on type,
(c) Gaskets to ANSI B16.21, ANSI B16.20 or ANSI A21.11 of heavy duty graphite impregnated compressed sheet 1.6 mm (1/16 in) thick.

Standard of Acceptance
° Chesterton 195

.2 black steel, high pressure piping and boiler feed piping

(a) Forged steel, Class 300 to ANSI B16.5, weld neck with wall thickness to match pipe, or slip on type,
(b) Gaskets to ANSI B16.5 ring style spiral wound type with carbon steel outer ring and stainless steel inner ring for raised face flanges.

Standard of Acceptance
° Flexitallic

.3 stainless steel piping, low and medium pressure:

(a) Forged steel, Class 150 to ANSI B16.5, weld neck with wall thickness to match pipe, or slip on type,
(b) Gaskets to ANSI B16.21, or ANSI B16.20 of heavy duty graphite impregnated compressed sheet 1.6 mm (1/16 in) thick.

Standard of Acceptance
° Chesterton 195]
°

.4 studs, bolts and nuts to ANSI B18.2.1, and ANSI 18.2.2 “high strength” type.

.3 Welding fittings:

.1 wall thickness and material specification to match pipe,

.2 butt weld type to ANSI B16.9 or socket weld type to

.3 ANSI B16.11.

3 EXECUTION

3.1 Steam piping material

.1 Black steel.

3.2 Gravity condensate and drip lines, and pumped condensate return lines material

.1 Building steam service: Black Steel

.2 Clean steam service: Stainless steel.

3.3 Joints

.1 NPS 2 and smaller:

.1 black steel: threaded with threaded fittings made up with pipe thread sealant similar to Masters Pro-Dope.

.2 stainless steel: socket welded joints. Threaded joints with backweld/seal weld are not acceptable.

.2 NPS 2 ½ and larger:

.1 welded with butt weld, or

.2 flanged.

3.4 Connections to equipment:

.1 provide unions at equipment where connections are NPS 2 and smaller, and

.2 with flanged connections where pipe size is NPS 2 ½ and larger.

3.5 Buried condensate:

.1 IPS red brass pipe run in enclosure made up from vitreous tile pipe and fittings with water-tight mechanical joints.

3.6 Piping installation

.1 Install pipes close to building structure to keep furring small and minimize obstruction to other services or in ceiling spaces.

.2 Run piping parallel to walls and conserve headroom and space. Group piping wherever practical.

.3 Provide drain valves and air vents in pumped condensate lines.

.4 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.5 Steam piping:

- .1 slope mains down in direction of flow 1:250 (½ in in 10 ft),
- .2 install branches with greater slope,
- .3 concentric reducers at pipe size changes in vertical runs,
- .4 eccentric reducers at pipe size changes in horizontal runs, arranged flat on bottom,
- .5 eccentric reducers arranged flat on bottom at valve inlet and flat on top at valve outlet, in horizontal runs at throttling or control valves where pipe connection size is greater than valve size.

.6 Condensate piping:

- .1 slope return mains down in the direction of flow 1:160 (¾ in in 10 ft),
- .2 install return branches with greater slope,
- .3 concentric reducers at pipe size changes in vertical runs,
- .4 eccentric reducers at pipe size changes in horizontal runs, arranged flat on top,
- .5 eccentric reducers arranged flat on bottom at valve inlet and flat on top at valve outlet, in horizontal runs at valves where pipe connection size is greater than valve size.

.7 Ream pipe after cutting to length and clean off scale and dirt both inside and outside before assembly.

.8 Cap ends during construction to prevent entry of foreign matter.

.9 Threaded pipe to be made up with;

- .1 couplings,
- .2 caps and plugs,
- .3 90° and 45° elbows, and

.4 tee fittings

.10 Welded pipe to be made up with;

.1 long radius elbows,

.2 tee fittings where branch connections are same size as main,

.3 tee fittings or welded outlet fittings where branch connections are smaller than main and where main is NPS 2 to NPS 5 size and

.4 saddles where mains and branches are NPS 6 or over but of different sizes,

.5 branches may be welded directly into main provided main is more than NPS 4 and branch is at least 2 pipe sizes smaller than main.

.6 Where branch fitting is welded into main;

(a) cut opening in main true and beveled,
(b) hole saw or drill and ream main to maintain full inside diameter of branch line,
(c) opening to be sized to prevent branch pipe from projecting inside main, and
(d) to inhibit entry of welding metal and slag into pipes.

3.7 Stainless steel pipe welding - additional requirements

.1 Weld pipe using automatic orbital tungsten inert gas (TIG) welding.

.1 Exception: at branch outlet connections and slip-on flanges, use hand TIG welding.

.2 Hand TIG tack welding of stainless steel pipe is permitted.

.2 Continuously purge inside of pipes with argon during welding;

.1 provide a purge restrictor on pipe to maintain oxygen levels below 50 ppm inside of pipe,

.2 inject argon within 150 mm of weld - use extension tubes as necessary,

.3 use portable oxygen analyzers reading ppm on pipe sizes NPS 2 ½ and larger, to check oxygen levels at purge outlet,

.4 time purging is acceptable on pipe sizes NPS 2 and smaller,

.5 at end of work shift, temporarily cap-off pipe and pressurize with argon to 15 kPa.

3.8 Stainless steel piping - post-weld pickling

.1 After flushing and cleaning, provide the services of a specialist pipe cleaning company to chemically pickle the stainless steel piping to remove weld heat tint.

.1 Portable chemical dewars or truck-tank units may be used.

.2 At completion of tests, drain down and dispose of cleaning chemicals as contaminated acid waste.

Standard of Acceptance
° CEDA - Reactor Ltd.

.2 Make-up test pipe specimens and provide to chemical cleaning company to conduct off-site sample cleaning test to determine cleaner selection.

.1 Three (3), NPS 6 x 300 mm (12 in) long pipe sections with an orbital TIG weld butt-joint at the midpoint,

.2 Two (2), NPS 6 x 300 mm (12 in) long pipe sections with a hand TIG weld butt joint at the midpoint.

.3 Three (3), NPS 3 x 300 mm (12 in) long pipe sections with an orbital TIG weld butt-joint at the midpoint,

.4 Two (2), NPS 3 x 300 mm (12 in) long pipe sections with a hand TIG weld butt joint at the midpoint.

.3 Provide temporary cross connections to bypass equipment. Temporarily remove flexible connections at pumps and install stainless steel spool pieces. Reinstall flexible connections after completion of pickling program.

.1 Bypass piping material: stainless steel 316, threaded, flanged, or welded. Hoses as recommended by the chemical cleaning company may be used.

.4 Continuously circulate cleaner and periodically check the weld inspection spool piece. Temporarily remove the spool piece to permit visual inspection of the flange and butt welds. Continue to clean pipe until visible heat tint is removed.

.5 Pickle the outside pipe welds with hand applied gel compound to remove weld heat tint.

3.9 Stainless Steel Pipe Passivation

.1 Passivate inside of stainless steel piping with nitric acid to ASTM A380 standard.

.1 Passivation may form part of the pickling process, or may be post-picking.

.2 At completion of passivation, drain down and dispose of passivation chemical as contaminated waste.]

3.10 Drip trap assemblies

.1 Provide drip trap assemblies in accordance with Steam Specialties Section.

.2 Condensate discharge from drip trap assemblies to be piped to drain by gravity to the nearest flash tank or condensate receiver taking condensate from equipment or drip assemblies connected to steam supplies at same pressure.

3.11 Flushing and cleaning

.1 After pressure test, flush steam and condensate lines to drain with clean water for minimum of four hours.

.2 Isolate system from other piping systems and by-pass traps. Drain and fill with solution of water and non-foaming, phosphate free detergent, 3% by weight. Provide temporary pump and circulate solution for minimum of eight hours.

.3 Flush to drain with clean water for four hours. Remove and clean strainers.

.4 Drain and refill system with clean water and circulate for two hours. Inspect strainers, and repeat drain, fill and recirculate routine until strainers are free of debris.

.5 Drain and allow steam into system with condensate at receivers diverted to drain. Inspect strainers and continue passing condensate to drain until strainers are free of debris.

.6 Place traps in service and condensate pumping system in operation. Check traps for blow through and service faulty units.

.7 Clean strainers and service traps before final acceptance of steam system.

END OF SECTION

STEAM CONDENSATE PUMPING UNITS
23 22 23

1 GENERAL

1.1 Scope

.1 Provide steam condensate pumping units.

1.2 Shop drawings

.1 Submit shop drawings or manufacturers' product data sheets and pump curves.

.1 Indicate connection points, weights, loading points and electrical characteristics

.2 Submit wiring diagrams for control systems showing field and factory installed wiring.

2 PRODUCTS

2.1 Main condensate storage and pumping system

.1 General:

.1 field assembled three pumping arrangement with horizontal elevated tank.

.2 Pumps:

.1 base mounted end suction pumps selected in accordance with requirements for base mounted pumps.

.3 Receiver tank:

.1 hydrostatically tested to pressure of 50 kPa (7 psi) when filled with water,

.2 welded from ASTM A285 Grade C steel plate, minimum shell thickness 6 mm (¼ in) or 5 mm (3/16 in) and minimum head thickness 10 mm (7/16 in) or 6 mm (¼ in),

.3 one 600 mm (24 in) diameter manhole in one head,

.4 opening for float switch in opposite end to manhole,

.5 fittings for thermometer and tank heater control, approximately 150 mm (6 in) above bottom of tank in opposite end to manhole,

.6 fittings for gauge glasses,

.7 chemical injection quill, located below normal operating level, and in flow stream of make-up water connection,

.8 connections for return piping, capped connections, suction connections for each pump, and vent and drain connections.

(a) connections NPS 2 and smaller: threaded,
(b) connections NPS 2 ½ and over: class 150 steel flanges.

.9 Pump suction connections to project 50 mm (2 in) from bottom up into tank. Drain to be flush with bottom.

.10 saddles and steel supports for tank.

.11 internal surfaces of tank sand blasted to near white finish free of voids, gaps, craters, pits, high spots, sharp edges, undercutting and weld splatter and then shop coated with not less than 6 mils of Heresite P-403 baked-on Phenolic lining.

.4 Controls and starters:

.1 self-contained tank temperature controller with valve selected for (3 psi) pressure drop and sensing element inserted in tank fitting adjacent thermometer.

.2 float switches of quick break type with seamless copper float, bronze rod and packed stuffing box.

.3 float mechanical alternator on triplex pump sets to alternate pump starting and run both pumps on high demand.

.4 combination magnetic starter with overload and Hand-Off-Auto switch,

.5 green pilot light to indicate pump running.

.6 Low water cut-out/alarm: SPDT switch, Mercoid type 123-2 SP-ST, set 250 mm (10 in) from bottom of tank,

.7 High water cut-out/alarm: SPDT switch, Mercoid type 123-2 SP-ST, set 250 mm (10 in) from top of tank,

.8 Tank level control: Fisher No. 2500-249-S1 level control with iron float cage;

(a) NPS 1½ screwed connections,
(b) standard stainless steel trim,
(c) 21 kPa (3 psi) to 100 kPa (15 psi) output.

.9 Condensate make-up control: Fisher No. 657 ET diaphragm air operated control valve for condensate make-up, to pass 1.25 L/s (20 USgpm) with not more than 35 kPa (5 psi) pressure drop.

(a) Fisher No. 3582 positioner with No. 6TFR air set to stroke condensate tank make-up valve, over 21 kPa (3 psi) to 40 kPa (7 psi) input signal range.

.10 Audible and visual alarm for low water level, and high water level alarm.

.5 Accessories:

.1 dial thermometer

.2 gauge glasses:

(a) not more than 380 mm (15 in) long in sufficient number to cover total depth of tank,
(b) isolating cocks complete with integral stainless steel ball check valves.
(c) glass or plastic shield to cover front and sides of gauge glass.

Standard of Acceptance
- O'Connor Tanks
- Clemmer
- Drummond Welding and Steel Works
- DTE

3 EXECUTION

3.1 Installation - General

.1 Supply templates for anchor bolt placement, dimensioned layouts for housekeeping bases and furnish anchor bolts with sleeves.

.2 Place unit level on concrete base, dowel, shim and grout with minimum 13 mm (½ in) grout.

.3 Connect condensate return lines and pump discharge lines to unit. Pipe tank vent to exterior of building, pipe drain connection with gate valve and terminate at nearest floor drain.

3.2 Field Assembled units

.1 Provide gate valve in each pump suction line, and strainer, noiseless check valve and globe valve in each pump discharge.

.2 Provide supporting steel under tank.

.3 Supply templates for anchor bolt placement, dimension layouts for pump bases and furnish anchor bolts with sleeves.

.4 Place pumps level on concrete base, dowel, shim and grout with minimum 13 mm (½ in) grout.

.5 Fill hollow portion of bases with concrete.

.6 Pipe drip base to nearest open drain.

.7 Align couplings before and after piping connections have been made.

3.3 Main boiler plant receiver

.1 Install in accordance with field assembled units described above.

.2 Install condensate make-up valve in cold water line to receiver and provide interconnecting pneumatic piping, isolating valves for make-up control. Provide wiring between low water level switch at tanks, float mechanical alternator and condensate pump starters. Wire Low and high level alarm switches to BAS.

END OF SECTION

HVAC WATER TREATMENT SYSTEMS
23 25 13

1 GENERAL

1.1 Scope

.1 Provide water conditioning program, with equipment and chemicals, to control corrosion and scale formation, and inhibit algae and bacteria growth in piping systems and equipment.

.2 Provide chemicals and instructions for the cleaning of piping systems and equipment.

1.2 Shop drawings

.1 Submit shop drawings and data sheets for chemical feed control panels, pumps, tanks, agitators, pot feeders, corrosion coupon stations, filters and equipment.

.2 Submit WHIMS data sheets for chemicals to be used for water conditioning and cleaning.

1.3 Training

.1 Provided qualified instructor to train operation's staff in testing water samples, and operation of chemical treatment system.

1.4 Qualifications of supplier

.1 Equipment, chemicals and services to be provided by specialist firm with an established reputation in field.

Standard of Acceptance
- Klenzoid
- GE Betz
- Drew Chemical
- Industrial Treatment Solutions

2 PRODUCTS

2.1 Steam Boiler and Deaerator Treatment

.1 Design Data:
- .1 Boiler Type; Fire Tube Steam Boiler
- .2 Number of Boilers: 3
- .3 Steam Capacity per Boiler: 300 BHP
- .4 Operating Steam Pressure: 125
- .5 Deaerator Operating Pressure: (5 psi) 35 kPa
- .6 Source of Make-Up Water: Vancouver City Water
- .7 Make-Up Rate: up to 80%

.2 Automatic boiler surface blowdown system:
- .1 For each steam boiler provide the following automatic conductivity-based blowdown equipment:

(a) one temperature compensated, micro-processor based, conductivity controller, 0-10,000 micro Siemens/cm,
(b) one conductivity sensor, suitably rated for boiler pressure and temperature,
(c) one sensing chamber for sensor installation,
(d) one 13mm (½ in) high temperature solenoid valve,
(e) two stainless steel needle valves.

.3 Boiler chemical treatment:

.1 For each steam system provide the following automatic chemical feed arrangement;

(a) one electronic programmable controller with 3 flow-based reset timers and flow-rate/ totalizer with LCD display,
(b) one turbine flow sensor sized to meet makeup flow rate with not more than 15 kPa (2 psi) pressure drop, to be installed on the makeup line to deareator/feedwater tank,
(c) three electronic metering diaphragm pumps, 0.01 to 1.9 LPH @ 550 kPa for 110V/ 60Hz/single phase supply.

.2 Chemicals fed directly from shipping containers to main condensate feed tank.

.3 Chemical feed to include sludge conditioner, oxygen scavenger, caustic for alkalinity control, and inhibitor for condensate line corrosion control.

.4 Deaerator corrosion control system

.1 Feed catalysed sulphate to deaerator storage tank with skid mounted, shop packaged, pre-engineered chemical feed unit.

.2 205 litre (45 Imp gal) polyethylene chemical tank.

.3 High pressure diaphragm reciprocating positive displacement type pump capable of pumping against head of 2000 kPa (250 psi) with micrometer dial capacity adjustment from 0 to 100%.

.4 Direct drive agitator with stainless steel shaft, propeller, and TEFC motors.

.5 Pump control panel with "Hand-Off-Auto" switch and reset type timer, 0-60 minute range. In "Auto" position pump start is initiated by treated water make-up meter, pump is shut down through timer. In "Hand" position pump is in continuous operation.

.6 Pump suction assembly with pre-piped PVC shut-off valve, polypropylene strainer with PVC screen and PVC suction tubing between tank and pump.

.5 Boiler system scale control

.1 Feed phosphate, sludge conditioner and anti-foam treatment to main condensate storage tank with shop packaged, skid mounted, pre-engineered chemical feed unit.

.2 205 litre (45 Imp gal) polyethylene chemical tank.

.3 High pressure diaphragm reciprocating positive displacement type pump capable of pumping against head of 2000 kPa (250 psi) with micrometer dial capacity adjustment from 0 to 100%.

.4 Direct drive agitator with stainless steel shaft, propeller, and TEFC motor.

.5 Pump control panel with "Hand-Off-Auto" switch and reset type timer, 0-60 minute range. In "Auto" position pump start is initiated by treated water make-up meter, pump is shut down through timer. In "Hand" position pump is in continuous operation.

.6 Pump suction assembly with pre-piped PVC shut-off valve, polypropylene strainer with PVC screen and PVC suction tubing between tank and pump.

.7 Register type water make-up meter with contact closure after passing preset amount of make-up. Size meter for estimated maximum make-up rate with maximum 15 kPa (2 psi) pressure drop. Provide relays and interconnecting wiring from meter to both corrosion and scale control system panels.

2.2 Cooling Tower Treatment

.1 Open recirculating cooling tower system data:

.1 Type of cooling tower: steel induced draft

.2 Recirculation Rate: Refer to SOR

.3 Temperature range: 29.3 °C to 34.9 °C (77 °F to 87 °F)

.4 Make-up Water:

(a) Vancouver City Water
(b) evaporation rate: 1% of recirculation rate,
(c) windage loss: 0.2% of recirculation rate,
(d) bleed-off: 1.5% of recirculation rate,
(e) estimated make-up: 3% of recirculation rate.

.2 Cooling Tower Scale and Corrosion Control System:

.1 Feed non-acid, non-chromate, scale and corrosion control chemical to cooling tower water system and two (2) biocides to control slime and algae in open cooling tower water system. Biocide materials to be registered and registration numbers to be submitted with shop drawings.

.2 Feed equipment to consist of;

(a) one triple re-set and dual biocide programmable controller,
(b) one make-up line turbine meter, sized to system make up rate with not more than 15 kPa (2 psi) pressure drop,
(c) one electronic metering diaphragm pump, 0.01 to 1.9 LPH @ 550 kPa for 110V/ 60Hz/ single phase supply to feed scale and corrosion inhibitor,
(d) two peristaltic pumps, 16.6 LPH @ 225 kPa for 110V/ 60Hz/ single phase supply to feed biocide,
(e) one (1) manual flow control valve for sampling.

.3 Chemicals fed direct from shipping containers.

.3 Cooling Tower Bleed-off Control System:

.1 Bleed off control system to consist of;

(a) 25 mm (1 in) cooling tower bleed-off solenoid valve,
(b) register type water make-up meter with contact closure after passing preset amount of make-up to cooling towers, sized for make-up rate with not more than 15 kPa (2 psi) pressure drop,
(c) Relays, reset timer, 0-60 minute range, and interconnecting wiring between meter and corrosion and scale control system panel, and bleed off solenoid.

2.3 Chilled Water Treatment

.1 Chilled Water System Data:

.1 Type of System: Closed recirculating

.2 Recirculation Rate: Refer to SOR

.3 Temperature Range: 7.7 °C differential (6.7 °C to 14.4 °C)
(14 °F differential (44 °F to 58 °F)

.2 Chilled Water Scale and Corrosion Control System

.1 Feed corrosion control chemicals into closed chiller water system with;

(a) Pot feeder
(b) Adjustable flow diaphragm type single phase chemical pump mounted on drum with insertion style suction piping,

(c) Pump control panel with "Hand-Off-Auto" switch, seven day time clock and reset type timer, 0-60 minute range. In "Auto" position pump start is initiated by time clock, pump is shut down through timer. In "Hand" position pump is in continuous operation.

.2 Chemicals to be fed direct from shipping containers.

2.4 Hot Water Heating System Treatment

.1 Corrosion control equipment and chemicals are required for each of following closed circuit heating systems:

.1 Constant Temperature System Data

(a) Type of System: Closed recirculating
(b) Recirculation Rate: Refer to SOR
(c) Temperature Range: 71 °C to 49 °C (160 °F to 120 °F)

.2 Provide equipment for *EACH* of above noted systems to feed corrosion control chemicals as follows;

(a) Adjustable flow diaphragm type single phase chemical pump mounted on drum with insertion style suction piping,
(b) Pump control panel with "Hand-Off-Auto" switch, seven day time clock and reset type timer, 0-60 minute range. In "Auto" position pump start is initiated by time clock, pump is shut down through timer. In "Hand" position pump is in continuous operation.

.3 Chemicals to be fed direct from shipping containers.

2.5 Miscellaneous Equipment for Water Treatment Systems

.1 Pot Feeders:

.1 9 litre (2 gal.) capacity, cast steel, rated for 2000 kPa (250 psi) working pressure and 110 °C (220 °F) working temperature.

.2 Fitted with cartridge type filter for filtrate quality of 20 microns.

.2 Spray water treatment system:

.1 Total dissolved solids (TDS) concentration analysis system to maintain evaporative condenser spray water quality.

.2 Mount TDS controller on condenser water basin or on indoor sump.

.3 System to be suitable for 120 V/60 Hz operation, and consist of;

(a) TDS controller and sensor with automatic temperature compensation,
(b) electrically operated solenoid valve, and
(c) manually set throttling valve in blowdown line.

.3 Corrosion Coupon Test Stations:

.1 Fabricated from 25 mm (1 in) pipe and fittings for working pressure of 2000 kPa (250 psi) with globe valve and rotameter to adjust flow to 0.65-1.0 l/s (10-15 USGPM).

.2 Arranged as an array with four tee fittings with reducing bushings to accommodate test coupon holders.

.3 Test coupon holders made up from screwed plugs with stainless steel shaft and coupon securing screw and nylon or delrin isolating washers.

.4 Coupons: steel, brass, bronze and stainless steel.

.4 Chemical Control Panels:

.1 Shop assembled and pre-wired for each system, suitable for wall mounting.

.2 Fabricated from 1.9 mm (14 ga) steel plate finished in grey enamel with ¼ panel door and key lock.

.3 Disconnect switch for incoming 115 V power supply and single phase starters, timers and push-to-test pilot lights for each pump, agitator and solenoid valve.

.4 Internal wiring terminated on numbered terminal board.

.5 CSA labels or Electrical Inspections approval.

.6 Panel wiring diagram indicating internal wiring and field connections.

.7 Lamicoid nameplates to identify each starter, timer, indicating light and selector switch

.5 Sample Coolers:

.1 Fabricated with internal tubing of stainless steel or inconel.

.2 Design pressure: 900 kPa (125 psi) on tube side, and 900 kPa (125 psi) on shell side.

.3 Provided for sampling continuous blowdown, boiler feed water, condensate and steam.

2.6 Test Equipment

.1 One white enamel metal test equipment cabinet with:

(a) Lock and fluorescent light
(b) Space for at least four titration bottles.
(c) Total alkalinity test set.
(d) Chloride test set.
(e) Total hardness test set.
(f) Conductivity test set.
(g) Dual range solubridge with high and low cells.
(h) Sulphite test set.
(i) Molybdenum test kit.
(j) Organic cooling water treatment test kit.
(k) Bacterial test strips.
(l) Two discs, Bromthymol blue and Phenol red with indicators.
(m) Additional titration equipment for specific inhibitors used.

3 EXECUTION

3.1 Installation

.1 Mount and pipe equipment. Make-up water meters and condensate meters to be fitted with isolating valves and line size by-pass valve. Pipe bleed-off and blow-off connections to nearest drain.

.2 Provide external wiring from chemical panels to chemical pumps, chemical tank agitators, valves, meters and equipment as applicable. 115 volt single phase power will be provided to each control panel under Division 26 Electrical.

.3 Provide coupon test stations at following locations:

.1 Condensate return piping system at main condensate receiver.

.2 Condensate pump discharge into deaerator.

.3 Cooling tower water system.

.4 Closed chilled water system.

.5 Low temperature heating system.

.6 Glycol system.

.4 Mount test equipment cabinet over test sink and connect fluorescent light to outlet over bench.

3.2 Cleaning of systems

.1 Boiler internals

.1 Provide alkaline boil-out compound and chemically clean new boiler internals.

.2 Flushing and cleaning of steam and condensate systems:

.1 After piping pressure test, flush steam and condensate lines to drain with clean water for minimum of four hours.

.2 Make temporary piping cross-overs, blank-off equipment connections, bypass control valves, install drain and fill lines. Blank off at connections to existing treated systems and provide temporary pot feeder and circulating pump to maintain cleaning fluid minimum velocity through piping at 1.5 m/s (5 fps).

.3 Refill with clean city water using temporary meter to establish system volume.

.4 Isolate system from other piping systems and by-pass traps.

.5 Drain and fill with solution of water and non-foaming, phosphate free detergent, 3% by weight.

.6 Circulate solution for minimum of eight hours.

.7 Flush to drain with clean water for four hours.

.8 Remove and clean strainers.

.9 Drain and refill system with clean water and circulate for two hours.

.10 Inspect strainers, and repeat drain, fill and recirculation routine until strainers are free of debris.

.11 Drain, remove temporary pumps, and cross-overs. Allow steam into system with condensate at traps and receivers diverted to drain. Inspect strainers and continue passing condensate to drain until strainers are free of debris.

.12 Place traps in service and condensate pumping system in operation. Check traps for blow through and service faulty units.

.13 Clean strainers and service traps before final acceptance of steam system.

.3 Chilled, condenser water and hot water systems

.1 Drain system after completion of hydrostatic testing.

.2 Make temporary piping cross-overs, blank-off equipment connections, bypass control valves, install drain and fill lines. Maintain minimum velocity of circulating cleaning fluid through piping at 1.5 m/s (5 fps). Blank off at connections to existing treated systems and provide temporary circulating pump and pot feeder.

.3 Refill with clean city water using temporary meter to establish system volume.

.4 Circulate water for 30 minutes, clean strainers, check for leaks, and repair leaking joints and seals.

.5 Add neutral pH, non-chromate chemical cleaner to remove sludge oil and debris. Use cleansing compound at rate of 10 kg. per 5000 litres (20 lb. per 1000 Imp gal) of water in system.

.6 Circulate cleaner for 72 hours at room temperature or 24 hours between 40°C and 48°C (104°F and 118°F). Temperature of water during cleaning to be not more than 50°C (122°F).

.7 Check for removal of cleaning compound, samples to be clear, not coloured, and free of foam after agitation.

.8 Drain system and flush with clean water until cleaner is removed.

.9 Drain and refill with clean water and inhibitor

.10 Recirculate fluid for 3 days and test samples from system for iron content. Drain, refill, and add chemicals so that total iron content in system is less than 1 ppm.

.11 When iron content of glycol system is satisfactory, add glycol or softened water to achieve design concentration.

.12 Remove temporary pumps and cross-over piping

3.3 Operating manuals

.1 Submit information for each water treatment system for incorporation in operating manual. Include schematic drawings, data sheets for equipment, step by step instructions for testing procedures and guidelines for interpreting test results.

3.4 Operating instructions

.1 Provide 3 days instruction for operating personnel: two days during start-up and commissioning and one day after approximately six months operation.

3.5 Service

.1 Provide qualified representative to visit on monthly basis to:

.1 Review water analyses, records, correspondence and reports created since previous visit.

.2 Test water samples with portable test kit.

.3 Check performance and records of treatment, feeding, testing, and plant operation.

.2 Submit written service report at completion of service call.

3.6 Supply of chemicals

.1 Provide:

.1 Sufficient compound to clean heating and cooling systems.

.2 Chemicals to protect systems when refilled after cleaning.

.3 One year's supply of water treatment chemicals to maintain piping and equipment protection for each system.

.4 Chemicals and supplies for water treatment testing program for same period.

END OF SECTION

TERMINAL BOXES
23 36 13

1 GENERAL

1.1 Scope

.1 Provide terminal box(es) in duct serving main make-up air to the CCH room, Entrance Facility Room and Tech room.

1.2 Shop drawings

.1 Submit manufacturer's data sheets with equipment model numbers, performance and design data, outline dimensions, enclosure details, support and connection arrangements and electrical power requirements where applicable.

1.3 Applicable codes and standards

.1 ARI Standard 880 Standard for Air Terminals

.2 ARI Standard 885 Standard for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

.3 ASHRAE Standard 180 Methods of Testing for Rating Ducted Air Terminal Units

2 PRODUCTS

2.1 General

.1 Selection of units to meet air quantities shown to be based on;

.1 maximum Inlet Air Pressure; 750 Pa (3 in wg),

.2 minimum Inlet Air Pressure; 75 Pa (0.3 in wg),

.3 maximum room NC sound pressure level (2×10^{-4} microbar reference) at maximum inlet pressure to be less than 40 at discharge and 42 radiated for box with attenuator mounted exposed (without ceiling).

.2 Where sizes, model numbers and unit types are indicated, selections are taken from E.H. Price catalogue.

Standard of Acceptance
- E.H. Price (SRDV Series)
- or approved equivalent

2.2 Terminal box

.1 Construction:

.1 pressure independent type with pneumatic velocity sensor, damper assembly, factory calibrated controller and actuator with adjustable minimum stop

.2 damper arranged "normally open" for morning warm-up.

.3 controller capable of maintaining air quantity within ±5% of set value, between zero and stipulated rated air flow,

.4 sound level below specified values when operating from minimum to maximum inlet static pressure.

.2 Silencer/attenuator:

.1 on box discharge, acoustically treated open end or multiple outlet attenuator 900mm (30 in) long on boxes up to Size 10 and 1.5m (5 ft) long on boxes Size 12 and larger.

.2 acoustic lining - fibreglass:

(a) 20mm (13/16 in) thick, 64kg/m^3 (4 lb/sq ft) density, rigid fibreglass with fire resistive reinforced aluminum foil-scrim-kraft (FSK) facing,
(b) flame spread rating not to exceed 25, smoke development rating not to exceed 50,
(c) fastened to interior sheet metal surface with 100% coverage of adhesive, and fasteners at 1 pin per 0.2m^2 (2 sq ft) but not less than 1 row on each duct side.
(d) edges concealed by metal nosings at inlet and discharge, with notch and tuck fabrication and seams protected by Z strips

Standard of Acceptance
° Steri-Liner

.3 acoustic lining - elastomeric:

(a) spray coated, flexible, closed cell elastomeric insulation in sheet form, with self adhering backing]
(b) flame spread rating not to exceed 25, smoke development rating not to exceed 50,
(c) fastened to interior sheet metal surface with 100% coverage of adhesive, and fasteners at 1 pin per 0.2m^2 (2 sq ft) but not less than 1 row on each duct side.

Standard of Acceptance
° Armacell AP Armaflex SA

.4 duct liner fasteners:

(a) 2.0 mm (1/16 in) diameter pins,
(b) length selected to suit thickness of insulation,
(c) 32 mm (1¼ in) square Nylon retaining clips.

2.3 Controllers

.1 Direct Digital Controllers (DDC) including actuators to be supplied by BMS Equipment Controllers, and factory mounted by Terminal Box Manufacturer. Costs associated with receiving, storage, installation and calibration to be included by Terminal Box Manufacturer.

.2 Air flow sensor to be provided by Terminal Box Manufacturer.

.3 120 VAC to 24 VAC transformer for DDC controller to be supplied by BMS Equipment Controllers, and factory installed by the Terminal Box Manufacturer.

3 EXECUTION

3.1 Box installation

.1 Support terminal boxes from building structure with angles, hangers and supplementary steel before installation of piping and connecting ductwork.

.2 Provide access door in ductwork downstream of terminal box.

3.2 Ductwork connections

.1 Connect inlet ductwork with rectangular duct of same size as terminal box inlet

.2 Support outlet ductwork independent from box.

.3 Seal openings in box and attenuator for control, and power wiring.

3.3 Electrical connections

.1 Electrical Division 26 will provided 120 Volt, single phase power supply with a junction box for each group of terminal boxes with maximum of 12 terminal box controls fed from one junction box.

.2 Extend power supply from these junction boxes and connect to terminal units.

3.4 Leakage testing

.1 Terminal boxes and attenuators to be included in ductwork leakage testing.

END OF SECTION

FABRICATED BREECHING AND ACCESSORIES
23 51 16

1 GENERAL

1.1 Scope

.1 Provide unlisted, shop fabricated breeching and accessories as required for

.1 heating oil fired appliances,

.2 natural gas fired appliances,

.3 dual-fuel gas/oil fired appliances.

1.2 Related Sections

.1 23 51 19 Fabricated Stacks

.2 23 51 33 Insulated Sectional Chimneys

1.3 Definitions

.1 In this section the following definitions apply:

.1 ***Chimney*****:** has the meaning as defined in CSA B139-09

.2 ***Chimney connector*****:** has the meaning as defined in CSA B139-09

.3 ***Breeching*****:** is the unlisted round or rectangular ductwork which conveys flue gases from the appliance to the chimney, and has the same function as a chimney connector,

.4 ***Low heat appliances*****:** appliances with a flue gas outlet temperature of 540°C (1000°F) or less.

.5 ***Medium heat appliances*****:** appliances with a flue gas outlet temperature of 980°C (1800°F) or less.

.6 ***Stack*****:** a vertical conduit containing multiple chimney flues and may also function as a chimney flue.

1.4 Submittals

.1 Submit shop drawing data sheets for manufactured products and standard fittings showing dimensions and describing construction.

1.5 Applicable Codes and Standards

.1 Installation standards and codes:

.1 B.C. Safety Authority

.2 CSA B139 Installation Code for Oil Burning Code.

.3 SMACNA Accepted Practice for Industrial Duct Construction manual

.4 SMACNA Rectangular Industrial Duct Construction Standards

.2 Product standards:

.1 ASTM A1011/M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

.2 ASTM A283/M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

.3 ASTM A36/M Standard Specification for Carbon Structural Steel

.4 ASTM A480/M Specification for General requirements for Flat Rolled Plate, Sheet, and Strip

.5 ASTM A924/M Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

.6 ASTM A653/M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.6 Design Conditions

.1 Design pressure: -1.0 kPa (4 in.wc.) to + 5.0 kPa (20 in wc.)

2 PRODUCTS

2.1 Breeching

.1 Material:

.1 Select material based on flue gas operating temperature at the appliance outlet as follows:

Type	Flue Gas Temperature °C (°F)	Material
II	>150 (300) and ≤ 340 (650)	Plain mild steel
III	>340 (650) and ≤ 560 (1000)	T304 Stainless steel
IV	>560 (1000) and ≤ 980 (1800)	Plain mild steel with refractory lining]

.2 panel thickness:

(a) for straight duct runs: to SMACNA Industrial duct standards for Class I applications and for negative pressures of 0 – 1000 Pa (0 – 4 in. wg.)
(b) for elbows: 2 gauges heavier than straight run ducts.

.2 Joints and reinforcement:

.1 shop fabricated longitudinal and transverse joints: welded seam

.2 field transverse sectional joints: reinforced angle companion flanges.

.3 reinforcement: stitch welded angle iron stiffeners of same material as panels.

.4 touch-up galvanized materials damaged by welding wit zinc-rich epoxy primer paint.

.3 Flange Sealants

.1 high temperature, 6.5 mm (1/4" thick extruded gasket, or caulking sealant

.2 service temperature: 90 - 510°C (200 - 950°F)

Standard of Acceptance
° Deacon – 3100 (gasket)

° McGill AirSeal – Uni-Extreme Sealer (sealant)

.3 service temperature: 315 - 760°C (600 – 1400°F)

Standard of Acceptance
° Deacon – 3300 (gasket) or 8875-Thin (sealant)
° McGill AirSeal - Uni-Extreme Sealer (sealant)

.4 Refractory:

.1 Low-heat appliances:

(a) no refractory required.

2.2 Expansion Joints

.1 General

.1 design temperature: 650°C (1200°F)

.2 design pressure: 70 kPa (10 psi) positive pressure.

.2 Rectangular:

.1 corrugated T304 stainless steel,

.2 connections: bolted flange ends

.3 axial deflection: as required.

Standard of Acceptance
° Hyspan – model 2500 Rectangular

.3 Round:

.1 corrugated T304 stainless steel,

.2 connections: bolted flange ends

.3 internal flow liners: T304 stainless steel.

.4 axial deflection: as required.

Standard of Acceptance
° Hyspan – model 2500 Round
° Flexonics – model DEJ

2.3 Motorized Dampers

.1 Construction:

.1 opposed blade louvre type

.2 modulating service for boiler draft control,

.3 single bank design,

.4 airfoil blade,

.5 outdboard bearings and individual packing glands,

.6 metal seals: damper-to-damper, damper-to-side,

.7 fixed linkages,

.2 Material:

.1 blade and frame: T304L stainless steel,

.2 seals: T304L stainless steel.

.3 Performance:

.1 through blade leakage in closed position: maximum 10% of rated air flow at 500Pa (2 in wg) differential across assembly,

.2 shaft-through-bearing leakage in closed position: 0%

.3 pressure drop in open position: maximum 50 Pa (0.2 in wg) differential at 5 m/s (1000 fpm).

.4 Actuator:

.1 24 Volt electric actuator with spring return, stroking damper from closed to open with 4 -20 mA signal.

Standard of Acceptance
° Flextech - Louvre Dampers

2.4 Barometric draft control for non draft hood applications

.1 Construction:

.1 single acting, for natural gas,

.2 dual acting for natural gas and oil fired applications,

.3 80% of full size of breeching area,

.4 fabricated from 3.5 mm [10 ga] steel.

Standard of Acceptance
° Wing DA and SA
° Field M and MG2

3 EXECUTION

3.1 General

.1 Breeching serving gaseous fuel and liquid fuel appliances: installed by tradesmen certified for installation of fuel fired appliances.

3.2 Installation

.1 Support breechings from structure, independent of appliance flue collar connection.

.2 Make breeching connection to equipment flue gas outlet with flanged joints.

.3 Make field joints with welded or flanged connections. Seal flange joints with high temperature gaskets or sealant.

.4 Seal refractory lined breechings:

.1 seal joints with refractory joint cement supplied by stack manufacturer,

.2 butt weld field joints with continuous welds,

.3 grind smooth tack welds, and fill holes and pits with weld metal and ground smooth,

.4 touch up primer at field welds and other ground areas.]

.5 Provide expansion joints as required. Anchor breeching to building structure.

.6 Provide draft control motorized dampers as required.

3.3 Pressure Test

.1 Pressure test portions of breeching located inside the building, from the appliance flue ring and up to the first joint outside the building. Provide temporary pressure blanks at appliance connection and at first joint outside of buidling. Do not insulate breeching until pressure testing is completed.

.2 Pneumatically pressure test breeching to a minimum of 5.0 kPa (20 in.wc.)

END OF SECTION

FABRICATED STACKS
23 51 19

1 GENERAL

1.1 Scope

.1 Provide unlisted, custom shop fabricated stacks and chimneys for

.1 diesel oil fired appliances,

.2 natural gas fired appliances,

.3 dual-fuel gas/oil fired appliances.

1.2 Related Sections

.1 23 35 16 Engine Exhaust Systems

.2 23 41 16 Fabricated Breeching and Accessories

.3 23 51 33 Insulated Sectional Chimneys

1.3 Definitions

.1 In this section the following definitions apply:

.1 ***Chimney*****:** a vertical conduit conveying flue gases to the outside atmosphere,

.2 ***Chimney connector*****:** has the meaning as defined in CSA B139-09,

.3 ***Breaching*****:** is the rectangular conduit which conveys flue gases from the appliance vent outlet to the chimney, and has the same function as a chimney connector,

.4 ***Low heat appliances*****:** appliances with a flue gas outlet temperature of 540°C (1000°F) or less,

.5 ***Medium heat appliances*****:** appliances with a flue gas outlet temperature of 980°C (1800°F) or less,

.6 ***Stack*****:** a vertical conduit containing multiple chimneys, and may also function as a single chimney,

(a) ***Coaxial Stack***: a stack which functions as a chimney for one or group of appliances and also contains separate chimneys inside the stack for other appliances,

.7 ***Vent*****:** (as it applies to a vent flue) has the meaning as defined in CSA B139-09 and CSA B149.1,

.8 ***Vent connector*****:** (as it applies to a vent flue) has the meaning as defined in CSA B139-09 and CSA B149.1.

1.4 Manufacturer Design Services

.1 Manufacturer to provide engineering services for design of stacks, chimneys, breeching connection and accessories based on appliance layout and general routing of chimney and breeching. Include:

.1 layout and sizing drawings,

.2 bill of materials,

.3 thermal analysis including theoretical draft and available draft,

.4 wind loading restraint, seismic restraint, and structural support details.

.5 stack/chimney base including concrete reinforcing cage,

.6 breeching connection,

.7 lightning protection and manway access,

.8 aircraft warning lights.

1.5 Submittals

.1 Submit shop drawing data sheets for manufactured products and standard fittings showing dimensions and describing construction.

.2 Submit calculations and shop drawings for fabricated chimneys, designed and sealed by a Professional Engineer licensed in the province of British Columbia, and include;

.1 material lists and fabrication drawings for stacks and chimneys,

.2 showing assemblies, overall dimensions, clearance requirements, size and location of connections, and flashing details,

.3 steel base details with base reaction loads, bolt quantity, bolt diameter and bolt circle diameter.

.4 concrete reinforcing cage.

1.6 Applicable Codes and Standards

.1 Installation standards and codes:

.1 B.C. Safety Authority

.2	CSA B139	Installation Code for Oil Burning Code.
.3	NFPA 211	Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
.4	ASME STS-1-2011	Steel Stacks

.5 Transport Canada Standard 621.19 - Standards Obstruction Markings.

.2 Product standards:

.1	ASTM A36/M	Standard Specification for Carbon Structural Steel
.2	ASTM A53/M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
.3	ASTM A312/M	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
.4	ASTM A588/M	Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance

1.7 Design Conditions

.1 Design pressure: -1.0 kPa (4 in.wc.) to + 2.5 kPa (10 in wc.)

2 PRODUCTS

2.1 Unlisted Single Wall Stacks - Custom Fabricated

.1 General:

.1 engineered custom fabricated, unlisted product to ASTM STS-1.

Standard of Acceptance
- Ellesmere Fabricators
- Van-Packer Model EC

.2 to NPFA 211 for Low-heat appliances;

(a) maximum operating temperature: 540°C (1000°F) without refractory

.3 to NFPA 211 for Medium-heat appliances;

(a) maximum operating temperature: 980°C (1800°F) with refractory

.4 vent pressure: negative, neutral or positive pressure

.5 fuels: natural gas, propane, oil.

.2 Design criteria:

.1 Diameter: as per appliances

.2 height: as Per SOR

.3 applicable Building Code: B.C. Building Code

.4 Wind Load, Seismic Zone, Exposure Factor, and Deflection: in accordance with Building Code.

.5 corrosion allowance on outer shell of engineered stacks: 1.6mm (1/16 in)

.6 designed to withstand applied loads appropriate for site and surroundings, as stable structures without guy wires, supported from base and stiffened to produce natural frequency greater than 45 Hz.

.3 Stack Materials:

.1 T304 Stainless steel, minimum 3.5 mm (0.14 in / 10 gauge) thick,

.2 shell reinforcement same material as shell.

.3 finish: stainless steel: uniform colour similar to hot rolled, annealed, pickle #1 finish

.4 Inner Chimney Materials:

.1 for temperatures up to 340°C (650°F) : ASTM A53 Gr B, Schedule 40 ERW black steel pipe,

.2 for temperatures >340°C (650°F) and ≤ 560°C (1000°F): ASTM A312, T304 stainless steel, Schedule 10 Seamless or welded pipe.

.3 finish:

(a) black steel pipe: sandblasted and primed with inorganic zinc rich epoxy primer and finished with polyurethane grey topcoat.

.5 Fabrication:

.1 sectional pre-fabricated single wall, free-standing, manufactured in shop specializing in cylindrical sections, by welders qualified to CSA W47 under Canadian Welding Bureau certificates.

.2 fabricated in sections of equal width rolled to cylindrical shape with welded vertical seams staggered between uniformly spaced horizontal joints,

.3 welded using manual arc, double butt, full penetration or submerged arc cover pass welds over manual arc back-up welds,

.4 clamped and restrained to prevent damage, soiling, or heat distortion during welding,

.5 weld deposit matching base metal strength, atmospheric corrosion resistance and weathered appearance,

.6 welded with temperature of base metal at more than 15.6 C (60 F), with welds ground smooth and finished to match base material finish,

.7 exposed surfaces protected during fabrication, handling, storage and erection

.8 pre-assembled in shop before delivery to site. SPEC NOTE: coordinate with structural for the concrete depth to accommodate the foundation cage.

.9 welded steel foundation cage for embedding in concrete foundation,

.10 spiral wind strakes and stack dampening for control of wind induced vibration.

.6 Additional requirements for inner chimneys:

.1 inner chimneys supported and anchored at entry base elbow, with elbow supported from stack base,

.2 guide rings to support inner chimney with clearance gaps not to exceed 6 mm (1/4 in) and be provided;

(a) within 300 mm (12 in) of top of stack,
(b) at midpoint of chimney, and
(c) at other locations as required not to exceed a spacing of 9 m (30 ft) between supports.

.3 stack cap flashing:

(a) fabricated from T316 stainless steel,
(b) with reinforced openings for inner chimneys to provide free movement of chimney through cap.

.7 Refractory:

.1 Low-heat appliances:

(a) no refractory required.

.8 Access door at base of stack:

.1 size: lesser of 2/3 stack diameter or 600 mm (24 in) in height and width,

.2 material: to match stack,

.3 angle frame and stack reinforcement, hinged door, and manual latch on both sides of door.

.9 Access ladder and service platform

.1 exterior vertical access ladder to top of stack,

.2 service platform located at approximately 1800 mm (6 ft) below top of stack;

(a) welded steel shapes with painted epoxy primer and polyurethane finish coats,
(b) complete with guard rail, mid-guard rail, toe-kick plates, and open anti-skid grating walkways,
(c) service walkway minimum 1000 mm mm (39 in) wide,
(d) designed for a live load of 225 kg (500 lbs) for two people plus 70 kg (150 lbs) for equipment.

.3 two (2) test ports located 90° apart, and approximately two stack diameters down from top of stack;

(a) NPS 3, schedule 40 black steel pipe, with ANSI flange and flange-cap.

.10 Accessories:

.1 base cap flashing collar, inlet thimble tee, clean-out door below thimble, and drain connection from base.

.2 clean-outs: shop fabricated, bolted, gasketed type access doors.

.3 lightning protection system.

.11 Aircraft obstruction light system:

(a) double obstruction warning light fixtures and control system,
(b) painted galvanized steel conduit and wiring, wired to junction box at base of stack,
(c) support conduit off from side of stack with minimum 50 mm (2 in) clearance to stack.

.12 Factory pressure test:

.1 factory pressure test sections of stack shell and inner chimneys to 14 kPa (2 psi),

.2 furnish pressure test record prior to shipping from factory.

Standard of Acceptance
° Ellesmere Fabricators
° Van-Packer Model EC

2.2 Ventilating roof thimbles

.1 Listed roof thimbles to section 23 51 13 in accordance with listed Industrial Chimneys.

.2 Unlisted roof thimbles to NFPA 211 for Low-heat appliances:

.1 materials: galvanized steel, minimum 0.61 mm (24 ga)

.3 Unlisted combination roof thimble and pipe anchor:

.1 materials: carbon steel plate,

.2 welded box construction, with gusset reinforcing as needed at mounting points,

.3 reinforcing steel frames to connect to structure.

(a) review with building structural engineer for connections to building.

.4 designed for wind loading and seismic loads for free-standing structure.

°

2.3 Lightning Protection System

.1 20mm (3/4") diameter stainless steel air terminals connected to base of stack with 3/8" diameter copper rod and 6/0 copper cable in accordance with CSA B72.

2.4 Aircraft Obstruction Lights

.1 Aircraft warning lights in accordance with Transport Canada Standard 621.19.

.2 Light fixtures – obstruction light:

.1 double head obstruction light 224mm (9") H x 130mm (5") diameter with threaded red fresnel glass globe for 360 degree visibility,

.2 threaded bottom to accept a 25.4mm (1") mounting post and power feed,

.3 housing: cast aluminum.

.4 lamp: LED, flashing red medium intensity

.5 Voltage: 120 volt

Standard of Acceptance
° Crouse Hinds type L-810/864 flashing red beacon obstruction light

.3 Controller:

.1 NEMA 4 rated enclosure,

.2 power supply: 120VAC,

.3 solid state flashers with zero voltage switching for longer lamp life, encapsulated to protect against harsh conditions and vibration,

.4 solid state alarm modules, encapsulated to protect against harsh conditions and vibration,

.5 line voltage transient protection,

.6 circuit breakers,

.7 alternating lamp function,

.8 lighning arrestor,

.9 failure detection for:

(a) beacon lamp failure
(b) obstruction lamp failure
(c) flasher failure (force beacon on steady in the event of failure)
(d) power failure

.10 local LED indicators for:

(a) beacon lamp failure
(b) obstruction lamp failure
(c) flasher failure
(d) Power present

.11 Individual isolated alarm contacts for remote alarming for:

(a) beacon lamp failure
(b) obstruction lamp failure
(c) flasher failure
(d) power failure

.12 Photo-control override switch on enclosure door

.13 BMS integration:

(a) summary alarm fault – Form C dry contact.

Standard of Acceptance
° Crouse Hinds – OLC series controllers

3 EXECUTION

3.1 General

.1 Stacks, chimneys and breeching serving gaseous fuel and liquid fuel appliances: installed by tradesmen certified for installation of fuel fired appliances.

3.2 Stacks with inner chimneys

.1 Provide stacks with inner chimneys;

.1 chimneys for building heating appliances,

.2 chimneys for diesel engines.

3.3 Installation

.1 Supply anchor bolts, foundation cages and templates for setting chimney bases.

.2 Erect stacks true and plumb to within 1 in 1200.

.3 Place non-shrink grout between chimney foundation and base.

.4 Assemble stacks with butt weld field joints or flanged connections. Touch up painted finish where damaged by welding or installation with same materials as for stack and chimney.

.5 Seal joints with bead of high temperature sealant, fill channel of vee band with high temperature sealant, and install and tension vee-band, or as required by manufacturers listing instructions.

.6 Seal refractory lined stacks and breechings:

.1 seal joints with refractory joint cement supplied by stack manufacturer,

.2 butt weld field joints with continuous welds,

.3 grind smooth tack welds, and fill holes and pits with weld metal and ground smooth,

.4 touch up primer at field welds and other ground areas.

3.4 Roof thimbles

.1 Listed roof thimbles:

.1 Install listed roof thimbles and maintain clearance to combustibles in accordance with manufacturer listings.

.2 Fabricated roof thimbles:

.1 Maintain the following minimum clearance dimensions:

(a) horizontal clearance from exhaust stack to combustibles: 225 mm (9 in) unless otherwise shown,
(b) vertical clearance from exhaust stack to combustibles: 225 mm (9 in) unless otherwise shown,
(c) clearance between thimble and combustible materials: 25 mm (1 in) unless otherwise shown.
(d) ventilation space dimension from exhaust stack to thimble:

Stack insulation thickness mm (in)	**Clearance mm (in)**
0 (0)	200 (8)
25 (1)	150 (6)
50 (2)	100 (4)
75 (3) and larger	50 (2)

3.5 Pressure Test

.1 Pressure test portions of stack and/or chimneys located inside the building and up to first joint outside the building. . Provide temporary pressure blanks at breeching connection to stack and/or chimney and at first joint outside of building. Do not insulate stack or chimney (if specified) until pressure testing is completed.

.2 Pneumatically pressure test to a minimum of pressure or 14 kPa (2 psi).

3.6 Aircraft Obstruction Light System

.1 Mount control panel and extend wiring from junction box at base of stack to control panel.

.2 Power for control panel provided under Division 26.

.3 Test and commission aircraft obstruction lighting system in accordance with manufacturer's installation instructions.

END OF SECTION

INSULATED SECTIONAL CHIMNEYS
23 51 33

1 GENERAL

1.1 Scope

.1 Provide chimneys and chimney connectors as required for;

.1 heating oil fired appliances,

.2 natural gas fired appliances,

.3 dual-fuel gas/oil appliances.

1.2 Related Sections

.1 23 51 19 Fabricated Stacks

1.3 Definitions

.1 In this section the following definitions apply:

.1 ***Chimney*****:** a vertical conduit conveying flue gases to the outside atmosphere,

.2 Chimney connector**:** has the meaning as defined in CSA ***B139-09***

.3 ***Low heat appliances:*** appliances with a flue gas outlet temperature of 540°C (1000°F) or less.

.4 ***Vent*****:** (as it applies to a vent flue) has the meaning as defined in CSA B139-09 and CSA B149.1

.5 ***Vent connector*****:** (as it applies to a vent flue) has the meaning as defined in CSA B139-09 and CSA B149.1

1.4 Manufacturer Design Services

.1 Manufacturer to provide engineering services for design of chimney and chimney connectors based on appliance layout and general routing of chimney and chimney connectors as required. Include:

.1 layout and sizing drawings,

.2 bill of materials,

.3 thermal analysis including theoretical draft and available draft,

.4 wind loading restraint, seismic restraint, and structural support details.

1.5 Submittals

.1 Submit shop drawing data sheets for manufactured products and standard fittings showing dimensions and describing construction.

.2 Submit engineering shop drawings including layout and installation details.

1.6 Applicable Codes and Standards

.1 Installation standards and codes:

.1 B.C. Safety Authority

.2 CSA B139 Installation Code for Oil Burning Code.

Product standards:

.3 CAN/ULC-S604 Standard for Factory-Built Type A Chimneys

.4 CAN/ULC-S629 Standard for 650°C Factory-Built Chimneys

.5 ULC/ORD-C959 540°C and 760°C Industrial Chimneys

2 PRODUCTS

2.1 Building Heating Appliance Chimneys

.1 General:

.1 to CAN/ULC-S604 or CAN/ULC-S629 or ULC/ORD-C959

.2 maximum flue gas temperature: 540°C (1000°F)

.3 vent pressure: negative, neutral or positive pressure

.4 fuels: natural gas, propane, oil.

.5 size: 150 – 1200 (6 – 48 in) liner ID.

.6 clearance to combustibles: 100 - 250 mm (4 - 10 in) maximum depending on chimney size.

.2 Construction:

.1 double wall construction for chimney and chimney connectors,

(a) flue liner: T304 stainless steel
(b) casing: T304 stainless steel
(c) insulation: 25 mm (1 in) air space or mineral wool insulation

.2 prefabricated sectional lengths and fittings, and accessories including roof flashings, storm collars, Belmont top, roof and wall supports, firestop spacers, wall thimbles, for both chimney and chimney connectors.

Standard of Acceptance

- Selkirk – model UltraTemp/ UltimateOne/ ICA
- Van-Packer – model DW
- Metal-Fab – model PIC
- Schebler – model P1

2.2 Industrial Chimneys

.1 General:

.1 to ULC/ORD-C959

.2 maximum flue gas temperature: 750°C (1400°F)

.3 vent pressure: negative, neutral or positive pressure

.4 fuels: natural gas, propane, oil.

.5 size: 150 – 1200 (6 – 48 in) liner ID.

.6 clearance to combustibles: 50 - 100 mm (2 - 4 in) maximum depending on chimney size.

.2 Construction:

.1 double wall construction for chimney and chimney connectors,

(a) flue liner: T304 stainless steel
(b) casing: T304 stainless steel
(c) insulation: 50 mm (2 in) thick mineral wool

.2 prefabricated sectional lengths and fittings, and accessories including roof flashings, storm collars, Belmont top, roof and wall supports, firestop spacers, wall thimbles, for both chimney and chimney connectors.

.3 joints: veebands and sealant for liner flanges and draw band for shell flanges, or proprietary band joints, as per listing requirements.

.4 expansion joints: low-spring bellows type joints.

Standard of Acceptance
- Selkirk – model ICA
- Van-Packer – model DWPlus
- Metal-Fab – model IPIC
- Schebler – model P1
- Security Chimneys – model SecureStack Pro CIX

2.3 Barometric draft control for non-draft hood applications

.1 Construction:

.1 single acting, for natural gas,

.2 dual acting for natural gas and oil fired applications,

.3 80% of full size of breeching area,

.4 fabricated from 3.5 mm [10 ga] steel.

Standard of Acceptance
- Wing DA and SA
- Field M and MG2

3 EXECUTION

3.1 General

.1 Chimneys and chimney connectors serving gaseous fuel and liquid fuel appliances: installed by tradesmen certified for installation of fuel fired appliances.

.2 Select chimney type base on flue gas temperature, and required chimney size as per the following:

Type of Appliances	Maximum Flue Gas Temperature Limit	Appliance Flue Outlet Size or Manifolded Chimney Connector Size(1)	Chimney Type
	≤540°C (1000°F)	All sizes	Building Heating Appliance Chimney
Stationary Engines(2)	≤750°C (1400°F)	All sizes	Industrial Chimney

Notes:

.1 Whichever is greater.

.2 Includes but not limited to diesel-generators, fire pumps, compressors, etc.

3.2 Installation

.1 Install chimney system in accordance with chimney manufacturer and appliance manufacturer installation requirements.

.2 Maintain clearance between chimney connectors and combustible materials or building insulation in accordance with product listing requirements.

.3 Position chimneys inside of enclosures to maintain minimum clearances to:

.1 combustible material in accordance with chimney listing requirements, and

.2 for non-combustible materials as follows:

(a) 50 mm (2 in) for chimney OD size less than or equal to 450 mm (18 in)
(b) 100 mm (4 in) for chimney OD size larger than 450 mm (18 in).

.4 Support chimneys at roof penetrations and provide roof flashing and counter-flashing.

.5 Provide expansion joints as required by specific product engineered design.

.6 Erect chimneys true and plumb to within 1 in 1200.

.7 For multiple appliances, manifold the chimney connectors in accordance with manufacturer installation requirements.

.8 Where an offset is required, make offset with 45° elbow fittings whenever possible.

.9 Provide clean-outs at base of chimney and provide access to clean-outs.

.10 Seal double wall pressure stacks and breechings:

.1 seal inner joints bead of high temperature sealant,

.2 fill channel of vee band with high temperature sealant and install and tension vee-band,

.3 install insulation filler strips in air space between inner and outer walls, and secure outer shell with draw band,

.4 caulk upper edge of drawbands exposed to the weather with silicone sealant.

.11 Make connector connection to equipment, flue gas outlet with slip type joints and mechanically fasten with a minimum of three (3) screw fasteners.

.12 Where chimney passes through combustible floor or wall construction, provide fire-stop fitting.

.13 Where breeching system is designed to absorb thermal expansion make connection with flange adaptor.

END OF SECTION

PACKAGED HOT WATER BOILER - CONDENSING
23 52 16

1 GENERAL

1.1 Scope

.1 Provide dual-fuel fired (natural gas & No.2 fuel oil) hot water boilers to operate under condensing conditions on natural gas. Condensing operation not required when firing on fuel oil.

1.2 Shop drawings

.1 Submit shop drawings for each boiler showing:

.1 model number,

.2 guaranteed input and output rating performance,

.3 outline dimensions,

.4 fuel and power requirements,

.5 layout of fuel piping trains,

.6 combustion air inlet, exhaust piping (vent piping), and condensate drain requirements,

.7 water inlet and outlet connection details,

.8 loading points and weights, and

.9 control panel layouts and wiring diagrams.

1.3 Applicable codes and standards

.1 Pressure components:

.1 ASME Boiler and Pressure Vessel Code, Section I Power Boilers; for high pressure,

.2 ASME Boiler and Pressure Vessel Code, Section IV Heating Boilers; for low pressure,

.3 CSA B51, Boiler Pressure Vessel and Pressure Piping Code,

.4 CAN1 3.1 Industrial and Commercial Gas-Fired Package Boilers,

.5 CSA B140.7 Oil Burning Equipment: Steam and Hot Water Boilers

.6 Requirements of BC Safety Authority,

.7 CRN registered for the province of installation.

.2 Boiler installation, burners, and burner safeguards:

.1 CSA B139 Installation Code for Oil Burning Equipment

.2 CSA B149.1 Natural Gas and Propane Installation Code, and

.3 Local Authorities having jurisdiction.

.4 Boiler/burner package to bear ULC, or CSA label

2 PRODUCTS

2.1 General

.1 Shop assembled and tested condensing type with burner, gas train, controls, boiler trim, and jacket.

° Viessmann - Vitomax 200

2.2 Boiler requirements

.1 Design conditions:

.1	Pressure:	1034 kPa (150 psig).
.2	Temperature:	49C (120 F) return with design system differential of 22 C (40 F).
.3	Capacity (each):	11,000 MBH
.4	Fluid:	water

.2 Fuel: Natural gas & No.2 Fuel oil with Natural gas supply pressure: 13 kPa (2 psig)

.3 Efficiency (output/input): 88% minimum over entire operating range.

.4 Burner/boiler combination to perform in accordance CCME National Emission Guideline for Commercial / Industrial Boilers and Heaters with respect to NO_x Emission Limits.

2.3 Boiler

.1 Construction:

.1 condensing type,

.2 heat exchanger/combustion chamber of fire tube design,

.3 corrosion resistant exhaust manifold/decoupler with flue connection and condensate drain,

.4 shop assembled and skid mounted with integral burners and burner controls, gas train with PRV and regulator, factory mounted, piped and wired to control panel, and fire tested at factory,

.5 2 in (50 mm) thick fibreglass insulation, with reinforced metal jacket secured with sheet metal screws or stove bolts,

.6 controls shall be set up so that all boilers feed into a master controller. Boiler onboard controllers shall not be used to provide master control.

.2 Boiler trim:

.1 low water cutoff float type, manual reset, wired to burner control circuit.

.2 All required components including bypass valves, recirculation pumps and controls to be provided for boiler's internal protection against condensing conditions while running on backup fuel oil.

.3 temperature and pressure gauges mounted at supply and return connections on boiler.

.4 temperature and pressure relief valve to comply with Code requirements.

.5 operating and high limit aquastats to control normal operation of burner and provide manual reset shut down on high water temperature.

2.4 Burner

.1 Pulse combustion type with;

.1 integral with heat exchanger,

.2 spark ignition,

.3 blower for pre purge and post purge,

.4 flame safeguard controller,

.5 air safety switch monitoring prepurge,

.6 blocked combustion air intake switch.

.2 High radiant, multi-port type for natural gas with;

.1 full modulation,

.2 flame safeguard controller,

.3 interlocks for low fire ignition,

.4 gas pilot of premix type with automatic electric ignition monitored by UV detector,

.5 ignition train fitted with;

(a) pilot cock,
(b) pilot pressure regulator and
(c) ignition solenoid valve,

.6 combustion air damper and fuel flow control valves operated by single damper control motor to regulate fire,

.7 gas train with;

(a) automatic motorized flow control valve,
(b) safety gas shut-off valve,
(c) manual gas shut-off cock,
(d) high and low gas pressure switches,
(e) gas pressure gauges and
(f) main gas pressure regulator, primary gas shut-off valve controlling gas burner and closing automatically in event of power failure, flame failure, excessive pressure or temperature, high or low gas pressure, and low water

.3 Control panel:

.1 mounted on front of boiler.

.2 CSA Standard C22.2 No.94.1 Type 2 enclosure, with hinged door and neoprene dust seal.

.3 contain electronic programming relay, blower motor starter control switches and flame safeguard controller.

.4 manual-automatic selector switch.

.4 Boiler management system for multiple units:

.1 alarm bell to indicate "flame failure".

.2 wiring to interconnect control switches, motors and electrical devices on boiler and control panel.

.3 wiring inside panel to be connected to elements outside panel through numbered terminal strip.

.5 Flame safeguard controller:

.1 mounted in control panel,

.2 computerized solid state control with sequence and flame on lights and digital "first-out" fault code indication of flame safeguard functions.

.3 dynamic self-check logic,

.4 fixed operating sequence incapable of being manually advanced,

.5 sequence to include start pre-purge, ignition, main flame, post-purge and stop.

2.5 Factory Installed Insulation and Guards

.1 Provide insulation, jacketing and guards to prevent human contact with any part of boiler assembly that has a surface temperature greater than 70 C (158 F) under operating conditions.

2.6 Painting

.1 Boiler assembly: factory applied hard enamel paint finish.

3 EXECUTION

3.1 Installation

.1 Mount boilers level on housekeeping pads.

.2 Make piping, wiring and vent connections.

.3 Maintain clearances for operation and maintenance.

3.2 Start-up

.1 Provide services of manufacturer's Service Representative to check installation, start boilers, calibrate controls and instruct Operators.

.2 Check-out operation of safety controls and demonstrate operation of boilers over entire firing range of burners. Submit written report showing records of water flow, water temperatures, fuel flow.

END OF SECTION

PACKAGED BOILERS - FIRE TUBE
23 52 39

1 GENERAL

1.1 Scope

.1 Provide fire tube boilers and fuel oil feed pumps.

1.2 Shop drawings

.1 Submit shop drawings for each boiler with model number, performance and design data, outline dimensions, fuel and power requirements, inlet and outlet connection details and loading points and loads.

.2 Include guaranteed input and output rating, boiler heating surface, detail of fuel piping trains and control panels and wiring diagrams.

1.3 Applicable codes and standards

.1 Pressure components:

.1 ASME Boiler and Pressure Vessel Code, Section I Power Boilers; for high pressure,

.2 ASME Boiler and Pressure Vessel Code, Section IV Heating Boilers; for low pressure,

.3 CSA B51, Boiler Pressure Vessel and Pressure Piping Code,

.4 CAN1 3.1 Industrial and Commercial Gas-Fired Package Boilers

.5 CSA B140.7 Oil Burning Equipment: Steam and Hot Water Boilers

.6 Requirements of BC Safety Authority

.7 CRN registered for the province of installation.

.2 Boiler installation, Burners, and burner safeguards;

.1 CSA B139 Installation Code for Oil Burning Equipment

.2 CSA B149.1 Natural Gas and Propane Installation Code, and

.3 Local Authorities having jurisdiction.

.3 Boiler/burner package to bear ULC, or CSA label.

.4 Electrical equipment and wiring to Canadian Electric Code.

2 PRODUCTS

2.1 General

.1 Packaged three or four pass horizontal fire tube type with burner, forced draft fan, gas and oil piping trains, burner controls, boiler trim and refractory, shop assembled and tested, mounted on heavy steel base frame.

.2 Boilers fitted with control devices and systems required under the Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation of British Columbia.

- Cleaver Brooks Model CBEX Elite

2.2 Boiler requirements

.1 Design conditions:

.1 Heating surface: 85.7 m2 (922 sq ft) heating surface (fireside).

.2 Operating pressure: 860 kPa (125 psig)

.3 Capacity (each): Three (3) @ 300 BHP.

.4 10:1 turndown range based on natural gas.

.5 Limit of 3% oxygen across the full operating range with 30 ppm NOx performance while firing on natural gas.

.2 Fuel: Natural gas and no. 2 fuel oil, individually and not in combination.

.1 Gas supply pressure: 13 kPa (2 psig)

.3 Efficiency (output/input): 82.5% minimum without accounting for economiser over entire 10:1 turndown range based on natural gas.

.4 Burner/boiler combination to perform in accordance CCME National Emission Guideline for Commercial / Industrial Boilers and Heaters with respect to NO_x Emission Limits.

2.3 Boiler

.1 Construction:

.1 shop assembled and skid mounted with integral forced draft burners and burner controls, factory mounted, piped and wired to control panel, and fire tested at factory,

.2 2 in (50 mm) minimum fibreglass, factory applied with metal jacket covering, finish painted,

.3 observation ports for inspection of flame conditions at each end of boiler,

.4 hinged front and rear davitted doors, for access to front and rear tube sheets,

.5 shell handholes for water side inspection and cleaning.

.6 Boilers over 1200 mm (48 in) diameter: access manholes on waterside.

.2 Steam boiler trim:

.1 water column assembly: tricocks, gauge glass, blowdown valve operable from firing floor, low water cut-off with alarm and pump control switch,

.2 auxiliary low water cut-off (manual reset): separate from water column, with separate connections to boiler,

.3 both water column and auxiliary low water cut-off to be piped to boiler using plugged tees,

.4 high water limiting device with manual reset alarm,

.5 ASME rated safety valves,

.6 flue gas temperature gauge 114 mm (4 ½ in) diameter,

.7 130 mm (5 in) steam pressure gauge.

.8 operating pressuretrol to control normal operation of burner and manual reset high limit pressuretrol to shut down burner on high steam pressure,

.9 automatic blowdown valves.

2.4 Stack heat recovery economizer

.1 Stainless steel interior shell

.2 Built in by-pass damper to also allow manual stack temperature control and heat adjustment

.3 Removable panels allow for complete cleaning

.4 Built-stainless steel condensate pan and drain

.5 Selects Economizers that would produce an outlet flue gas temperature between 290 to 310 F

.6 Standard Al-Fuse stainless tube/aluminum fin construction. Maximum 6 fins/inch

.7 Running boiler feedwater directly through the economizer (direct feedwater heating) – continuous run pump and modulating feedwater control is required. Flow should not be stagnant as long as flue gasses are running through the economizer.

2.5 Forced draft fan

.1 sized to provide air for combustion.

.2 direct-connected to motor drive.

.3 fitted with air inlet register for connection to damper control motor.

.4 Inlet silencer to obtain noise level not exceeding 85 dbA 1 m (3 ft) from front of boiler.

2.6 Burner

.1 High radiant, multi-port type for natural gas [and pressure atomizing type for commercial no. 2 fuel oil with full modulation, with;

.1 Interlocks for low fire ignition.

.2 Gas pilot of premix type with automatic electric ignition monitored by UV detector that prevents primary fuel valve from opening until pilot flame is established.

.3 Ignition train fitted with pilot cock, pilot pressure regulator and ignition solenoid valve.

.4 Combustion air damper and fuel flow control valves operated by single damper control motor to regulate fire according to load demand.

.2 Oil system:

.1 oil system with fuel oil piping,

.2 oil pressure regulating devices and oil metering controls,

.3 solenoid shut-off valve,

.4 pressure gauges and fuel strainer,

.5 piped and integrally mounted on unit.

.6 one oil pump per boiler, sized for twice maximum firing rate with relief valves, strainers, accessories, motor and starter.

.3 Gas train - to 2930 kW (10,000 MBH) input:

.1 automatic motorized flow control valve,

.2 safety gas shut-off valve,

.3 manual gas shut-off cock,

.4 high and low gas pressure switches,

.5 gas pressure gauges and main gas pressure regulator.

.4 Gas train - over 2930 kW (10,000 MBH) input:

.1 automatic motorized flow control valve,

.2 two safety gas shut-off valves,

.3 automatic vent valve installed immediately downstream of first safety shut-off valve,

.4 manual lubricated plug type shut-off cocks,

.5 high and low gas pressure switches, gas pressure gauges and main gas pressure regulator.

.5 Primary gas flow valve controlling gas burner and closing automatically in event of power failure, flame failure, excessive pressure or temperature, high or low gas pressure, and low water.

2.7 Control panel

.1 Mounted at eye level on front of boiler.

.2 CSA Standard C22.2 No. 94.1 Type 2 enclosure, with hinged door and neoprene dust seal.

.3 Electronic programming relay, blower motor starter control switches and flame safeguard controller.

.4 Gas-oil selector switch on control panel.

.5 Manual-automatic selector switch and damper positioning switch to permit automatic firing in accordance with load demand or manual control of firing rate between low fire and maximum rating.

.6 Indicating lights on panel as follows:

.1 Red - low water level

.2 Amber - flame failure

.3 Blue - fuel valve open

.4 Green - load demand

.7 Alarm bell to indicate "flame failure".

.8 Wiring to interconnect control switches, motors and electrical devices on boiler and control panel. Wiring inside panel to be connected through numbered terminal strips.

.9 Low fire hold switch to hold burner on low fire until boiler return water temperature reaches 65 C (150 F).

.10 Controls shall be set up so that all boilers feed into a master controller. Boiler onboard controllers shall not be used to provide master control.

2.8 Flame safeguard controller:

.1 Mounted in control panel.

.2 Computerized solid state control with sequence and flame on lights and digital "first-out" fault code indication of flame safeguard functions.

.3 Dynamic self-check logic.

.4 Fixed operating sequence incapable of being manually advanced.

.5 Sequence to include start pre-purge, ignition, main flame, post-purge and stop.

2.9 Internal or external transient voltage and surge suppression

.1 DDC and electronic modules:

.1 transient voltage protection and

.2 Surge protection with;

(a) Dielectric strength of 1000 V minimum
(b) Response time of 10 nanoseconds or less
(c) Transverse mode noise attenuation of 65 dB or greater
(d) Common mode noise attenuation of 150 dB or greater at 40-100 Hz

2.10 Factory Installed Insulation and Guards

.1 Provide insulation, jacketing and guards to prevent human contact with any part of boiler assembly that has a surface temperature greater than 70 C (158 F) under operating conditions.

2.11 Painting

.1 Boiler assembly to have factory applied paint finish of hard enamel.

2.12 Oil pumps

.1 One per boiler, sized for twice maximum firing rate with relief valves, strainers, accessories, motor and starter.

3 EXECUTION

3.1 Factory inspection

.1 Arrange for Boiler Inspection prior to shipment and submit Certificate of Approval Inspection Report.

3.2 Installation

.1 Mount unit level on pad type vibration isolators.

.2 Make piping, wiring and breeching connections.

.3 Maintain clearances for operation and maintenance.

3.3 Start-up

.1 Provide the services of the Manufacturer's factory trained service representative to check the installation, start the boilers, calibrate controls and train the Owner's Operators in the proper operation and maintenance of the equipment.

.2 Demonstrate operation of safety controls.

.3 Demonstrate operation of the boilers over the entire firing range of the burners on both natural gas and fuel oil.

.4 Record;

.1 water temperatures,

.2 steam pressure,

.3 steam flow,

.4 fuel flow,

.5 flue gas temperature, and

.6 percent O_2.

.7 NOX emissions, corrected to 3% O_2.

.5 Submit written report on completion of start-up and commissioning.

END OF SECTION

DEAERATOR
23 53 16

1 GENERAL

1.1 Scope

.1 Provide deaerator as required.

1.2 Shop drawings

.1 Submit shop drawings for deaerator with model number, performance and design data, outline dimensions, inlet and outlet connection details, loading points and loads.

.2 Provide graph showing dissolved oxygen in ppm in output feedwater to suit specified condition between 5% and 100% of rated capacity of deaerator.

1.3 Reference standards

.1 ASME Pressure Vessel Code.

2 PRODUCTS

2.1 General

.1 Deaerator:

.1 packaged low profile horizontal spray type

.2 deaerating section, feedwater storage tank, and accessories.

Standard of Acceptance
- Kansas City
- Water Group Industrial
- Cochrane
- Cleaver Brooks
- Ecodyne

2.2 Design criteria

.1 Rating:

.1 outlet capacities: 1,600 kg/hr (3,500 lbs/hr)

.2 make-up water temperature: 10 C (50 F)

.3 condensate temperature: 65.5 C (150 F)

.2 Pressure:

.1 Design: 340 kPa (50 psig)

.2 Operating: 35 kPa (5 psig)

2.3 Deaerator

.1 Construction:

.1 Material and construction in accordance with ASME Section 8, Division 1, Pressure Vessel Code.

.2 316 stainless steel for inlet water connection and other locations where material is in contact with un-deaerated water.

.2 Water outlet quality:

.1 Oxygen content;

(a) maximum 0.005 cc/litre when tested to ASTM D888-66 Reference Method A at 108 C (227 F) leaving temperature,
(b) guarantee oxygen content for all flow conditions between 5% and 100% load,

.2 Carbon Dioxide content;

(a) free CO_2 zero when tested by standard methods.

.3 Storage capacity:

.1 10 minutes, between normal operating level and overflow level based on full load hourly design output capacity.

.4 Vent condenser:

.1 Internal, direct contact type.

.2 Type 304 stainless steel.

.5 Spray valves:

.1 Double seated type, self-adjusting.

.2 Uniform spray at loads from 5% to 105% of design.

.3 316 stainless steel mounted on underside of water spray box.

.4 Pressure loss at maximum load 35 kPa (5 psig).

.6 Vent valves:

.1 One or more gate type vent valves.

.2 4 mm (1/8 in) diameter hole in valve disc.

.7 Surface preparation:

.1 External and internal surfaces free from rust and scale.

.2 One coat of red primer on external surfaces.

.8 Manhole openings:

.1 One flanged, gasketed and bolted manhole opening for access to deaerating section.

.2 One 275 mm x 400 mm (11 in x 16 in) manhole in storage tank.

2.4 Connections

.1 Sizes as indicated.

.1 One steam inlet.

.2 One make-up and condensate inlet.

.3 One water outlet.

.4 One high pressure drip inlet.

.5 Two atmospheric vents with valve.

.6 One drain.

.7 One chemical feed inlet.

.8 One overflow with internal standpipe.

.9 One NPS ¼ sampling connection on storage tank.

.10 One vacuum breaker.

.11 Auxiliary connections for thermometers, pressure gauges, level controls, gauge glasses, alarm switches, and relief.

.2 Connections NPS 2 and smaller: screwed forged steel full couplings.

.3 Connections NPS 2½ and larger: 125 mm (5 in) long nozzles with 1035 kPa (150 psig) welding neck flanges with raised face removed. Internally seal weld shell welds to prevent corrosion.

.4 Extend connections and openings 75 mm (3 in) to clear 63 mm (2½ in) thick insulation.

2.5 Shop testing

.1 Radiography:

.1 shop radiograph shell and head seams,

.2 submit written report documenting date of test and test results.

.2 Magnetic particle testing:

.1 wet magnetic particle test nozzle to shell welds.

.2 submit written report documenting test results.

2.6 Accessories

.1 Compound gauge:

.1 one 150 mm (6 in) diameter dial type for deaerating section,

.2 indicate 0 to 30" hg vacuum,

.3 0 to 104 kPa (0 to 15 psig) range dual Imperial and Metric scale,

.4 complete with syphon and cock.

.2 Relief valve:

.1 one or more sized for steam input capacity,

.2 bronze body type,

.3 set at 207 kPa (30 psig).

.3 Gauge glasses:

.1 sets as required with guarded isolating cocks and ball check valves,

.2 glass guard,

.3 to show level in storage section of heater.

.4 Supports:

.1 two steel saddles.

.5 High level alarm switch:

.1 one high water alarm with SPDT switch to sound high water alarm.

Standard of Acceptance
° Mercoid Type 123-3-SP-DT contacts open as level rises.

.6 Low water alarm switch:

.1 one low water control with SPDT switch to sound low level alarm.

Standard of Acceptance
° Mercoid Type 123-2-SP-ST contacts open as level lowers.

.7 Low water pump cut-off switch:

.1 one low water control with SPDT switch to shut-off operating boilerfeed pumps.

Standard of Acceptance
° Mercoid Type 123-3-SP-ST contacts close as level falls.

2.7 Deaerator level control system

.1 General:

.1 pneumatic system of level controls to maintain deaerator operating levels.

.2 system selected to operate over 21 to 104 kPa (3 to 15 psig) pneumatic signal range.

.3 refer to Deaerator and Main Condensate Tank Level Control Diagram.

Standard of Acceptance
° Fisher

.2 Supply following equipment with deaerator:

.1 Condensate control valve V-1

(a) Design flow: 2.5 l/s (40 USGPM)
(b) Pressure drop: 35 kPa (5 psig)
(c) pneumatic type.
(d) Iron body, 416 stainless steel trim.

Standard of Acceptance
° Fisher 657 ET to fail open without air supply.

.2 Make-up control valve V-3

(a) Design flow: 2.5 l/s (40 USGPM) at design condition.
(b) Pressure drop: 35 kPa (5 psig).
(c) Pneumatic type.
(d) Iron body, 416 stainless steel trim.

Standard of Acceptance
° Fisher 657 ET to fail open without air supply. Valve complete with No. 3582 positioner.

.3 Sequencing relay

(a) Normal air signal through ports C and A.
(b) Factory set to switch air signal through ports B to A when inlet air signal on port D increases to 83 kPa (12 psig).

Standard of Acceptance
° Fisher No. 164A

.4 Level controllers

(a) Both direct acting.

Standard of Acceptance
° Leveltrol LT-2, 2500-249 with 67 FR air set.
° Leveltrol LT-3, 2500-249 with 67 FR air set.

3 EXECUTION

3.1 Installation

.1 Install deaerator level and secure in place.

.2 Make piping, tubing and wiring connections.

.3 Maintain installation clearances for operation and maintenance.

3.2 Start-up

.1 Provide services of manufacturer's service representative for one day to check installation and advise Owner's operators on start-up and operating procedures.

3.3 Site testing

.1 Organize and co-ordinate site testing of output feedwater supplied from deaerator with project internal water treatment supplier specialist to demonstrate specified deaerated water conditions are met.

.2 Provide experienced and qualified personnel to assist in conducting tests and recording test data.

.3 Provide copy of site test data to Owner.

3.4 Site commissioning of level control system

.1 After level control system is installed with tubing and external compressed air supply to valve positioners and level controllers, demonstrate that system is functioning as per Deaerator and Main Condensate Tank Level Control Diagram and control description.

.2 Arrange and pay for site visit by level control system equipment supplier to commission and calibrate system.

END OF SECTION

HEAT EXCHANGERS
23 57 13

1 GENERAL

1.1 Scope

.1 Provide heat exchangers as required.

1.2 Shop drawings

.1 Submit shop drawings for each heat exchanger with model number, performance and design data, outline dimensions, inlet and outlet connection details, operating weight, loading points.

2 PRODUCTS

2.1 Shell-and-tube heat exchangers

.1 Construction:

.1 design pressure: 1034 kPa (150 psi)

.2 two or four pass design, steam to water or steam to glycol with steam in shell and liquid in tubes,

.3 shell: fabricated steel, for 1034 kPa (150 psi) working pressure (no water in tubes)

.4 head: cast iron or welded steel for 1034 kPa (150 psi) working pressure (no steam in shell),

.5 tubes:

(a) U-bend configuration constructed of No. 18 B.W.G. NPS ¾ deoxidized hard drawn copper or stainless steel,
(b) baffled to prevent direct impingement of incoming steam on tubes,
(c) number of tubes selected for tube velocity of not more than 2 m/s (7 ft/sec) ,and
(d) tube length and no of passes selected on basis of shell side fouling factor of: 0.088 m^2 C/kW (0.0005 sq ft F/Btu/hr) and tube side fouling factor of: 0.088 m^2 C/kW (0.0005 sq ft F/Btu/hr) with steam in shell at 0 kPa (0 psi), and

.6 tube sheet: steel,

.7 support saddles: steel or cast iron.

.2 Connections:

.1 inlet connection, outlet connection and tappings for pressure gauge and vacuum breaker in shell,

.2 inlet and outlet connections and tappings for drain and pressure relief valve to tube space,

.3 connections:

(a) up to NPS 2; threaded,
(b) NPS 2½ and larger; flanged.

Standard of Acceptance

- S. A. Armstrong
- Tranter
- ITT Bell & Gossett
- American Standard
- Taco
- AIC - P Line

2.2 Plate and frame heat exchangers

.1 Construction:

.1 design pressure: 860 kPa (125 psi),

.2 performance to meet ARI 400 certification

.3 plates: 304 stainless steel

.4 frames: carbon steel epoxy coated, with Class 150 steel flanges

.5 gaskets: EPT, Nitrile Rubber or Viton to suit operating temperatures.

Standard of Acceptance

- Tranter - Superchanger
- ITT Bell & Gossett
- S. A. Armstrong
- Alfa Laval
- American Standard - Plateflow
- APV-Crepaco - Paraflow
- Secespol - A Line
- Viex - Viexplate

3 EXECUTION

3.1 Installation

.1 Level heat exchangers with shims under supports.

.2 Arrange piping around shell and tube heat exchangers to allow tube bundle removal by disconnecting two unions or flanges adjacent to head.

.3 Arrange piping around plate and frame heat exchangers to allow plate and gasket removal and re-assembly.

.4 Make steam and condensate connections to shell and tube heat exchangers and provide:

.1 NPS ¾ drain on water space,

.2 NPS ½ vacuum breaker on steam space,

.3 pressure relief valve, minimum size NPS ¾ on water space, sized for heating capacity of heat exchanger,

.4 steam trap assembly, with dirt pocket, in condensate return line.

.5 Provide steel support stand for shell and tube heat exchangers in steam service, to provide:

.1 a minimum drop leg on the condensate line of 300 mm (12 in) between outlet from heat exchanger and inlet to steam trap, and

.2 minimum of 150 mm (6 in) between underside of steam trap and floor.

END OF SECTION

REFRIGERANT DETECTION SYSTEM
23 61 09

1 GENERAL

1.1 Scope

.1 Provide refrigerant detection system, and emergency ventilation system control.

1.2 Shop drawings

.1 Submit shop drawings of refrigeration detection sensors and controller units.

.1 Provide wiring schematic drawings.

1.3 Applicable codes and standards

.1 Install system in compliance with CSA B52 Mechanical Refrigeration Code requirements for Group A1 and B1 refrigerants to detect and alarm at concentration of 10 ppm as designated in ANSI/ASHRAE Standard 34.

.1 TLV of 1000 ppm for R-1, R-22, R-134a, and R-12

.2 TLV of 30 ppm for R-123.

2 PRODUCTS

2.1 Refrigerant detection system

.1 General:

.1 refrigerant detection system consisting of a detection sensors, refrigerant alarm unit, and Master Control Unit.

Standard of Acceptance
° Honeywell - Analytics - VA301EM series

.2 Refrigerant sensors:

.1 microprocessor based, infrared sensor, with 0-1000 ppm measurement range, with resolution of 1 PPM.

.2 certified to CSA C22.2 No. 205

.3 operating temperature range: 0 to 40 C (32 to 100 F)

.4 refrigerant detection: both Group A1 and B1 refrigerants,

.5 three alarm levels

.6 automatic humidity compensation

.7 enclosure: NEMA 1

.8 power: 24 VAC, 60 Hz.

.3 Refrigerant alarm unit:

.1 microprocessor based with auto diagnostics, suitable for four sensor connections,

.2 certified to CSA C22.2 No. 205

.3 alphanumeric keypad and display

.4 four programmable relays,

.5 three alarm levels and contacts,

.6 four 4-20 mA outputs for gas concentration,

.7 audible and visual alarm indication lights and dry contacts, for operation with 115 VAC, 60Hz, 1 phase electrical power,

.8 beacon light, and alarm horn rated for minimum 100 dBa at 1500 mm (5 ft).

.9 power: 24 VAC, 60 Hz.

2.2 Master machine room control unit

.1 Master control unit:

.1 system "AUTO-OFF" switch with green pilot light

.2 system reset button

.3 flashing amber alarm light for refrigerant alarms

.4 flashing blue alarm light for natural gas leak

.5 audible alarm

.6 switch to close natural gas valve

.7 green light indicating fans are running

.8 contacts to start exhaust fan into high speed and switch supply air dampers to all fresh air.

.9 dry contacts for indicating a refrigeration leak at the BAS

.10 dry contacts for indicating a chiller alarm condition at the BAS

.11 chiller alarm test push button

.12 chiller "ENABLE-OFF" switch.

.13 refrigerant alarm unit and ventilation override control,

.14 ventilation override control hardwired to machine room ventilation fans, activated by:

(a) automatically by refrigerant alarm,
(b) manually by emergency push button located inside machine room,
(c) manually by emergency push button located outside machine room, but cannot disable/reset emergency ventilation control.

.15 ventilation control relays rated for 15 A, 120 VAC, 60 Hz.

.16 Power: 120 VAC, 60 Hz.

.2 Accessories:

.1 combination beacon light, and alarm horn rated for minimum 100 dBa at 1500 mm (5 ft), 24 VAC, 60 Hz.

.2 power transformers, 120/24 VAC, sized to suit loads,

.3 handswitches, inside room: 30mm, emergency stop with latching, red mushroom button, Allan Bradley 800T series.

.4 handswitches, outside room: 30 mm, momentary, yellow mushroom button, Allan Bradley 800T series.

3 EXECUTION

3.1 Refrigerant leakage alarm system

.1 Mount refrigerant sensor adjacent to each refrigeration compressor, at location where refrigerant will collect.

.2 Mount additional refrigerant sensors in any low point locations in the machine room, such as equipment pits or lower levels.

.3 Mount refrigerant control unit inside of machine room.

.4 Mount remote alarm horn and strobe outside of each entrance to machine room.

.5 Locate the red emergency ventilation switch/with reset, inside the machine room, adjacent to each door.

.6 Locate the yellow emergency ventilation switch/without reset, outside the machine room, adjacent to each door.

.7 Provide power transformers and wiring between circuit taken from 120 VAC panel in MCC, and control devices.

3.2 Training and instruction

.1 Provide instruction for Owners operating staff in service and maintenance of refrigerant leakage alarm unit.

END OF SECTION

PROCESS COOLING PACKAGE CHILLER - SCROLL
23 62 23

1 GENERAL

1.1 Scope

.1 Provide process cooling (24/7) chiller with scroll refrigeration compressors as required.

1.2 Shop drawings

.1 Submit shop drawings for each chiller with;

.1 model number,

.2 performance and design data,

.3 outline dimensions,

.4 power requirements,

.5 inlet and outlet connection details, and

.6 loading points and loads at each point.

.2 Include rating and power input requirements and evaporator and condenser heat transfer areas.

.3 Provide diagrams showing piping for field assembly, with chilled and condenser water flows, connection pipe sizes, and pressure drop.

.4 Provide schematic circuit diagrams showing electrical wiring, interlocks, starters, and relays with wire numbers and terminal numbers clearly identified.

1.3 Applicable standards

.1 CSA B52 Mechanical Refrigeration Code

.2 CSA C743 Performance Standard for Rating Packaged Water Chillers

.3 ASME Boiler and Pressure Vessel Code, Section VIII

.4 ARI 550/590, Water Chilling Packages Using the Vapor Compression Cycle.

.5 ARI 575, Method of Measuring Machinery Sound Within an Equipment Space.

.6 ARI 530, Method of measuring sound and vibration of refrigeration compressors

1.4 Acceptance tests

.1 The package consists of three (3) modules. Conduct factory tests on the two packages to establish certified chiller performance in accordance to AHRI 550/590, 2011. Sound data to be in accordance with AHRI 575.

.2 Organization, co-ordination and performance of test to be responsibility of machine manufacturer.

1.5 Warranty

.1 Warranty compressors against burn-out for five (5) years, and warranty to include;

.1 for labour and materials used in replacing compressors, and

.2 cleaning, dehydrating and charging refrigeration system.

2 PRODUCTS

2.1 General

.1 Package to consist of scroll compressors, compressor motors, evaporators, condensers, controls, internal piping and wiring, refrigerant and oil charge.

.2 Application: indoor water cooled

.3 Evaporator fluid: water

.4 Refrigerant type: R-410A.

.5 Factory assembled and shipped ready for connection to chilled water circuit, condenser/heat recovery water circuit and electric power source.

.6 Provide machines with initial charge of refrigerant and lubricating oil.

.7 Chiller to be built up within welded steel frame with removable steel enclosure panels, phosphatized or primed and finished with enamel or lacquer

Standard of Acceptance

- Multistack
- ArctiChill

2.2 Machine rating

.1 Design criteria:

.1	cooling capacity per package:	200 Tons
.2	number of modules per package:	minimum 2 plus one spare module
.3	number of compressors per module:	2 minimum
.4	evaporator water flow rate:	29.9 l/s (473.2 gpm)
.5	evaporator fluid:	water
.6	evaporator water pressure drop, maximum:	23 kPa (7.5 Ft)
.7	evaporator water inlet temperature:	14.4 C (58 F)
.8	evaporator water outlet temperature:	8.9 C (48 F)
.9	condenser water flow rate:	20.6 l/s (327 gpm)
.10	condenser water pressure drop, maximum:	12.88 kPa (4.24 Ft)
.11	condenser water inlet temperature:	46.1 C (115 F)
.12	condenser water outlet temperature:	57.2 C (135 F)
.13	maximum power input:	265 kW

.2 Part load rating:

.1 Machine designed, selected, and controlled to provide part load operation at specified evaporator water outlet temperature, without surge;

(a) From 12.5 % to 100% of full load capacity with outlet condenser water temperature of 48.9 C (120 F).

.3 Machine sound pressure levels:

.1 measured before installation of sound isolation ,

.2 determined in accordance with ARI 575, and

.3 not more than values tabulated below, per module;

	Octave band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Maximum dB	65	64.5	70	74.5	76.5	74.5	69.5	59.5

2.3 Compressors

.1 Compressor:

.1 Direct connected, electrically driven, scroll, hermetic design operating at 3600 rpm,

.2 motor rated at not more than 50 bhp.

2.4 Evaporator/chiller:

.1 Construction:

.1 316 stainless steel plate type heat exchanger,

.2 Insulated with 20 mm (3/4 in) closed cell polyvinyl (PVC) foam insulation.

.3 Automatic liquid shut-off valve for each module

.4 Additional manual shut-off valve for isolation of each evaporator.

.2 Design criteria:

.1 Pressure, refrigerant side: 2482 kPa (360 psi)

.2 Pressure, water side: 1035 kPa (150 psi)

.3 Maximum fluid velocity: 2.5 m/s (8 ft/s) in evaporator

.4 Evaporator fouling factor: 0.0172$m^2{}^oC/kW$ (0.0001 $ft^2{}^oF/Btu/hr$)

2.5 Water cooled condenser

.1 Construction:

.1 316 stainless steel brazed plate and frame heat exchanger, and automatic liquid shut-off valve for each module.

.2 Additional manual shut-off valve for isolation of each condenser.

.3 Water regulating valve for head pressure control.

.2 Design criteria:

.1 Pressure, refrigerant side: 2070 kPa (300 psi)

.2 Pressure, water side: 1035 kPa (150 psi)

.3 Maximum fluid velocity: 2.5 m/s (8 ft/s) in evaporator

.4 Evaporator fouling factor: 0.0254 $m^2{}^oC/kW$ (0.0005 $ft^2{}^oF/Btu/hr$)

2.6 Refrigeration circuits

.1 For multiple compressor units, provide separate and independent refrigeration circuits and include:

.1 Piping, valves, and fittings

.2 Expansion valve,

.3 Solenoid valves,

.4 Liquid sight glasses with moisture indicator

.5 High side pressure relief device,

.6 Charging valve,

.7 Suction line insulated with ¾ in thickness of flexible elastomeric insulation.

2.7 Chiller control panel

.1 General:

.1 EEMAC-1 with dripshield, factory mounted and wired, programmable microprocessor based system,

.2 capacity control return water to maintain leaving chilled water temperature within set range by sequencing compressor start, opening refrigerant solenoid valves and regulating compressor unloading.

.3 each module to have separate chilled/condenser water supply/return temperature sensors, flow proving switch, phase monitor, suction/discharge pressure sensor, and compressor sight glass

.4 switches to start and stop unit and reset safety controls,

.5 isolation switches complete with lockout tags,

.6 internal wiring brought to field wiring terminal blocks,

.2 Controllers and protection interlocks:

.1 master controller to operate all modules as one with optimization of staging for energy efficiency,

.2 independent module controller providing backup to master controller,

.3 Safety limits:

(a) high and low refrigerant pressure,
(b) motor starting more than once in any 20 minute period,
(c) low chilled water temperature with separate limit and operating controls,
(d) motor over-current,
(e) motor winding over temperature,
(f) loss of condenser water flow,
(g) loss of chilled water flow.

.3 Key-pad operation:

.1 Key-pad programming with indication through multiline LCD display in English (plain language) of;

(a) Operating status,
(b) Power on,
(c) Alarm,
(d) Safety shutdown codes,

(e) Self diagnostics,
(f) Leaving chilled water temperature,
(g) Entering chilled water temperature,
(h) Leaving condenser water temperature,
(i) Entering condenser water temperature
(j) Elapsed run time indicator (totalized six digit type), and
(k) Non-resettable counter showing number of starts.

.4 Master Controller and module board fault lights

.1 power on,

.2 high head, low suction, oil pressure failure, low water flow, low water temperature, motor overload or winding high temperature (one light each condition).

.3 records last 50 faults

.5 BACNet MS/TP communications card for bi-directional communications with chiller control panel and BMS consisting of the following minimum data configuration:

.1 Write attributes:

(a) Drive enable
(b) Start-Stop
(c) Speed setpoint
(d) Fault Reset
(e) Run on Bypass
(f) Read attributes
(g) Speed
(h) Frequency
(i) Current
(j) Power
(k) Output voltage
(l) KWH counter
(m) System ready
(n) System enabled
(o) System started
(p) System running
(q) Local or fieldbus control setting
(r) Bypass run
(s) Bypass alarm
(t) Bypass fault
(u) System fault
(v) Damper open (auxiliary input)

2.8 Guarded Controls- Regulation Respecting Stationary Enginemen

.1 In addition to all other requirements include the following protection devices:

.1 High pressure limit control (refrigerant),

.2 Low pressure limit control in the lubricating oil system.

2.9 Remote Control – Regulation Respecting Stationary Enginemen

.1 Provide the following instrumentation devices on the chiller for remote control and monitoring station:

.1 Emergency stop,

.2 Bearing temperature indicator or lubricating oil pressure indicator,

.3 Compressor lift and suction pressure indicator.

3 EXECUTION

3.1 General

.1 Position unit with adequate clearances for service and maintenance.

.2 Provide machines with initial charges of refrigerant and lubrication oil and make-up losses during warranty period.

3.2 Installation and piping

.1 Arrange chilled water and condenser water piping with:

.1 Thermometers in wells, pressure gauges,

.2 Provide one flow switch (per module) on outlet of chilled water and condenser pipe. Each water side flow switch installed with five (5) pipe diameters of straight pipe upstream and three (3) pipe diameters downstream of unit,

.3 Wire flow switches to terminals in chiller control circuit so that chiller cannot operate unless there is flow through both evaporator and condenser,

.4 Control valves, and shut-off valves,

.5 Vent and drain valves,

.6 Drain piping extended to nearest open drain.

3.3 Power and control wiring

.1 Provide power feeders from starter to chiller for each module,

.2 Provide control wiring from starter to chiller for each module. Provide power and control wiring between each module in the package.

.3 Isolation switches complete with lockout tags for each module.

3.4 Manufacturer's supervision

.1 Provide services of trained personnel from chiller manufacturer's staff to;

.1 supervise installation, charging and start-up of machine, and

.2 provide minimum of 24 working hours of instruction for plant staff in proper operation of equipment.

END OF SECTION

PACKAGE CHILLER - CENTRIFUGAL
23 64 16

1 GENERAL

1.1 Scope

.1 Provide electric drive centrifugal water chillers as required.

1.2 Shop drawings

.1 Submit shop drawings for each chiller with;
- .1 model number,
- .2 performance and design data,
- .3 outline dimensions,
- .4 power requirements,
- .5 inlet and outlet connection details, and
- .6 loading points and loads at each point.

.2 Performance and design data to show;
- .1 liquid flows,
- .2 pressure drops,
- .3 design temperatures entering and leaving machine,
- .4 refrigerant temperatures and pressures,
- .5 evaporator and condenser heat transfer areas, and
- .6 power input and sound pressure levels at point of rating.

.3 Performance ratings:
- .1 full and part load performance data to be determined in accordance with ARI 550/590.
- .2 Part load performance to be Non-standard Part Load Value (NPLV) ratings using evaporator and condenser conditions set out in Table3 of ARI 550/590.

.4 Submit shop drawings for purge unit and refrigerant pump out unit showing physical sizes, piping and wiring connections.

.5 Provide diagrams showing piping for field assembly, with chilled and condenser water flows, connection pipe sizes, and pressure drops.

.6 Provide schematic circuit diagrams showing electrical wiring, interlocks, starters, and relays with wire numbers and terminal numbers clearly identified.

1.3 Applicable standards

.1 CSA B52 Mechanical Refrigeration Code

.2 CSA C743 Performance Standard for Rating Packaged Water Chillers

.3 ASME Boiler and Pressure Vessel Code, Section VIII

.4 ARI 550/590, Water Chilling Packages Using the Vapor Compression Cycle.

.5 ARI 575, Method of Measuring Machinery Sound Within an Equipment Space.

.6 ARI 530, Method of measuring sound and vibration of refrigeration compressors

1.4 Acceptance tests

.1 Conduct factory tests to establish machine provides specified performance at full load.

.2 Submit a record sheet signed by manufacturer's authorized representative detailing performance of machine during tests.

.3 Machine manufacturer to provide calibrated instrumentation.

.4 Organization, co-ordination and performance of test to be responsibility of machine manufacturer.

.5 Owner will provide electric power and water for field tests.

.6 Where field testing identifies discrepancies between performance under test and specified performance, machine manufacturer to provide Owner with

.1 written explanation for condition,

.2 detailed procedure for rectification

.3 time schedule for work.

.7 On receipt of Owners written agreement, machine manufacturer to proceed with rectification and retesting and to repeat procedure until performance discrepancy is eliminated.

1.5 Warranty

.1 Warranty compressors against burn-out for three (3) years, and warranty to include;

.1 for labour and materials used in replacing compressors, and

.2 cleaning, dehydrating and charging refrigeration system.

2 PRODUCTS

2.1 General

.1 Refrigerant type: HCFC-123 or HFC-134A.

.2 Packaged electric drive centrifugal machine with compressor, evaporator, water cooled condenser, variable frequency drive (VFD) and VFD rated motor, transformer, controls, piping, wiring, purge unit, and refrigerant and oil charge.

Standard of Acceptance

- Trane
- York
- Carrier
- Daikin - McQuay

2.2 Machine rating

.1 Design criteria:

.1	cooling capacity (Indicative Design):	1200 tons
.2	evaporator water flow rate:	129.6 (2057) l/s (gpm)
.3	evaporator fluid:	water
.4	evaporator water pressure drop, maximum:	44.4 (14.6) kPa (ft)
.5	evaporator water inlet temperature:	14.5 C (58 F)
.6	evaporator water outlet temperature:	6.7 C (44 F)
.7	condenser water flow rate:	227 (3600) l/s (gpm)
.8	condenser water pressure drop, maximum:	74 (24.3) kPa (ft)
.9	condenser water inlet temperature:	25 C (77 F)
.10	condenser water outlet temperature:	30.6 C (87 F)
.11	maximum power input:	545 kW maximum
.12	NPLV	.345 kW/ton

.2 Part load rating:

.1 Machine designed, selected, and controlled to provide part load operation at specified evaporator water outlet temperature, without surge;

(a) from 15% to 55% of full load capacity with inlet condenser water temperature of 18.3 C (65 F), and
(b) from 45% to 100% of full load capacity with inlet condenser water temperature of 29.5 C (85 F).

.3 Tube bundle criteria:

.1 maximum fluid velocity of 2.5 m/s (12 fps) in condenser and evaporator,

.2 condenser fouling factor: 0.044 m^2 C/kW (0.00025 sq ft F/Btu/hr),

.3 evaporator fouling factor: 0.0172 m^2 C/kW (0.0001 sq ft F/Btu/hr).

.4 Machine sound pressure levels:

.1 measured before installation of sound isolation ,

.2 determined in accordance with ARI 575, and

.3 not more than values tabulated below;

	Octave band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Maximum dB	78	78	79	77	80	75	72	65

2.3 Compressors

.1 Compressor:

.1 electric motor driven centrifugal type,

.2 balanced statically and dynamically with rotating vibration levels less than one mil at operating speed.

.3 Designed for no-load start with automatic capacity control through adjustable pre-rotation vanes.

.2 Motor:

.1 two pole, squirrel cage, induction motor with overload/over current protection,

.2 motor winding over-temperature protection,

.3 motor terminal box sized to accept cable or bus duct from starter.

.4 voltage rating not exceeding 600V.

.3 Lubricating oil system:

.1 positive oil supply at start-up and during coast down after power failure,

.2 electric driven lubricating oil pump

.3 replaceable external oil filter,

.4 low watt density oil heater,

.5 oil cooler,

.6 controls and starter.

2.4 Variable frequency drive

.1 Manufacturer's standard product.

.2 Unit mounted and factory wired.

2.5 Evaporator and condenser

.1 Construction:

.1 horizontal steel shells and finned copper tubes with steel intermediate supports and steel tube sheets,

.2 distribution and baffle plates arranged to prevent direct high velocity impingement of refrigerant on tubes and uniform refrigerant side heat exchange.

.3 refrigerant side working pressure suitable for refrigerant used and leak tested by heat pressurization in the field with electronic (chlorine/fluorine) leak detector.

.2 Water boxes:

.1 removable 1035 kPa (150 psi) water boxes on evaporator,

.2 1035 kPa (150 psi) marine water box(es) with flanged connections on condenser where piping connects.

2.6 Purge unit (supplied for each machine using R-123 as refrigerant):

.1 Factory mounted, piped and wired, with single phase positive displacement compressor, starter, automatic controls, and purge drum.

2.7 Chiller control panel

.1 EEMAC-1 with dripshield, factory mounted and wired, programmable microprocessor based system using 115 VAC, single phase control voltage.

.2 Safety limits:

.1 to shut down machine or prevent machine from starting on;

(a) bearing or high oil temperature,
(b) motor winding high temperature,
(c) motor over current,
(d) high refrigerant pressure
(e) low refrigerant temperature,
(f) low oil pressure,
(g) no flow at chilled water flow switch,
(h) no flow at condenser water flow switch,
(i) low chilled water temperature.

.3 Permissive controls:

.1 to prevent machine from starting:

(a) for a 30 minute period after a start;
(b) if pre-rotation vanes are open.

.4 Capacity control:

.1 to maintain leaving or entering chilled water setpoint;

(a) leaving chilled water control module positioning pre-rotation guide vanes to modulate refrigerant flow through compressor, and
(b) motor load control module overriding chilled water temperature control module and positioning guide vanes to limit motor current to predetermined setting between 40 and 100% of full load amperes.

.5 Key-pad operation:

.1 key pad programming with indication through multiline LCD display in english (plain language) of;

(a) operating status,
(b) power on,
(c) alarm,
(d) safety shutdown codes,
(e) self-diagnostics,
(f) leaving chilled water temperature,
(g) entering chilled water temperature,
(h) entering condenser water temperature,
(i) leaving condenser water temperature,
(j) elapsed run time indicator (totalized six digit type), and
(k) non-resettable counter showing number of starts.

.6 Surge suppression:

.1 provide internal or external transient voltage and surge suppression for DDC modules;

(a) dielectric strength of 1000 V minimum
(b) response time of 10 nanoseconds or less
(c) transverse mode noise attenuation of 65 dB or greater
(d) common mode noise attenuation of 150 dB or greater at 40-100 Hz

.7 Building Automation System (BAS) interface, point-to-point:

.1 inputs:

(a) leaving chilled water reset from a 4-20 mA input signal,
(b) remote enable/disable, dry contact

.2 outputs:

(a) electrical demand limiting from a 4-20 mA input signal,
(b) head pressure sensor with 4-20 mA output signal

(c) alarm on machine safety shut-down, through dry contacts.

.8 Building Automation System (BAS) interface:

.1 BACnet standard ANSI/ASHRAE 135 interface, for read or write attributes as listed.

.2 Lonmark certified refrigeration machine profile, including optional values, complying to Lonmark functional profile 8040.

.3 Inputs:

(a) chiller enable/disable
(b) chilled water temperature setpoint
(c) demand limit %
(d) fixed speed switch

.4 Outputs:

(a) chiller status On/Off
(b) current load % tons rating
(c) leaving chilled water temperature
(d) entering chilled water temperature
(e) entering condenser water temperature
(f) leaving condenser water temperature
(g) alarm with descriptors
(h) kilowatt demand
(i) kilowatt-hour consumption

2.8 Special requirements for high pressure centrifugal machines (using R-134a as refrigerant)

.1 Guarded plant devices:

.1 additional protective devices to be fitted on high pressure chillers to achieve "guarded plant" status

.2 A refrigerant high pressure limiting device in refrigerant discharge line from compressor.

.3 A refrigerant high liquid level limiting device in evaporator or refrigerant suction accumulator, unless design inherently prevents possibility of liquid refrigerant being drawn into compressor.

.4 A low flow limiting device in condenser coolant circuit, if refrigerant is liquid cooled.

.5 A low flow limiting device in compressor coolant circuit, if compressor is liquid cooled.

.6 A low oil pressure limiting device.

2.9 Accessories

.1 Provide machine with;

.1 differential pressure transducer for chilled water and condenser water, each unit to have 3 second time delay between flow collapse and contact activation,

.2 spring loaded automatic resetting type refrigerant pressure relief valve, in series with or as an alternate to rupture disc relief device,

.3 pressure sensors for condenser and evaporator refrigerant pressure with panel mounted read-out,

.4 thermometer wells for measuring liquid refrigerant condensing and evaporating temperatures,

.5 sight glasses for monitoring refrigerant level and oil level,

.6 vibration isolation pads.

.2 Supply machine with:

.1 separate starters for chiller oil pump, purge unit, and contactor for oil heater, for field installation.

2.10 Insulation

.1 20 mm (¾ in) thick factory applied elastomeric insulation applied to;

.1 evaporator,

.2 evaporator head at opposite end from connections,

.3 suction piping,

.4 compressor inlet,

.5 hermetic motor housing, and hermetic motor coolant lines.

2.11 Painting

.1 Factory applied;

.1 minimum two (2) coats of primer, and

.2 minimum two (2) coats of finished paint on uninsulated and insulated surfaces of machine.

2.12 Chiller Starter - Low Voltage

.1 General:

.1 Machine manufacturer to provide three phase unit mounted compressor starter. Note: There are switched capacitors to additionally be mounted on unit.

.2 Machine manufacturer to provide services of starter manufacturer's representative for;

(a) supervision of handling, installation, assembly, and testing of electrical components.
(b) checking and calibration of instruments and relays.
(c) preparation of Instruction Manuals for starter and electrical components.
(d) submission of detailed shop drawings indicating internal and external wiring with terminal numbers and pertinent data.
(e) preparation and submission of co-ordination curves on one common sheet of K & E TCC graph paper showing;
- motor damage curve.
- motor heating characteristics.
- overload relay characteristics.
- circuit breaker characteristics.

(f) coordination of overload relay and circuit breaker characteristics at settings that will protect motor.

.2 Starter:

.1 Main circuit breaker with shunt trip, to provide isolation, short-circuit protection and overcurrent protection. Main breaker to be sized to provide secondary protection for the upstream transformer.

.2 Variable frequency drive with rated voltage to match motor, integrated with main breaker in a single enclosure with factory installed and wired auxiliary controls, instrumentation and equipment,

.3 Enclosure: CSA Standard C22.2 No.94.1 Type 1 with drip shield enclosure, unit mounted, with front access,

.4 Operating handle and trip indicator of main circuit breaker located in starter door and capable of being padlocked,

.5 harmonic mitigation: include active or passive harmonic filter to limit the total harmonic current distortion (THiD) at the starter input terminals to:

(a) less than 5% of the full load fundamental current of the motor when operating at full load; and
(b) less than 8% when the motor is 30% loaded.

.6 ground fault protection: with indication and reset capability provided in starter door,

.7 momentary power interruption: relaying system to shut down motor in event of an interruption of three or more cycles on one, or three phases,

.8 undervoltage protection: protect motor in event of a momentary voltage dip in excess of 10% on one or all phases,

.9 incomplete sequence safety device,

.10 overload protection monitoring current in three phases,

.11 metering, control, local monitoring and remote monitoring:

(a) current,
(b) voltage,
(c) real and reactive power,
(d) kilowatt hour,
(e) 4-20 mA signals for each for remote monitoring.

.12 115 V, 1 phase power source for chiller control panel and controls.

2.13 Power factor correction

.1 Provide power factor correction.

.2 Achieve minimum of 95% power factor at full load on supply to compressor unit with capacitors, switches, controls and capacitor racks wired upstream of overloads in starter.

.3 Provide contactor for power factor correction that will open when chillers run on emergency generators.

2.14 Transformer:

.1 Construction:

.1 Class H Dry type sized to match power requirements of machine on ANAN rating and conforming to CSA Standard C9.

.2 12.47 kV Delta primary winding

.3 600 or 480 volt secondary windings

.4 Voltage adjustment for 2-2½% step FC below normal and 2 - 2½% step FC above normal.

.5 95 kV BIL impulse level to CSA Standard C9.

.6 Nominal 5% impedance

.7 Maximum 150 C temperature rise inside transformer enclosure.

.8 Standard Class 220 insulation

.9 Maximum sound level of 65 dbA at 3 m.

.10 Intermediate class lightning arrestors.

.11 CSA Standard C22.2 No. 95.1 Type 1 with drip shield enclosure

.12 ASA 61 grey paint finish

3 EXECUTION

3.1 General

.1 Provide machines with initial charges of refrigerant and lubrication oil and make-up losses during warranty period.

3.2 Installation and piping

.1 Position unit with adequate clearances for service and maintenance.

.2 Mount unit on isolation pads and level using steel plate shims for adjustment.

.3 Pipe evaporator and condenser with flange couplings so that heads can be removed for cleaning through disassembly of a pair of couplings.

.4 Connect up oil cooler and purge units with chilled water piping, strainer, and control and isolating valves, piped in a dedicated loop with supply taken at chilled water pump discharge and return connected to chilled water pump suction.

.5 Provide refrigerant vent piping from refrigerant pressure relief device and purge unit exhaust to atmosphere. Provide flexible connection at pressure relief device.

.6 Provide valved evaporator and condenser drains to nearest open drain at floor level adjacent to chiller, and vent valves, same size as vent connection, on water side of condenser and evaporator.

3.3 Power and control wiring

.1 Electrical contractor (Division 26) will wire high voltage cables to line side of transformer.

.2 Provide power feeders between transformer, starter and chiller.

.3 Not used.

.4 Provide control wiring from starter to chiller where starter is mounted remotely from chiller.

.5 Provide power and control wiring between purge unit, oil heater and oil pump and starters and contactors located on emergency power splitter adjacent machine.

.6 Mount starters for chiller oil pump, purge unit, and contactor for oil heater, mounted on a metal frame rack adjacent to machine and fed from emergency power splitter provided under Division 26.

3.4 Manufacturer's supervision

.1 Provide services of trained personnel from chiller manufacturer's staff to;

.1 supervise installation, charging and start-up of machine, and

.2 to provide minimum of 24 working hours of instruction for plant staff in proper operation of equipment.

END OF SECTION

COOLING TOWERS
23 65 13

1 GENERAL

1.1 Scope

.1 Provide cooling towers as required.

1.2 Shop drawings

.1 Submit shop drawings for each cooling tower with:

.1 model number,

.2 water and air-side performance data,

.3 sound pressure levels,

.4 outline dimensions,

.5 power requirements,

.6 inlet and outlet connection details,

.7 loading points, dead loads and live loads.

.2 Sound pressure levels to be stated for design water load, fan power and fan speed, and measured in accordance with CTI ATC-128

.3 Provide diagrams showing, internal piping for field assembly, condenser water flows, make-up water flows, connection pipe sizes, and pressure drops in equipment.

1.3 Applicable standards

.1 Cooling Tower Institute (CTI) ATC-105 Performance Testing

.2 CTI STD-210 Thermal Performance Certification.

.3 CTI ATC-128 Measurement of Sound from Water-cooling Towers

.4 B.C. Building Code

.5 NFPA 214 - Water Cooling Towers

.6 Factory Mutual Recommendations and Data Sheet # 1-6 Cooling Towers.

.7 ASTM-A653 - Zinc Coating hot dipped on iron and steel

2 PRODUCTS

2.1 General

.1 Provide a single cell factory assembled cooling tower located outdoors for summer/winter operation.

Standard of Acceptance

- Baltimore
- CTI
- Marley

° Evapco

.2 Unit to be one piece assembly ready for connection to water, electrical, and control systems.

2.2 Performance

.1 Selection criteria, each cell:

Item	Operating Mode	SI	IP
Cooling capacity (Indicative Design)	(nominal)	4220 kW	1200 tons
Condenser water flow		227 l/s	3600 USGPM
Ambient wet bulb temperature	cooling	20° C	68° F
Entering water temperature	cooling only	30.6 C	87° F
Leaving water temperature	cooling only	25° C	77° F

.2 Windage and drift loss: maximum 0.02% of rate of water circulation.

.3 Sound pressure levels:

.1 measured 1.5 m (5 ft) from tower front, back, and sides, and

.2 not more than values as tabulated below;

	Octave band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Maximum dB	106	95	91	86	82	79	74	67

2.3 Induced draft, crossflow or counterflow, steel tower

.1 Construction:

.1 manufactured from galvanized steel frames, angles, channels, and metal panels,

.2 cold water basin and hot water deck to be fabricated with 304 stainless steel

(a) depressed side outlet sump
(b) lift out suction strainer,
(c) overflow, drain and clean out connections
(d) filtration system sweeper pipe, fitted with eductors.

.3 outlet sizing requirement: direct pump suction connection.

.4 PVC fill arranged in vertical sheets or chevron configuration, and PVC drift eliminators in galvanized steel frames

.5 gasketed weir to isolate cold water basin between cells

.6 hinged access doors for entry into plenum area,

.7 galvanized steel exterior surfaces, and

.8 PVC or galvanized louvres with galvanized wire mesh inlet screens,

.9 ladder to top of tower,

.10 platform with handrail around top of tower

.11 inlet water distribution through gravity basins with non-ferrous orifices, and hinged covers, fed from individual internal risers in each cell and inlet headers with flow control valves.

.12 NPS ¾ drain valve connected close to but above basin water level at base of each inlet riser.

.13 internal plenum walk ways,

.14 fan cylinder and fan discharge guard.

.2 Super low sound Fan:

.1 fibreglass propeller,

.2 multi-blade,

.3 adjustable pitch,

.4 statically and dynamically balanced,

.5 fitted with vibration cut-out switch with remote reset contacts,

.6 powered through;

(a) multiple V-belt drive with belt guard and fixed pitch sheaves designed for not less than 150% of motor nameplate rating or,
(b) direct motor driven gear reduction assembly, fitted with oil level gauges, extended oil fill and drain lines.

.3 Fan motor:

.1 variable speed operation forward.

.2 Totally enclosed fan cooled (TEFC).

2.4 Basin make-up (water level) control:

.1 Float operated brass valve type with

.1 EEMAC 3R rainproof control panel,

.2 three (3) stainless steel water level sensing electrodes for "ground", "valve open", and "valve closed".

.3 brass or stainless steel, slow closing solenoid valve with 6 second (adjustable) delay on "valve open" and separate similar delay on "valve close".

.4 control transformer

.5 dry contacts for high water and low water alarm connection to BAS

.2 Not more than 70 kPa (10 psi) pressure drop at maximum make-up water flow, and able to close off against of not less than 690 kPa (100 PSI) inlet water pressure.

2.5 Centrifugal separator package:

.1 Factory assembled separator, PVC solids collection vessel with removable cover, booster pump and isolation valves.

.2 Control package with;

(a) automatic purge valve,
(b) differential pressure sensor,
(c) differential pressure gauge,
(d) flow control orifice,

Standard of Acceptance
° Lakos - BXL

3 EXECUTION

3.1 General

.1 Position unit with adequate clearances for service and maintenance.

.2 Trained representative from manufacturer's staff to supervise installation.

3.2 Installation

.1 Mount vibration isolation on structural steel grillage or concrete supports.

.2 Provide supplementary steel over vibration isolation and under cooling tower to transfer cooling tower loads to building structure.

.3 Supplementary steel to be hot dipped galvanized.

.4 Mount cooling tower on vibration isolators and supplementary steel.

.5 Connect condenser water, make-up water, filtration suction and return piping, drain, and overflow piping.

.6 Provide valved equalizer line between separate cooling tower basins.

.7 Provide separator type filtration system.

.8 Provide power and control wiring for basin heaters, dampers, filtration system, and tower fan equipment.

.9 Wire vibration cut-out switches to fan AFD or starter to shut down fan on detection of excessive vibration.

END OF SECTION

INDIRECT AIR-SIDE ECONOMIZER RECIRCULATION UNIT
23 65 15

1 GENERAL

1.1 Scope

.1 Provide roof-mounted Data center indirect air-side economizer recirculation cooling unit(s) for the CCH Room. Data center indirect air-side economizer to include the following:

- .1 Polymer tube air-to-air heat exchanger
- .2 Indirect evaporative cooling system
- .3 Supply fans and direct-drive premium efficiency motors (VFDs)
- .4 Scavenger/Condenser fans and motors with EC motors
- .5 Supply and return Isolation air dampers
- .6 Scavenger fan back-draft dampers
- .7 Supply air filters
- .8 Scavenger air filters and screens
- .9 DX cooling coil
- .10 Integral factory piped air-cooled condensing section
- .11 Complete DDC control system, factory installed, wired, programmed, and functionally tested in factory.

1.2 Shop drawings

.1 Submit shop drawings for each indirect air-side economizer recirculation unit with:

- .1 model number,
- .2 performance and design data,
- .3 outline dimensions,
- .4 power requirements,
- .5 inlet and outlet connection details,
- .6 loading points,
- .7 dead loads and live loads.

.2 Provide diagrams showing, internal piping for field assembly, spray water flows, make-up water flows, heat exchange section, tube side flows, connection pipe sizes, and pressure drops in equipment.

.3 Submit equipment performance, including psychrometric charts with all state points clearly indicated, detailing the state paths of the recirculation and scavenger airstreams at the ASHRAE summer ambient design dry bulb and wet bulb conditions, along with the winter ambient design condition. Provide a bin weather operational analysis that clearly demonstrates knowledge of the equipment and operation. Analysis shall detail the cost of operating supply fans, scavenger fans, refrigeration, and pumps at all bin conditions, and water consumed at each bin shall be computed. TMY3 weather data shall be binned on Wet Bulb with MCDB in 2 degree bins for the purpose of the analysis. Manufacturer shall provide performance data of the unit operating at the extreme maximum wet bulb condition for the installation location.

.4 Submit sequence of control of proposed equipment, including all sensor locations. Provide peak operating kW.

.5 Submit shop drawings of remote indoor sump showing dimensions, construction details, connection arrangements.

1.3 Applicable standards;

.1 ASTM-A153 - Zinc Coating hot dipped on iron and steel

.2 ETL

.3 UL 1995/CAN/CSA

.4 ASHRAE Standard 84-1991

.5 ARI Standard 1060

.6 ANSI/ASHRAE Standard 143-2000

.7 ASHRAE Standard 52.2-2007

1.4 WARRANTY

.1 Manufacturer shall maintain a local service representative sufficiently staffed to handle all warranty claims in a timely manner.

1.5 QUALITY ASSURANCE

.1 Wiring internal to the unit shall be wired to a numbered terminal strip for simplified identification and ease of trouble shooting. Units shall be ETL listed and labeled, classified in accordance with UL 1995/CAN/CSA/ No. 236-M90.

.2 The manufacturer must have a quality management system in place, equal to the quality assurance standard ISO 9001-2000, for the design, manufacture, and service of heat exchangers and packaged ventilation/air conditioning equipment.

.3 Standard catalog units requiring modification to meet these specifications, or units that are field assembled, shall not be considered or accepted.

.4 All units shall be factory assembled, internally wired, and 100% run tested to check operation and control sequence before leaving the factory.

1.6 FACTORY INSPECTION

.1 After shop drawings have been reviewed and returned, arrange for factory inspection of first unit being manufactured.

.2 Schedule inspection to allow shop floor review of;

.1 support base and drain pan construction

.2 unit framing,

.3 access door construction and mounting,

.4 internal and external casing panel attachment details,

.5 coil, humidifier and filter mounting details, and

.6 power and control wiring standards

.3 Make corrections and/or revisions identified in Inspection Report issued following factory inspection of unit before factory test and release for shipment to site.

.4 Transfer record of revisions to shop drawings and resubmit shop drawings for final review.

.5 Manufacture subsequent units in accordance with revised and reviewed final shop drawings.

1.7 FACTORY TESTING

.1 Conduct factory functional testing on each finished unit. Connect unit to power and water and perform the following tests:

.1 Test and Verify wiring and functionality of Inputs/Outputs on the unit controller.

.2 Operate unit through all steps of the sequence of control to test:

(a) damper operation
(b) fan operation and rotation
(c) compressor operation
(d) water pump and valve operation

.2 Conduct factory pressure test and flow test on one (1) finished unit.

.1 Seal off supply and return duct connection openings

(a) For blow-through unit configurations, test unit under positive pressure
(b) For draw-through unit configurations, test unit under negative pressure

.2 Use a calibrated orifice plate and blower unit to measure air leakage rate at test pressure.

.3 Pressure test air leakage to be not more than 1-1/2% of unit airflow capacity at 1.25 kPa (5 inWC) pressure.

.3 Factory flow test procedure

.1 Use supply and return isolation dampers to simulate scheduled external static pressure.

.2 Conduct test at scheduled design performance flow and external static pressure. Measure airflow at supply fans with included piezo metering devices. Measure external static pressure with manometer.

.3 Measured flow and pressure shall be within 5% of scheduled design values.

.4 Submit test report and plot of pressure flow characteristic on catalogue fan curve for review as shop drawing.

.4 Correct problems identified during factory performance testing prior to manufacture of remaining units.

2 PRODUCTS

2.1 General

.1 Factory assembled indirect air-side economizer recirculating cooling unit located outdoors for summer/winter operation.

.2 One piece assembly ready for connection to water, electrical, ducting and control systems.

2.2 Performance

.1 Selection criteria, each unit:

.1	Indirect evaporative cooler water flow:	0.2 L/s (3.0 gpm)
.2	Liquid:	water
.3	Outdoor drybulb temperature:	33 C (92 F)
.4	Outdoor wetbulb temperature:	23.5 C (74.3 F)

2.3 Casing and framework

.1 Construction:

.1 Base Frame:

(a) Manufactured on all-welded structural C-channel steel frame.

(b) Cross supports at all equipment loading points at a minimum.

.2 Unit Casing:

(a) Constructed using double wall, no through metal panels (walls, upper floors and ceilings). Each panel shall be minimum of 2.36" (60 mm) thick and constructed such that there no through metal connections between exterior surface and the interior surface.

(b) Interior and exterior casing shall be fabricated from 22-gauge (0.8 mm) corrosion resistant galvalume.

(c) Panels shall be foam injected into individual panels with a minimum density of 2-1/2 lb/ft^3 (40 kg/m^3).

(d) Heat transfer coefficient through casing walls shall be less than 0.0625 Btu/sq. ft. °F (0.3546 w/m^2 °C) equivalent to an R-value of 16 (2.82). Construction shall be suitable for a 50 °F (27.8 °C) difference as tested between process air dry bulb temperature and the dew point of the air surrounding the plenum. Panel deflection not to exceed 1/200th of longest unsupported span.

(e) Unit casing shall meet the following criteria based on ASTM E84-90 (Standard Test Method for Surface Burning of Building Materials)
- Flame Spread = 0
- Smoke Index = 10

(f) Access doors on end walls for servicing basin,

(g) All roof and sidewall seams shall be positively sealed to prevent water and air leakage. Air leakage shall be less than 1% of design airflow at 1-1/2 times maximum unit operating pressure.

(h) Steel ladder and platform for access to scavenger fan discharge

(i) Structure designed for wind loads of 1.45 kN/m^2 (30 lb/sq ft) on projected area and transmission of live and dead loads to foundations and anchors.

(j) The roof shall be coated with a TPO rubber membrane to ensure no water leaks.

(k) Casing shall house the fans, motors, coils, heat exchangers and all factory-supplied optional equipment.

.3 Access Doors:

(a) Hinged access doors for areas requiring routine inspection/maintenance.

(b) Minimum two gaskets for sealing.

(c) Door frames shall be thermally broken.

(d) Door panel shall be of the same thickness and insulating properties as wall panels.

(e) Provide viewports in the following access doors: supply fan access, door accessing sections upstream and downstream of polymer tube HX, door accessing supply plenum.

(f) A minimum of two adjustable glass reinforced nylon door latches shall be furnished for each hinged door. Each door handle shall be provided with large nylon roller cam for ease of operation and superior gasket compression.

(g) Each hinged door shall include a locking mechanism that requires the use of a tool to open for safety and security purposes prior to unit startup. Handles shall be operable from either side of the door.

(h) Doors shall have adhesive-backed stickers applied to their exterior surfaces which indicate the compartment contents and any safety/hazards within the enclosure.

(i) All exterior doors shall be equipped with rain gutters.

.4 Floors:

(a) constructed of 16ga. 304 stainless steel, with all seams fully welded.

(b) Underside of floor insulated with R-8 closed cell foam insulation.

(c) Upturned flange around the entire perimeter and around all interior chases to contain moisture within the unit. The entire floor and upturn flanges must be factory water tested and certified leak proof for a period of five years from the date of shipment.

(d) Multiple 1-1/2 inch floor drains shall be provided to route moisture to either side or bottom of unit (manufacturer to provide plans for specific drain locations).
- Each floor drain shall be factory trapped and piped to sump.
- Heat tracing may be required for drains in cold climates.
- Drains shall be flush with the unit floor so as not to create a trip hazard.
- All drains and associated piping are to be factory tested.

2.4 Fan

.1 Supply Fans:

.1 Statically and dynamically balanced direct-drive centrifugal plenum type;

.2 Direct-drive, NEMA premium efficiency, totally enclosed fan cooled (TEFC) with fan inlet guard.

.3 Continuous duty, ball bearing type with class "F" insulation and of cast iron construction when commercially available.

.4 Factory pre-wired to motor VFD with shaft grounding on all motors wired to VFDs.

.5 Piezometer flow measurement rings at inlet at each supply fan, including piping to manufacturer provided differential transmitter wired to unit DDC.

.2 Scavenger Exhaust Fans:

.1 Direct-drive axial type, factory pre-wired to motor VFD with shaft grounding on all motors wired to VFDs.

.2 Controlled through ModBus from unit DDC.

2.5 Heat Exchanger

.1 Polymer tube cross flow air-to-air heat exchanger with indirect evaporative cooler.

.2 Thermal characteristics and pressure drops as scheduled.

.3 Engineered, elliptical tubes to be used as the primary heat exchanger surface. Tubes to be constructed of a corrosion resistant polymer with internally and externally extruded ribbing for enhanced heat transfer. The polymer material to be fire retardant, meeting UL94 V-O standards. The heat exchanger to be tested and approved to UL900 class II. When sprayed for indirect evaporative cooling, water leakage from scavenger side to supply side shall be guaranteed less than 0.001 gallons (3.78 cm^3) per hour per 10,000 CFM (16,990 m^3/hr) of primary air.

.4 Tubes to be elastic in design, flexing slightly as scavenger fans start/stop to facilitate shedding of dissolved solids buildup. Tube design must have a proven performance record for more than five-years operating in hard water conditions.

.5 Tubes to be sealed into 22-gauge 304 stainless steel headers at each end. Intermediate tube supports to be provided based on tube length as required. Heat exchanger side casing to be constructed of stainless steel.

.6 All heat transfer surfaces to be non-metallic, suitable for continuous operation in temperatures up to 130 °F (54 °C). Coated aluminum, polymer, or stainless steel plate-type or heat pipe heat exchangers, will not be considered or approved as a substitute for the specified tubular heat exchanger.

.7 Heat exchanger to have an integral spray manifold for indirect evaporative cooling. Spray manifold to consist of PVC water distribution header and cooling tower clip-on type spray nozzles (easily removable for cleaning and maintenance). The water distribution system to supply water equally to all tubes in the system. An all welded stainless steel sump to be installed beneath heat exchanger. Piping in accordance with the detailed piping diagrams provided by manufacturer.

.8 Heat exchangers shall be tested in accordance with ASHRAE Standard 84-1991, "Method of Testing Air-to-Air Heat Exchangers", ARI Standard 1060, "Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment", and ANSI/ASHRAE Standard 143-2000 "Method of Test for Rating Indirect Evaporative Coolers. Independent laboratory test data must be supplied by the manufacturer

as proof of heat exchanger performance under the data center operating conditions. Test shall document the thermal effectiveness of the heat exchanger when operating in the dry heat exchange mode, and the wet bulb depression effectiveness when operating as an indirect evaporative cooler.

2.6 Water sump

.1 Construction:

.1 Close-coupled bronze fitted stainless steel centrifugal sump pumps with mechanical seal,

.2 Make-up water and sump drain valves to be included and shipped loose for field installation by installing contractor.

.3 Sump water level float switches (low water pump cut-off, sump fill on, sump fill off, high water alarm) to be included. Provide an overflow drain of sufficient size to drain the volume of water dispensed by the water fill line.

.4 Sumps to be sloped to drain for complete drainage on each dump cycle.

.5 Pressure transducer for pump status, installed in the discharge piping, factory wired to DDC controller.

.6 Furnish and install a torroidal type sump water conductivity sensor in the recirculating water piping, wired to the unit controller. Provide the controls for bleeding the sump water to maintain the hardness levels at appropriate levels.

2.7 Coil section (Direct Expansion Coil)

.1 Construction:

.1 Coil to be copper tubes mechanically bonded to configured aluminum fins with a galvanized steel casing. The coils shall be rated in accordance with ARI standard 410.

.2 Coils to have an integral all seam welded stainless steel drain pan with a minimum depth of two inches.

.3 Factory tested to 2.4 Mpa (350 psi) under water for coil working pressure of 860 kPa (125 psi)

2.8 Air Cooled Condensing Section

.1 Integral, factory piped, charged and wired mechanical refrigeration system.

.2 R-410a refrigerant system.

.3 Condenser coil shall be of internally finned copper tubes mechanically bonded to configured aluminum plate fins. Coils shall be leak tested at the factory to insure pressure integrity. Thermoguard or electrofin coated condenser coils to be located in the scavenger airstream, after the mist eliminator.

.4 Multiple tandem or single compressor set that are direct drive, hermetic, scroll type with centrifugal gear type oil pump providing positive lubrication to moving parts. Each tandem or single compressor shall be individually circuited to the DX coil. Compressor motors to be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent unit nameplate voltage. Temperature and current sensitive motor overloads to be included for maximum protection. Compressors to have vibration isolation to minimize vibration transmission and noise. Provide 35 second anti-short cycle timers on all on-off compressors.

.5 Lead compressor shall be digital or variable speed scroll type with dedicated controller.

.6 UV resistant Nylon Conduit power wiring.

.7 Type L copper refrigerant circuit; nitrogen purged during all brazing processes. Include Filter Drier and Sight glass. Provide Thermal Expansion Valves with External Equalized Balancing Port to ensure stable operation over entire stroke range. Provide Superheat of 10-12°F (5.56-6.67°C).

.8 Manual reset high pressure cut out switch independently wired to the control panel.

.9 Head pressure and low pressure transducer wired to the DDC.

2.9 Eliminators

.1 0.6 mm (26 ga) galvanized sheet steel eliminators in 1.2 mm (18 ga) galvanized steel frames supported in coil discharge.

2.10 Dampers

.1 Tamco Series 1000 extruded aluminum with direct coupled Belimo actuator.

.2 Positive closure dampers with spring return electric actuators arranged to close on fan shut down.

.3 Provide the following dampers:

.1 Supply air isolation damper, (modulating actuator, fail to last position)

.2 Return air isolation damper, (modulating actuator, fail to last position)

.3 Scavenger air natural convection control dampers, (modulating actuator, fail to last position)

2.11 Air Filters

.1 Supply Air Filters:

.1 4" deep, with minimum efficiency reporting value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2-2007.

.2 No greater than 0.23" W.C. initial resistance to airflow at an airflow velocity of 500 ft per minute (2.54 m/s)

.3 Classified by underwriters laboratories as UL Class 2.

.4 Differential pressure transmitter factory wired to DDC.

.2 Scavenger Air Filters:

.1 Polymer mesh, cleanable screens shall be factory provided.

.2 Ambient light screens to limit sunlight entering sump area

2.12 Temperature, Humidity and Pressure Controls

.1 Electronic programmable microprocessor-based logic controller (PLC) with key pad input and LCD display to control unit.

.2 Set points and 365-day clock functions including daylight savings, holiday programming and user overrides, shall be easily input by the operator.

.3 All sensors, as required to accomplish the specified sequence of control, shall be provided and factory wired to the extent possible.

.4 All external sensors shall be installed by the contractor.

.5 All controls shall be installed in a recessed control panel cooled by recirculating air.

2.13 Seismic and Wind Certifications

.1 Manufacturer to ensure that all internal and external components of indirect air-side economizer recirculation cooling unit meet seismic requirements for the facility and as prescribed by the seismic engineer. Refer to Section 20 05 49 – Seismic Restraint.

2.14 Electrical Controls

.1 Unit Power: Electrical contractor shall provide two 600V power sources. Unit to be provided with automatic power transfer switch to accept two incoming sources and provide 600V/60Hz/3ph main power feed to Airside Economizer. An integral electrical control panel shall be provided that has a hinged access door and an approved locking device. All required safety and automatic operating controls, including motor protection, and motor thermal overloads shall be included.

.2 A fused control power transformer shall be furnished. All components shall be fully wired and tested prior to shipment and all major electrical components shall be UL listed. Electrical system shall be ETL listed and labeled, in accordance with UL 1995. A non-fused disconnect switch shall be furnished and installed on the unit. All internal power and control wiring shall be connected to a numbered terminal strip for easy troubleshooting. Any conduit used shall not be run across or come into contact with the floor.

.3 All power wiring shall be in liquid-tight conduit. Control wiring shall be in plenum rated cable, not in conduit.

.4 All wiring penetrations between air handler sections, and into electrical panel, shall be completely sealed to eliminate air and moisture transfer.

.5 Lights: Provide LED Lights with covers in the supply fan access plenum, upstream & downstream of polymer HX, and supply plenum sections. Lights controlled by ONE exterior switch.

.6 Control Power: Electrical contractor shall provide a dedicated UPS 120V/1PH circuit for controls.

3 EXECUTION

3.1 General

.1 Position unit with adequate clearances for service and maintenance as prescribed by the manufacturer.

.2 Trained personnel from manufacturer's staff to supervise installation.

.3 Start-up services by direct factory employed service technician(s).

.4 Commissioning assistance by direct factory employed service technician(s).

3.2 Installation

.1 Mount vibration isolation on structural steel grillage or concrete supports.

.2 Provide supplementary steel over vibration isolation and under indirect air-side economizer recirculation cooling unit to transfer cooler loads to building structure.

.3 Supplementary steel to be finished with two coats of rust resistant paint and one coat of zinc rich compound (silver colour).

.4 Mount indirect air-side economizer recirculation cooling unit on vibration isolators and supplementary steel.

.5 Anchoring of unit bases to slab or steel support frames is by the installing contractor.

.6 All field water piping, pipe insulation, drain traps, heat tracing, hydronic specialties and installation of such is by installing contractor.

.7 All field wiring to be done by the installing contractor.

.8 Networking of controllers and BMS interface and all graphics is by the BMS contractor.

.9 All equipment rigging, crane costs, and / or field assembly is by the installing contractor. Provide catwalks and stairs as required.

.10 Units to be cleaned from dirt and grime typical of construction sites and is part of installing contractor's work.

.11 Electrical contractor to bond IEC units to the lightning protection system.

END OF SECTION

MAKEUP AIR UNIT
23 74 33

1 GENERAL

1.1 Scope

.1 Provide make-up air supply unit for redundancy to serve the CCH room, Entrance Facility Room and Tech room. Provide separate ducting system.

1.2 Shop drawings

.1 Submit shop drawings for each unit with;

.1 equipment model number,

.2 outline dimensions,

.3 enclosure details,

.4 space requirements for service and maintenance,

.5 support arrangements.

.2 Provide rating information showing capacity and power input requirements for heating and cooling duty over the range from minimum load to full load.

.3 Provide diagrams showing;

.1 requirements for field assembly with air flows, connection pipe sizes and external pressure drop at rated air flow,

.2 unit internal and external electrical power and control wiring with motors, starters, relays and interlocks identified, and with terminal and wire numbers marked.

.4 Submit sound power data for supply fans rated at more than 2.0 m^3/s (4000 CFM) and for condenser section of package units of more than 40 kW (11.4 tons).

1.3 Reference standards

.1 Sound ratings to comply with AMCA (Air Moving and Air Conditioning Association) 301 when tested to AMCA 300 and soundproofing tested to ARI 270.

.2 Fans to be constructed to conform to AMCA 99

.3 Fan ratings to be based on tests performed in accordance with AMCA 210, and ASHRAE 51.

.4 Weatherproofing tested and certified to AGA [rain test standards] if unit installed on rooftop.

.5 Conform to ARI 210 Standard for Unitary Air Conditioning Equipment rating for units larger than 40 KW (11.4 tons).

1.4 Warranty

.1 Compressors to be warranted against burn-out for five (5) years and warranty to include for labour and materials used in replacing compressors, and in cleaning, dehydrating and charging refrigeration system.

2 PRODUCTS

2.1 General

.1 Cooling and heating roof top type with hermetic reciprocating or scroll compressor, evaporator, air cooled condenser, condenser fans, evaporator fan, heater section, filter box, motor starters, and controls,

.2 If make-up air supply unit is installed on rooftop, provide roof curb type mounting frame if applicable.

.3 Factory assembled and tested with refrigeration piping, refrigerant and oil charge and

.4 Ready for connection to ductwork, gas and electric power source.

Standard of Acceptance

- McQuay
- Trane
- Carrier
- York
- Lennox
- Engineered Air
- Enmar
- Reznor
- Bousquet

2.2 Cabinet

.1 Construction:

.1 assembled on steel base with lifting lugs and curb flashings,

.2 constructed with steel angle or folded plate frame, minimum 2.2 mm (14 ga), and panels of 1.2 mm (18 ga),

.3 weathertight casing with removable gasketed panels for access to motorized equipment and hinged gasketed access doors for electrical control panel and filter changing,

.4 primed and enameled.

.2 Insulation:

.1 insulation on panel surfaces in contact with conditioned air of 25 mm (1 in), 32 kg/m^3 (2 lb/ft^3) density neoprene coated glass fibre.

2.3 Evaporator

.1 Direct expansion type, arranged with counter flow between air and refrigerant, minimum of two circuits;

.1 aluminum fins on copper tubes mounted in zinc coated steel casing.

.2 maximum face velocity of 2.6 m/s (500 fpm), minimum 4 rows.

.3 stainless steel, welded condensate pan with 20 mm (¾ in) stainless steel drain.

2.4 Fans

.1 Double width, double inlet centrifugal type;

.1 statically and dynamically balanced,

.2 two-belt drive, with adjustable pitch sheave, sized for 200% of fan motor horsepower,

.3 mounted with motor and drive, on isolation base with belt tensioning arrangement, separated from unit casing with flexible connections and spring isolators.

2.5 Air filters

.1 50 mm (2 in) thick replaceable media type prefilters (MERV 8 filters), and

.2 100 mm (4") unit filters (MERV 14),

.3 Mounted ahead of evaporator coil, in filter box with access doors permitting separate servicing of filters.

2.6 Gas fired heating section

.1 Construction:

.1 multiple pass type with primary and secondary heating surfaces of stainless steel,

.2 factory mounted, gas fired, induced draft, spark ignition burner, with;

(a) modulating control,(4:1 turndown),
(b) wired and fire tested with operating and safety controls,
(c) high temperature limit switches,
(d) flame failure module,
(e) induced draft fan centrifugal switch,
(f) pilot flame proving switch and loss of airflow switch.

.3 burner control system located in sheet metal weatherproof enclosure with key locked door.

2.7 Refrigeration compressors

.1 Direct driven reciprocating or scroll semi-hermetic compressors operating at 1750 rpm with;

.1 thermal overloads,

.2 oil sight glass,

.3 manual reset high pressure switch,

.4 pump down low pressure switch,

.5 suction line strainer

.6 reversible oil pumps for forced feed lubrication.

.7 solid state motor protection and crank case heater,

.8 mounted on pad type vibration isolators, in separate compartment isolated from air stream.

2.8 Refrigerant circuit

.1 Piping, valves, fittings and related parts to CSA B52 with;

.1 thermal expansion valve,

.2 suction and discharge regulators,

.3 combination filter/dryer with replaceable core,

.4 solenoid stop valves,

.5 liquid sight glass with moisture indicator,

.6 high side pressure relief device,

.7 charging valve,

.8 hot gas bypass to permit operation down to 10% of nominal refrigeration capacity,

.2 Insulation:

.1 19 mm (¾ in) of flexible elastomeric insulation on suction line.

2.9 Condenser section

.1 Fans:

.1 direct drive, slow speed, multiple propeller fans,

.2 ball bearing, permanently lubricated, fan motors,

.2 Condenser coil:

.1 aluminum fins on copper tube,

.2 integral subcooling circuits,

.3 separate refrigeration circuits for each compressor,

.4 sized for outdoor air entering temperature of 38 C (100 F).

2.10 Refrigeration controls

.1 Microprocessor based DDC control system with;

.1 external unit stop switch,

.2 recycling pump down control,

.3 manual pump down switch,

.4 oil pressure safety switch,

.5 high and low refrigerant pressure switches,

.6 phase failure protection,

.7 under/over voltage protection,

.8 freeze protection thermostat,

.9 low ambient head pressure control to flood condenser and permit refrigeration system operation down to 0 C (32 F) outside temperature.

2.11 Temperature control system

.1 Microprocessor based, Direct Digital Control (DDC) processor, BACnet.

.2 Electronic thermostat and control module to operate heating and cooling system in response to thermostat sensed temperature.

.3 Remote status panel with indicating lights showing heat mode, cool mode, compressor operation, no heat, filter and touch sensitive key pad to allow hour/day operating program and adjustment of thermostat set point.

2.12 Electrical panel

.1 Single point power supply with;

.1 power connection,

.2 control interlock terminals,

.3 unit control system located in sheet metal weatherproof enclosure with key locked door.

.2 Circuit protection for;

.1 compressors and starters,

.2 fans and control circuit,

.3 solid state sequence timer,

.4 compressor motor overload protection with current sensing in three passes,

.5 control transformer.

2.13 Seismic Requirements

.1 Manufacturer to ensure that all internal and external components of make-up air unit meet seismic requirements for the facility and as prescribed by the seismic engineer. Refer to Section 20 05 49 – Seismic Restraint.

3 EXECUTION

3.1 Installation

.1 Install roof curb (if applicable) if unit is to be mounted on rooftop. Place unit on curb with adequate clearance for service and maintenance.

.2 If unit to be installed inside Mechanical Room, place unit on housekeeping pads with adequate clearance for service and maintenance.

.3 Connect ductwork, gas piping and electric power and control wiring.

3.2 Start-up service

.1 Arrange for manufacturers' field representative to supervise installation, start-up unit and instruct Owners operations and maintenance personnel.

END OF SECTION

DUCTED SPLIT AIR CONDITIONERS
23 81 26

1 GENERAL

1.1 Scope

.1 Provide ducted split air conditioning units to provide cooling for the Entrance Facility Room.

1.2 Shop drawings

.1 Submit shop drawings for each condensing unit and evaporator with;

.1 equipment model number,

.2 outline dimensions,

.3 enclosure details,

.4 space requirements for service and maintenance,

.5 support arrangements.

.2 Provide rating information showing capacity and power input requirements for heating and cooling at full load.

.3 Provide diagrams showing;

.1 requirements for field assembly with air flows, duct opening sizes, connection pipe sizes and rated air flow,

.2 unit internal and external electrical power and control wiring with motors, starters, relays and interlocks identified, and with terminal and wire numbers marked.

1.3 Warranty

.1 Compressors to be warranted against failure for five (5) years and warranty to include for labour and materials used in replacing compressors, and in cleaning, dehydrating and charging refrigeration system.

2 PRODUCTS

2.1 General

.1 Package system, factory assembled and tested with pre-charged refrigeration piping, refrigerant and oil charge.

.2 Ready for connection of electric power at evaporator unit and condensing unit and control wiring between units.

Standard of Acceptance

- Liebert Mini-Mate2
- Mitsubishi
- Sanyo
- Daikin

2.2 Evaporator Unit

.1 Concealed indoor evaporator unit;

.1 pre-charged direct expansion type cooling coil, arranged with counter flow between air and refrigerant,

.2 three speed fans statically and dynamically balanced,

.3 supply and return air openings for field-supplied ducting,

.4 disposable filters for particulate and odour control,

.5 condensate pan draining to 20 mm (¾ in) side outlet connection.

.6 exposed: plastic enclosure with removable panels for servicing,

.7 concealed: enamel sheet metal enclosure with access doors and concealed fasteners,

.8 concealed suspension brackets

.9 operating sound level less than 45dB(A)

2.3 Condensing unit

.1 Outdoor, air cooled, hermetic compressor;

.1 mounted on vibration isolators,

.2 air cooled condensing coil,

.3 condenser fans, motor starters, and controls,

.4 sheet metal enclosure with mounting lugs and fan safety grille primed and enameled to withstand 1000 hr salt spray test.

.5 low ambient operation to -22 C (-7 F)

.6 operating sound level less than 55dB(A)

2.4 Refrigerant circuit

.1 Piping, valves, fittings and related parts to CSA B52.

.2 Pipe insulation: 19 mm (¾ in) thick flexible elastomeric insulation on suction line.

2.5 Temperature control system

.1 Hard wired electronic thermostat and control module to operate cooling in sequence in response to thermostat sensed temperature, with indication for;

.1 operating mode (cool only)

.2 compressor operation,

.3 no heat,

.4 touch sensitive key pad to allow hour/day operating program and adjustment of thermostat set point.

3 EXECUTION

3.1 Installation

.1 Install evaporator unit in space, route supply ducting, return ducting and drain piping.

.2 Install condensing unit with adequate clearance for service and maintenance.

.3 Run refrigeration suction and liquid piping in accordance with manufacturer's instructions with respect to horizontal and vertical length limitations

.4 Charge systems and leak test in accordance with manufacturer's instructions

.5 Provide un-fused weatherproof disconnect on or adjacent condenser and evaporator units and run electric power and control wiring.

.6 As required, depending on manufacturer, sub-feed electrical power for evaporator unit from condenser unit.

.7 Provide sheet-metal wind-baffle shield on condenser as required by manufacturer's instructions for low ambient operation.

3.2 Start-up service

.1 Arrange for manufacturers' field representative to supervise installation, start-up system and instruct Owners operations and maintenance personnel.

END OF SECTION

ELECTRIC REHEAT COILS
23 82 19

1 GENERAL

1.1 Scope

.1 Provide electric reheat coil(s) in duct serving main make-up air to the CCH room, Entrance Facility Room and Tech room.

1.2 Shop drawings

.1 Submit shop drawings for each heater showing;

.1 model number,

.2 rated capacity in kW,

.3 outline dimensions,

.4 power requirements, voltage rated amps, phase,

.5 loading points and weights, and

.6 control panel layouts and wiring diagrams.

1.3 Applicable standards

.1 Electrical equipment and wiring to conform to Canadian Electrical Safety Code

.2 Heater package to bear ULC, or CSA label.

2 PRODUCTS

2.1 Coils

.1 Construction:

.1 nickel-chrome electric resistance wire embedded in refractory material and enclosed in steel sheathing with low watt density extended fins.

.2 rated for capacity in kW, with voltage and phase arrangement as required.

.3 flanged or insert type.

.2 Power and control:

.1 modulating SCR control

Standard of Acceptance
° Viconics - model R820

.2 NEMA 1 power panel with hinged door and catch,

.3 fan interlock,

.4 high temperature limit switch,

.5 air flow proving switch mounted on coil unit,

.6 fuses,

.7 unfused disconnect,

.8 SCR controlled from 0-10 VDC, 4-20 mA, or 0-135 ohm signal from Building Automation System,

.9 Three phase power:

.10 Primary voltage/120 or Primary/24 VAC control transformer.

Standard of Acceptance

- Thermolec
- Indeeco
- Caloritech
- Metalaire
- Thermolec

3 EXECUTION

3.1 Installation

.1 Mount units in ducts or unit casings as required.

.2 Connect power and control wiring.

.3 Verify operation of safety, limit and operating controls

END OF SECTION

UNIT HEATERS
23 82 39

1 GENERAL

1.1 Scope

.1 Provide heaters as required.

1.2 Shop drawings

.1 Submit manufacturer's data sheets for unit heaters with:

.1 equipment model numbers,

.2 performance and design data,

.3 outline dimensions,

.4 power requirements,

.5 support and connection details,

.6 equipment weights.

2 PRODUCTS

2.1 General

.1 Heating equipment capacities as required.

.2 Selection of hot water heating equipment to meet capacities shown to be based on;

.1 Entering water temperature: 71.1 °C (160 °F)

.2 Water temperature drop: 16.5°C (30°F),

.3 Entering air temperature: 15.6°C (60°F).

.3 Selection of steam heating equipment to meet capacities shown to be based on;

.1 Entering steam pressure: 7 kPa (1 psi),

.2 Entering air temperature: 18°C (65°F),

.3 Condensate return at atmospheric pressure.

.4 Unit working pressure: 860 kPa (125 psi) minimum.

.5 Manufacturers:

Standard of Acceptance

- Rosemex
- Sterling
- Rosemex
- Rittling
- Dunham Bush
- Reznor
- Engineered Air
- Slant/Fin
- Sigma

° Airtherm

2.2 Horizontal and projection unit heaters

.1 Casings:

.1 1.2 mm (18 ga) steel with gloss enamel finish and threaded connections for hanger rods,

.2 four way adjustable air outlet louvres on horizontal units and adjustable multi-vane diffuser on projection units.

.2 Coils:

.1 seamless copper tubing, silver brazed to steel headers with evenly spaced aluminum fins mechanically bonded to tubing,

.2 leak tested to 1000 kPa (150 psi) with air under water.

.3 Fans:

.1 factory balanced propeller type fans, direct connected to resiliently mounted motors, with anti-corrosive finish and fan guards.

.4 Accessories:

.1 supplied with line voltage thermostat for remote mounting.

2.3 Cabinet unit heaters

.1 Casings:

.1 surface mounted, recessed or semi-recessed type,

.2 1.6 mm (16 ga) steel finished with factory applied baked primer with internal glass fibre insulation,

.3 integral air outlet and inlet grilles,

.4 removable access panels allowing service of fans, coils, isolating valves and controls,

.5 removable 25 mm (1 in) fibrous glass media replaceable filters

.2 Steam and hot water coils:

.1 seamless copper tubing, silver brazed to steel headers with evenly spaced aluminum fins mechanically bonded to tubing,

.2 leak tested to 1000 kPa (150 psi) with air under water.

.3 Electric coils:

.1 nickel-chrome electric resistance wire embedded in refractory material and enclosed in steel sheathing with low watt density extended fins,

.2 arranged for two stage heating with magnetic contactors, high temperature limit switch, and fan override switch built into cabinet,

.3 heating elements and fan to be controlled by two stage thermostat and common On/Off control switch.

.4 Fan:

.1 statically and dynamically balanced, double width centrifugal fans with sleeve bearings, direct connected to resiliently mounted three speed single phase motor.

.2 speed controller and single phase motor starting switch factory wired to motor and mounted inside cabinet behind access door

.5 Accessories:

.1 supplied with line voltage thermostat for remote mounting.

3 EXECUTION

3.1 Heater support

.1 Attach heaters to building structure with angles, hanger rods and supplementary suspension steel before installation of piping.

.2 Provide spring isolation hangers for door heaters.

3.2 Connections

.1 Connect piping with swing joints.

.2 Install isolating valve on supply and lock shield valve on return of each hot water heater.

.3 Install isolating valve on steam line and trap assembly on condensate return of each steam heater.

.4 Install electric on/off automatic control valve, interlocked with fan motor, on supply to each cabinet unit heater.

.5 At hot water unit heaters, door heaters, and cabinet unit heaters provide air vent with isolating cock.

.6 Install remote thermostats, multi-speed controllers, motor starter switches and other controls and provide interconnecting wiring.

3.3 Cabinets and enclosures

.1 Install cabinets tight against furrings, columns, or wall surfaces.

.2 enclosure lengths to be job measured at site where enclosure extends between walls, furrings or similar fixed objects.

.3 Provide elements, hangers, hanger brackets and piping connections where enclosures are provided under another Division.

3.4 Completion

.1 Clean coils and comb fins on finned elements.

.2 Set dampers and isolating valves open.

.3 Re-finish units damaged during installation.

END OF SECTION

HUMIDIFIERS
23 84 13

1 GENERAL

1.1 Scope

.1 Provide humidifiers as required, to serve spaces including but not limited to: the CCH room, Entrance Facility Room and Tech Room. Main humidifier to be mounted in the duct providing make-up air to the CCH Room, Entrance Facility Room and Tech room. The redundant humidifier to be mounted in the duct coming from the standby make-up air unit.

1.2 Shop drawings and product data

.1 Submit manufacturer's piping and wiring diagrams, and data sheets showing:

.1 capacities,

.2 absorption distances,

.3 recommended installation methods.

.2 Submit manufacturers data substantiating absorption distances with air leaving humidifier at 24 C (75 F) and 40-55%RH (adjustable).

2 PRODUCTS

2.1 Steam injection humidifiers

.1 Single or multiple steam jacketed duct distribution manifolds across width of duct or plenum;

.1 normally closed modulating steam control valve,

.2 centrifugal type steam/water separator,

.3 factory installed electric valve actuator,

.4 number as follows:

Duct height mm (inches)	Number of Manifolds
0 to 950 (0 to 36)	1
950 to 1450 (36 to 60)	2
1450 to 2050 (60 to 80)	3
2050 to 2550 (80 to 100)	4
2550 to 3000 (100 to 120)	5
greater than 3000 (120)	Add additional humidifier

Standard of Acceptance

- Armstrong
- Dri-Steem
- Spirax Sarco - PMD
- Nortec
- Pure

2.2 Rapid absorption steam humidifiers

.1 Distribution panels with closely spaced steam dispersion tubes spanning between headers and mounted in galvanized steel casing;

.1 normally closed modulating steam control valve,

.2 centrifugal type steam/water separator,

.3 factory installed electric valve actuator,

Standard of Acceptance
° Dri-Steem - Ultra-Sorb

3 EXECUTION

3.1 Installation

.1 Mount and fit units in accordance with manufacturer's instructions.

.2 Provide hot water supply, minimum {6 mm (¼ in} size type K soft temper copper tubing with shut-off valve.

.3 Provide air gap or backflow preventer in inlet water line and air gap in drain line to each humidifier

.4 Connect overflow with drain line sloped 1 in 25, terminating over open drain.

.5 Install steam trap assembly, strainers, isolating valves, and connect up steam supply and condensate return.

.6 Locate steam generator close to and below distributors.

3.2 Seismic Requirements

.1 Manufacturer to ensure that all components of humidifier unit meet seismic requirements for the facility and as prescribed by the seismic engineer. Refer to Section 20 05 49 – Seismic Restraint.

3.3 Supervision and Start-up

.1 Arrange and pay for services of trained representative of equipment manufacturer to supervise installation, wiring, set up, and testing of humidifier systems.

.2 At completion, manufacturers' representative is to instruct Owners operating personnel in operation and maintenance of humidifier systems.

END OF SECTION

HHAngus

MASTER PROJECT SPECIFICATIONS
DIVISION 26 ELECTRICAL

Royal Columbian Hospital Redevelopment
Appendix 1B (I) Energy Centre Technical Specifications
Design-Build Agreement

HHA #2151229-02

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END OF SECTION

ELECTRICAL GENERAL REQUIREMENTS
26 01 01

1 REQUIREMENTS

1.1 General Contract Documents

.1 Comply with General Conditions of Contract, Supplementary Conditions and Division 01 - General Requirements.

1.2 Work Included

.1 Work to be done under this section to include furnishing of labour, materials, equipment and services required for installation, testing and putting into proper operation complete Electrical systems as shown, as specified, as intended, and as otherwise required. Complete systems to be left ready for continuous and efficient satisfactory operation.

1.3 Document organization

.1 Applicable Divisions for Electrical Work:

.1 Division 26 - Electrical

.2 Division 28 – Fire Alarm System

.2 For clarity, any reference in the Contract Documents to Division 26 includes Division 28 Fire Alarm System.

.3 The Specifications for these Divisions are arranged in Sections for convenience. It is not intended to recognize, set or define limits to any subcontract or to restrict Contractor in letting subcontracts.

.4 Contractor is responsible for completion of the Work whether or not portions are sublet.

1.4 Division 26, as it applies to Division 28

.1 Division 26 contains common work requirements that are applicable to the Work of Division 28 and apply as if written in full within Division 28.

1.5 Definitions

.1 The words "indicated", "shown", "noted", "listed" or similar words or phrases used in these Specifications, mean that the material or item referred to is "indicated", "shown", "listed" or "noted" on the Drawings or in the Specifications.

.2 The words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected", or similar words or phrases used in these Specifications, mean that the material or item referred to, is to be "approved by", "satisfactory to", "as directed by", "submitted to", "permitted by", "inspected by" the Consultant.

.3 Instructions using any form of the word "provide", requires the Contractor to furnish labour, materials and services as necessary to supply and install the referenced item.

.4 The term “building code” means the current edition of the “British Columbia Building Code”.

.5 The terms “electrical code” and “electrical safety code” mean the current edition of the “Canadian Electrical Safety Code”.

.6 The terms “electrical authority” and “electrical safety authority” mean the “BC Safety Authority”. The term “AHJ” means the “Authority Having Jurisdiction” and can include the local building inspector, the local fire department and the electrical safety inspector or their agents.

1.6 Language

.1 Specifications are written as a series of instructions addressed to the Contractor, and by implication to subcontractors and to suppliers. For clarity and brevity, use is made of numbered lists and bulleted lists. Where the list follows a semi-colon (;) punctuation is for clarity, where the list follows a colon (:) punctuation is to be read as short-hand form of verb “to be” or “to have” as context requires.

.2 It is not intended to debate with the Contractor reasons for these instructions, and words associated with justification for an instruction or restatement of anticipated performance have been omitted to avoid possible ambiguities.

1.7 Examination

.1 Examine any existing buildings and services, local conditions, building site, Specifications, and Drawings and report any condition, defect or interference that would prevent execution of the Work.

.2 Examine work of other Divisions before commencing the Work, and report any defect or interference.

.3 No allowance will be made for any expense incurred through failure to make these examinations of the site and documents prior to Tender or on account of any conditions on site or any growth or item existing there which was visible or known to exist at time of Tender.

1.8 Design Services

.1 Provide design services for elements of the Work where specified. Instruments of this service to be sealed by a professional engineer licensed in the applicable jurisdiction.

1.9 Standard of Material and Equipment

.1 Provide materials and equipment in accordance with Section 26 05 01 – Electrical Basic Materials and Methods.

.2 Materials and equipment:

.1 new and of uniform pattern throughout the Work,

.2 of Canadian manufacture where obtainable,

.3 labelled or listed by Code and/or Inspection Authorities, CSA certified and CMB listed; where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from electrical safety authority,

.4 standard products of approved manufacture,

.5 in compliance with Standards and Regulations with respect to;

(a) chemical and physical properties of materials,
(b) design,
(c) performance characteristics, and
(d) methods of construction and installation,

.6 identical units of equipment to be of same manufacture,

.7 within any unit of equipment, identical component parts to be of same manufacture, but various component parts comprising the unit need not be from one manufacturer.

.3 Materials and equipment are described to establish standards of construction and workmanship.

.1 Where manufacturers or manufacturers' products are identified in lists with phrase "Standard of Acceptance", these are manufacturers and/or products which meet standards with regard to performance, quality of material and workmanship.

.2 Manufacturers and/or products used are to be chosen from these lists.

.4 Include items of material and equipment not specifically noted on Drawings or mentioned in Specifications but which are required to make a complete and operating system.

.5 Confirm capacity or ratings of equipment being provided, when based on ratings of equipment being provided under other trade Sections, before such items are purchased.

.6 Factory fabricate control panels and component assemblies.

.7 Select materials and equipment in accordance with manufacturer's recommendations and install in accordance with manufacturer's instructions.

.8 Materials and equipment not satisfying these selection criteria will be condemned.

.1 Remove condemned materials from job site and provide properly selected and approved materials.

1.10 Substitutions

.1 The use of a substitute article or material which the manufacturer represents to be of at least equal quality and of the required characteristics for the purpose intended may be permitted, subject to the following provisions;

.1 a substitution will not be considered for reasons of meeting the construction schedule unless the Contractor can demonstrate to the satisfaction of the Authority that all reasonable efforts have been made to procure the specified product or material in a timely fashion,

.2 the manufacturer to advise the Authority of the intention to use an alternative article or material before doing so,

.3 the burden of proof as to the quality and suitability of alternatives to be upon the manufacturer, the manufacturer to supply all information necessary, as required by the Authority, at no additional costs to the contract,

.4 the Authority to be the sole judge as to the quality and suitability of alternative materials and the Authority's decision to be final,

.5 where use of an alternative material involves redesign or changes to other parts of the Work, the costs and the time required to effect such redesign or changes will be considered in evaluating the suitability of the alternative materials,

.6 no test or action relating to the approval of substitute materials to be made until the request for substitution has been made in writing by the manufacturer and has been accompanied by complete data as to the quality of the materials proposed, such request to be made in ample time to permit appropriate review without delaying the Work, taking into consideration that such a substitution request may be rejected requiring that the product or material as originally specified be provided,

.7 whenever classification, listing, or other certification by a recognized standards body is a part of the specifications for any material, proposals for use of substitute materials to be accompanied by reports from the equivalent body indicating compliance with the requirements of the specifications,

.8 the costs of testing required to prove equality of the material proposed to be borne by the manufacturer.

1.11 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 APPLICABLE CODES AND STANDARDS

.1 Install electrical systems in accordance with the Canadian Electrical Safety Code.

.2 Install underground systems in accordance with the latest edition of CSA C22.3 No.7 except where specified otherwise.

.3 Abbreviations for electrical terms: to the latest edition of CSA Z85.

.4 Comply with CSA Certification Standards in force at time of Tender submission.

.5 Where requirements of this specification exceed those of the above mentioned standards, this specification to govern.

.6 In the event of a conflict between codes, regulations, or standards, or where work shown is in conflict with these documents, obtain interpretation before proceeding. Failure to clarify any ambiguity will result in an interpretation requiring the application of the most demanding requirements.

3 EQUIPMENT

3.1 Manufacturers Nameplates

.1 Metal nameplate with raised or recessed lettering, mounted on each piece of equipment.

.2 Manufacturer's nameplate to indicate equipment size, capacity, model designation, manufacturer's name, serial number, voltage, cycle, phase and power rating, and approval listings.

3.2 Finishes

.1 Primary and final painting for Work, other than items specified as factory primed or finished, to be done under Finish Division 9.

.2 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.4 Leave a quart can of paint, as used with switchboards, with Authority for touch-up purposes.

.5 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

.6 Store electrical materials and equipment such as switchboards, panels, transformers, bus ducts, fire alarm devices, luminaires, etc., in a dry, clean location and cover with polyethylene plastic to preserve factory finish.

.7 Protect exposed or free standing equipment with plastic to minimize entry of dust and dirt and marring of finished surfaces during progress of work.

.8 Schedule luminaires, lamps, diffusers and fire detectors for installation as late as possible during construction in order to minimize accumulation of dust and/or dirt on them. Clean luminaires and diffusers, not acceptable because of dust and dirt, in an approved manner in accordance with the manufacturer's instructions. Wrap surface mounted and suspended luminaires and fire detectors, installed prior to painting or dusty construction being completed in the area, in plastic to prevent dirt or paint from settling on them.

.9 Wrap bus ducts in heavy gauge plastic to adequately prevent moisture and dirt from entering bus duct. Wrapping to remain until bus ducts are ready to be energized.

3.3 Pre-purchased Equipment, Damage and Ownership

.1 At time of receipt of pre-purchased or pre-tendered equipment at job site by the installing electrical contractor, the manufacturer/distributor/supplier's technical representative to be present to inspect the equipment prior to unloading and report any damage to the Consultant. The technical representative to also witness the unloading and advise the Contractor on the appropriate method for handling the equipment in order to avoid damage during unloading, moving and setting in place.

.2 In the event that the equipment or cable is found to be damaged before unloading it is to be returned immediately to the factory for repairs and/or replacement by the manufacturer/supplier.

.3 In the event of damage occurring at any time during unloading and until the equipment is accepted by the Authority, the Design-Builder is responsible for repairs and/or replacement to the satisfaction of the Authority.

4 COORDINATION

4.1 Field, Fabrication, and Installation Drawings

.1 Prepare field, fabrication, and/or installation drawings to show location of equipment and relative position of services and to demonstrate coordination with work of other trades.

.1 Drawing scale: minimum 1:50 (1/4"=1'-0")

.2 Use information from manufacturer's shop drawings for each trade and figured dimensions from latest Architectural and Structural Drawings.

.3 Layout equipment and services to provide access for repair and maintenance.

.4 Submit drawings to other trades involved in each area and include note in drawing title block as follows;

.1 "This drawing was prepared and circulated for review and mark-up to related subcontractors as noted and initialed in the table below. Corrections and concerns identified through this coordination process have been addressed on this drawing. Areas that incorporate significant changes from layouts shown on Contract Drawings have been circled for Consultants' review."

4.2 Cutting and Remedial Work

.1 For details of cutting and patching and division of Work refer to Division 1.

.2 Assume responsibility for prompt installation of work in advance of concrete pouring, masonry, roofing, finishing and similar work. Should any cutting or repairing of either unfinished or finished work be required because such installation was not done, employ the particular trade, whose work is involved, to do such cutting and patching. Pay for any resulting costs.

.3 Neatly cut or drill holes required in existing construction to accommodate equipment such as cables, raceways, bus ducts, cabletrays, etc.

.4 Arrange and pay for cutting and patching as required for the Work. Before cutting, drilling, or sleeving structural load bearing elements, obtain the Consultant's approval of location and methods in writing. For weather exposed or moisture resistant elements or sight exposed surfaces, employ the original installer or an expert in finishing of the material, to perform cutting or patching.

.5 Layout cutting of structural elements, such as floor slabs, walls, columns or beams and obtain approval before starting work. Conduct an electromagnetic scan for reinforcing rods, such as Hilti PS200 Ferroscan, and review with the Structural Engineer.

.6 Arrange and pay for supplemental x-ray examination to locate concrete reinforcement, conduits and other embedments. Submit x-ray results and obtain approval before starting work.

.7 Relocate core drilling location if steel or conduit is found in the proposed location and repeat procedure. Repair and reroute any circuits damaged by core drilling.

4.3 Voltage Ratings

.1 Operating voltages: to latest edition of CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

4.4 Wiring of Mechanical Trades Motors

.1 To limit responsibility and to specifically define the Work under this Division, use the following procedure with regard to motors provided under Mechanical Division 20.

.2 The Contractor under Mechanical Division 20 will be responsible for installing equipment which he supplies including motors, starters, disconnect switch, Motor Control Centres, "mechanical" panelboards and miscellaneous controls of the type specified.

.3 In every instance whether pertaining to Plumbing, Air Conditioning, Refrigeration, Heating or Ventilating equipment, wire to line side of the Motor Control Centre, panelboard, disconnect switch, or starter provided by these trades, in reasonable proximity to equipment being controlled.

.4 From this point, unless otherwise noted, the cost of electrical material and labour will be borne by the particular trade whose work is involved. That trade will mount starter and wire from it to motor being controlled, together with control wiring, remote switches, and pilot lights.

.5 Where individual starters and controls are grouped together, the Contractor under Mechanical Division 20 will provide a panel for mounting his equipment. Provide a feeder, main fused disconnect

switch, a splitter of adequate size and capacity, individual fused disconnect switches, and wire to line side of the Division 20 starters.

.6 In the case of unit heaters, reheat coils, electrical control devices, and cabinet unit heaters, terminate wiring in an outlet immediately adjacent to motor or device being electrically powered. Wiring from this point to starter, thermostat, or other devices will be done under Mechanical Division 20.

.7 Provide branch circuit wiring and an outlet for each motorized damper or heating control.

.8 Ascertain exact locations of starters, Motor Control Centres, “mechanical” panelboards and motors, from Mechanical Drawings.

.9 Motors up to and including 0.25 kW (1/3 HP) to be 120 volt, 60 Hz, single phase.

.10 Motors 0.37 kW (½ HP) and above to be 3 phase, 60 Hz, voltage as noted.

5 PROTECTION OF PERSONNEL, WORK, AND PROPERTY

5.1 Personnel Protection

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

.4 Do not leave conduit, wires, cables, tools, equipment or materials in such a way that they constitute a hazard.

.5 Provide guards around openings in the roof or floor to prevent stock or scrap from dropping down.

.6 Remove loose equipment and tools from overhead areas before leaving each day.

.7 Do not leave boards with protruding nails on the floor.

.8 Cut off bolts at floor level to eliminate a possible tripping hazard.

5.2 Protection During Construction

.1 Provide protection required to enable existing building and equipment to remain in continuous and normal operation.

.2 Take the necessary precautions to protect equipment, existing building and service from damage during the Work. Accept responsibility for any damage and make good without cost to the Authority.

.3 It is of vital importance, during work of this Contract, that all existing surfaces and items are not damaged in any way whatsoever by the work of all trades. Take precautions as necessary to prevent damage to walls, floors, ceilings, windows, doors, door frames, mouldings, finishes, piping, ductwork, light fixtures, etc. Provide protection, hoarding, tarpaulins, dust sleeves etc., as required. Any damage caused because of lack of adequate protection to be made good at no cost to the Authority.

.4 Take care when working above or around UPS modules, batteries and switchgear as this equipment must remain in service.

.5 Take care to eliminate dust in equipment areas.

.6 Protect switchgear fronts from accidental breaker trips when working around or above them. Provide an extended shield constructed of12 mm (½") fire retardant plywood a minimum of 450 mm (18") from board front to allow access to board.

5.3 Core Drilling

.1 Wherever core drilling is required, provide temporary dust proof screens.

.2 In areas where core drilling through a slab in an operating facility is necessary, the areas to be drilled to be marked out clearly on the underside of slab. Authority's representative to be notified at least 1 week prior to core drilling operation. Provide tarping of equipment supervised by the Authority.

.3 During core drilling operations, station at least one person directly below the area of drilling with a large plastic container pressed to underside of slab to capture and hold core and water upon completion of operations.

.4 A wet/dry commercial quality vacuum to be used continuously at location of drilling operation to remove all excess water from the area.

5.4 Temporary Dust Proof Screens

.1 Provide temporary dust proof screens where required to separate work areas from completed areas and/or existing areas, to prevent dust from settling on the Authority's plant and equipment.

.2 Dust proof material to be neoprene coated nylon tarpaulin or other types of fabric as approved by the Consultant.

.3 Provide temporary framing as required.

.4 Extend dust proof screens from floor to underside of floor or roof above. Lap sections of screen sheets 150 mm (6") minimum and tape joints.

.5 Secure screen sheets at top, bottom and ends and tape perimeter.

.6 Co-operate with Authority in the erection of temporary dust proof screens.

.7 Remove screens when and as directed by Consultant.

5.5 Protection of Floors during Equipment Installation

.1 Provide protection of floor finishes during installation or removal of equipment, and at any other time when moving or installing heavy equipment.

.2 Install 19mm (¾") plywood over 6 mil plastic over finished floor areas when moving heavy equipment that could damage floor finish.

.3 Repaint or re-tile any floors or walls damaged or scratched during construction.

5.6 Housekeeping

.1 Maintain a high level of cleanliness.

.2 Remove scrap and refuse from the work area daily.

.3 Whenever possible, clean up immediately following completion of work.

.4 Deposit oily and waste solvent rags in approved containers to minimize the fire hazard.

.5 Sweep and damp mop daily.

6 WORK IN EXISTING BUILDING

6.1 General

.1 The Work includes changes to the existing building and changes at junction of old and new construction. Route cabling, ducts, conduits and other services to avoid interference with existing installation.

.2 Core drilling to be scheduled to minimize impact on existing hospital operations. Coordinate with Authority.

.3 Relocate existing pipes, ducts, conduits, bus ducts and any other equipment or services as necessary to accommodate the Work.

.4 Maintain or relocate existing services which pass through the area of renovation or demolition, but which feed items located outside of these areas. Rewire devices to the original circuits.

.5 Remove existing lighting fixtures, wiring, devices and equipment to suit new construction. Cut back and cap conduits and electrical outlets not being used, so that finished work presents a neat and clean appearance. Disconnect at point of electrical supply, remove obsolete wiring and conduits, and make existing systems safe. Blank off openings in panels or boxes created by the removal of cables, conduits, wireways or ducts.

.6 Where an existing ceiling is to be removed and reinstalled or replaced under another trades scope of work, and the existing electrical items such as luminaires, fire detectors, speakers, exit signs, emergency lighting heads etc., are to be reused, provide the following regarding the electrical items:

.1 remove,

.2 store in a secure, clean, dry location,

.3 install in the new ceiling, extend wiring and raceways as necessary,

.4 provide new items to match existing where existing items have been lost or damaged,

.5 make connections,

.6 clean,

.7 relamp luminaires,

.8 test,

.9 verify fire alarm devices,

.10 replace defective items with new, then retest/reverify,

.11 submit test and verification reports.

.7 Unless noted otherwise removed materials and equipment become the property of the Contractor and are to be taken from the site and disposed of appropriately.

.8 Review removed luminaires and equipment with the Authority's representative, and if the Authority instructs they wish to keep any items, move them to a designated location on the site. Luminaires and equipment that the Authority does not want become the property of the Design-Builder and are to be taken from the site and disposed of appropriately.

.9 For devices, fixtures and equipment to be relocated, provide junctions boxes, outlet boxes, wiring, plates, supports, etc., as necessary.

.10 Revise panelboard directories accordingly if affected by the Work.

.11 Clean and relamp relocated luminaires and replace any faulty ballasts.

.12 On completion of relocations, confirm that relocated devices and luminaires are in proper working order.

.13 Co-ordinate work affecting fire alarm system, fire safety, or protection systems with the Authority, Consultant, fire alarm system manufacturer and authorities having jurisdiction prior to commencing work. Retain the original fire alarm system manufacturer to verify relocated fire alarm devices, modified equipment and revised wiring. Provide temporary fire protection and/or a fire watch in all areas affected by the demolition and as required by authorities having jurisdiction.

.14 Where the Authority wishes to take over renovated areas ahead of the project completion date and these areas are intended to be fed from the distribution systems in the new building, make temporary connections to the existing services in these areas. Reconnect to permanent services at a later date, when the new distribution systems are available.

6.2 Continuity of Services

.1 Keep existing buildings in operation with minimum length of shutdown periods.

.2 Make connections to existing systems at approved times.

.3 Obtain written approval, recording times when connections can be made.

.4 Repair any damage caused to existing systems when making connections.

.5 Provide temporary feeders and connections as required to maintain systems in operation where shutdown periods will exceed 8 hours, or extend beyond the allowable time frame determined by the Authority.

.6 Arrange the Work so that physical access to the existing buildings is not unduly interrupted.

7 FINAL CLEANING

7.1 General

.1 Do final cleaning in accordance with Section 01 74 23.

.2 Perform final cleaning after construction activities, that create dust, have been completed.

.3 Clean electrical equipment and devices installed as part of this project.

.4 Clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt, including the top surface, whether exposed or in the ceiling space.

.5 Clean switch, receptacle, and communications outlets, coverplates, and exposed surfaces.

.6 Clean and vacuum any smoke detectors exposed to construction dust, do not use compressed air.

.7 Electrical rooms, generator rooms, UPS and battery rooms and electrical or communication closets:

.1 Thoroughly vacuum and clean interiors and buswork of switchboards, panels, cabinets and other electrical equipment of construction debris and dust prior to energization using a HEPA vacuum cleaner. Final clean using clean lint free cloths with a cleaning liquid as recommended by the manufacturer for the purpose.

.2 HEPA vacuum the top of switchboards, panels, cabinets, bus ducts, cable trays and conduits, and mechanical duct work in the room, followed by a thorough HEPA vacuuming of the floors. Thoroughly wash floors with wet mop and clean water. Control access to the room after cleaning. Provide temporary filter media on air supply ducts to these rooms to prevent re-contamination from other areas of construction.

.3 Thoroughly re-clean as necessary prior to final turn over.

.4 Do not lay permanent switchboard matting in electrical rooms until rooms are thoroughly re-cleaned, and floors wet mopped and dried, immediately prior to final turn over.

8 OPERATING AND MAINTENANCE INSTRUCTIONS

8.1 Operating and Maintenance Data

.1 Provide operation and maintenance data bound in 210 mm x 300 mm x 50mm thick (8½ in x 11 in x 2 in thick) size, vinyl covered, hard back, three-ring covers.

.1 Organize material in volumes generally grouped by Division Section;

(a) Site services,
(b) Power,
(c) Lighting,
(d) Low Voltage Systems,
(e) Fire Alarm.

.2 Title sheet in each volume to be labeled "Operating and Maintenance Manual" and to bear;

(a) Project Name,
(b) Project Number,
(c) Date,
(d) Trade Section, and
(e) List of Contents.

.3 Provide three hard-copies to Authority.

.2 In addition, provide Adobe PDF files for each document, produced from original direct-to-digital file creations.

.1 Organize documents into separate PDF files for each Division Section identified above, and apply Adobe Bookmarks to create Table of Contents.

.3 Include in operations and maintenance data;

.1 details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation,

.2 technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists; advertising or sales literature not acceptable,

.3 wiring and schematic diagrams and performance curves,

.4 names and addresses of local suppliers for items included in maintenance manuals,

.5 reviewed shop drawings,

.6 operating characteristics of the equipment supplied such as calibration curves and coordination data to allow proper co-ordination with Authority's equipment,

.7 description of operation of the controls and protective devices used,

.8 maintenance and adjustment procedures,

.9 lifting and jacking instructions,

.10 fault locating guide,

.11 spare parts list and an itemized price list,

.12 name and telephone numbers of service organization and technical staff that will provide warranty service on the various items of equipment.

.4 Approval procedure;

.1 submit one set of first draft of Operating and Maintenance Manuals for approval,

.2 make corrections and resubmit as directed,

.3 review contents of Operating and Maintenance Manuals with Authority's operating staff or representative to ensure thorough understanding of each item of equipment and its operation,

.4 hand-over an additional two copies of Operating and Maintenance Manuals to Authority's operating staff and obtain written confirmation of delivery.

8.2 Operating and Maintenance Instructions

.1 Provide instructions to Authority's operations staff to thoroughly explain operation and maintenance of each system, incorporating specialized instruction by manufacturers as described under other Sections. Include classroom instruction and hands-on instruction, delivered by competent instructors.

.2 Develop the proposed training plan, submit an outline of the training program for review and adjustment by the Authority. Obtain approval from the Authority before commencing training.

.3 Structure each session to start with the classroom instruction for the overall system, followed by hands-on instruction for each item of equipment, utilizing the services of the manufacturers' representative as required.

.4 Organize and schedule each training session to deliver the required instruction in an efficient and effective manner on a schedule agreed upon with the Authority. Repeat each training session approximately one week after the original session.

.5 Organize each pair of training sessions as follows:

.1 Power Distribution - Normal Power- Division 26

.2 Power Distribution - Emergency Power- Division 26

.3 Power Distribution - UPS Power- Division 26

.4 Power Distribution – Other Systems- Division 26

(a) This will include, but not limited to:

- Lightning protection
- Lighting
- Lighting control

- Emergency (battery) lighting
- Wiring devices
- Pipe Tracing

.5 Electronic Safety and Security – Fire Alarm – Division 28

.6 Complete the training as close to Substantial Performance as possible, so that the operations staff are prepared to operate the systems after Substantial Performance is certified.

.7 Keep a record of date and duration of each instruction period together with names of persons attending. Submit signed records at completion of instruction.

.8 For each training session, include the following topics;

.1 general purpose of the system (design intent),

.2 use of O & M manuals,

.3 review of single line drawings and control schematics,

.4 start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, control set-up and programming, troubleshooting and alarms,

.5 interaction with other systems,

.6 adjustments and optimizing methods for energy conservation,

.7 maintenance requirements,

.8 special maintenance and replacement sources,

.9 health and safety issues,

.10 occupancy interaction issues, and

.11 system response to different operating conditions.

.9 Develop and provide training material, including printed documents and electronic presentation aids (eg. MS PowerPoint) for each session. Submit three (3) copies of materials in both hardcopy and electronic format, in accordance with article on Operating and Maintenance Manuals.

.10 Sessions may be videotaped by the Authority as an aid to ongoing training of Authority's staff.

9 CARE, OPERATION AND START-UP

.1 Arrange and pay for services of manufacturer's factory service technicians to supervise start-up of installation, check, adjust, balance and calibrate components.

.2 Provide these services for such periods, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with every aspect of the operation, care and maintenance thereof.

.3 Arrange and pay for services of applicable manufacturer's factory service engineer or certified independent testing organization to supervise initial start-up of specialized portions of installation and to check, adjust, balance and calibrate components including related wiring and controls. Provide these services for such periods, and for as many visits as may be necessary to put applicable portion of the installation in complete working order. Provide a certificate indicating that the equipment is free and clear of deficiencies.

10 TESTING

.1 Conduct and pay for the following tests;

.1 power distribution system including phasing, voltage, grounding and load balancing,

.2 circuits originating from branch distribution panels,

.3 lighting and its control,

.4 motors, heaters and associated control equipment including sequenced operation of systems where applicable,

.5 systems: fire alarm system, communications,

.6 additional testing as specified in other Sections.

.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Insulation resistance testing;

.1 megger circuits, feeders and equipment up to 350 V with a 500 V instrument,

.2 megger 350-600 V circuits, feeders and equipment with a 1000 V instrument,

.3 check resistance to ground before energizing.

.4 Carry out tests in presence of Consultant.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results for Consultant's review. Test electrical equipment to standards and function of specifications, applicable codes and standards in an approved manner. Replace defective equipment and wiring with new material and leave entire system in complete first class operating condition.

11 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes. Revise circuit labelling as appropriate.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral current on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

12 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as per equipment manufacturers' recommendations for each piece of equipment.

13 COMMISSIONING

.1 Participate in commissioning of equipment and systems in accordance with Section 26 08 15.

.2 Equipment supplied on this project will be subject to detailed factory inspection and on-site testing and commissioning prior to being placed in service. The electrical contractor, their major system and equipment suppliers, and the Independent Testing Agent (ITA) will be required to participate in special commissioning meetings to review progress and status of the commissioning program.

.3 Include in Bid amount for licensed electricians to participate in the commissioning program, to undertake temporary power connections, operation of equipment, opening and closing of panel boards and switchboards, testing of power and control wiring, and assisting the ITA and the equipment suppliers' field personnel in the startup and testing of the equipment.

.4 The contractor and equipment suppliers to include in the Bid amount the costs to accommodate and undertake factory and site testing.

ELECTRICAL BASIC MATERIALS AND METHODS
26 05 01

1 GENERAL

1.1 Scope

.1 Articles that are of a general nature, apply to each Section of Divisions 26 and 28.

1.2 Work Included

.1 Work to be done under this section to include furnishing of labour, materials, equipment and services required for installation, testing and putting into proper operation complete electrical systems as shown, as specified, as intended, and as otherwise required. Complete systems to be left ready for continuous and efficient satisfactory operation.

2 ACCESS DOORS

2.1 Construction:

.1 Access doors, unless shown or specified otherwise:
- .1 constructed from galvanized steel sheet,
- .2 flush mounted,
- .3 concealed hinges,
- .4 180^{o} opening door,
- .5 round safety corners,
- .6 anchor straps,
- .7 plaster lock,
- .8 screwdriver operated latches,
- .9 without visible screws,
- .10 finished prime coat only.

.2 Door metal thickness as follows:
- .1 up to and including 400 x400 (16” x 16”): 1.6 mm (16 gauge)
- .2 height or width larger than 400 (16”): 2 mm (14 gauge)

.3 Constructed of stainless steel for areas finished with tile or marble surfaces.

.4 Constructed of stainless steel with neoprene gasketted door where used in damp and high humidity areas.

.5 Dish type door design to receive a tile insert where acoustic tile is applied to plaster or gypsum board ceilings.

.6 Fire rated where installed in fire rated walls or ceilings. Fire rating to match the rating of the wall or ceiling.

.7 With keyed cylinder locks, keyed alike, for areas subject to security risks, examples;
- .1 public corridors, lobbies and spaces,

.2 Mental Health patient areas,

.3 public washrooms,

.4 parking garage

.5 auditorium and auditorium lobby

.8 Inside clear dimensions:

.1 approximately 400 mm x 400 mm (16" x 16") for hand access,

.2 at least 600 mm x 600 mm (24" x 24") where personnel are to enter through doors,

.3 larger where indicated or required.

.9 Submit access door shop drawings for approval as soon as possible after award of contract, showing size, type and exact location of access doors.

Standard of Acceptance

- Acudor
- Cendrex (up to 400 x 400 only)
- Elmdor (up to 400 x 400 only)
- Mifab (up to 400 x 400 only)
- Nystrom
- Williams Brothers – GP

2.2 Installation

.1 Provide access doors for locations where equipment requiring access, maintenance or adjustment is "built-in".

.2 Submit a list of proposed access door locations and obtain approval before commencing installation.

.3 Access doors to be installed under the Division in whose work they occur. Arrange for and pay cost of access doors and their installation.

.4 Access doors are not required in removable acoustic panel type ceilings.

.5 Size and locate access doors in applied tile, or in glazed or unglazed structural tile to suit tile patterns. Refer to Architectural Room Finish Schedule and details on Architectural drawings in this regard.

3 SLEEVES AND CURBS

3.1 Materials:

.1 Sleeves for bus ducts, wireways and cable trays: minimum 3 mm (1/8") galvanized steel.

.2 Integral flashing clamp on sleeves that pass through floors with a waterproof membrane.

.3 Removable (non fire rated) sealing material: Duxseal or acceptable alternative.

.4 Fire rated sealing material: per Article “Fire Stopping”.

3.2 Installation

.1 Provide sleeves for bus ducts, wireways, conduits and cable runs passing through;

.1 concrete walls, beams, slabs and floors,

.2 fire rated walls, partitions and ceilings.

.2 Place and secure sleeves in concrete form work.

.3 Supply sleeves to be set in concrete and masonry walls with installation detail drawings.

.4 Terminate sleeves flush with surfaces of concrete and masonry walls.

.5 Extend sleeves 100 mm (4") above finished floor.

.6 Size sleeves to accommodate fire stopping materials where required.

.7 Make watertight connections between sleeves and waterproof membranes.

.8 Fill any spaces between sleeves and masonry walls;

.1 with non-shrink grout,

.2 with a rated fire stopping material for rated walls.

.9 Seal spare sleeves and the space between sleeves and the through conduits, cables, wireways, bus ducts etc;

.1 using removable sealing material,

.2 using a rated fire stopping material for floors and rated walls,

.3 seal watertight where sleeves penetrate a floor slab.

.10 Sleeves in existing concrete and masonry walls and floors;

.1 cutting and drilling of structural elements, such as floors, slabs, walls, columns, or beams to be carried out in accordance with procedure set out in Article “Cutting and Remedial Work” in Section “Electrical General Requirements”,

.2 neatly cut or drill holes in existing construction,

.3 terminate sleeves flush with surfaces of concrete and masonry walls,

.4 extend sleeves 100 mm (4") above finished floor with flange, countersunk, and bolted down flush into floor surface,

.5 fill opening between sleeve and wall;

(a) with non-shrink grout,
(b) with a rated fire stopping material for rated walls.

.6 fill opening between sleeve and floor with rated fire stopping material with water barrier,

.7 seal as indicated above.

.11 Provide concrete curbs, minimum 100 mm (4") high above finished floor surrounding sleeves and openings for;

.1 conduits,

.2 cables,

.3 telephone cable risers,

.4 bus ducts,

.5 wireways,

.6 cable trays, and

.7 other openings for electrical services through slabs above grade.

.12 Size concrete curbs for bus ducts to provide sufficient area to adequately carry bus duct support brackets.

.13 Size openings to accommodate fire stopping materials as required.

3.3 FIRE STOPPING

3.4 General

.1 Maintain the integrity of floor and wall fire separations around electrical raceways, cables, bus ducts and boxes passing through rated floors or walls.

3.5 Materials

.1 Materials to form a ULC or cUL listed firestop system to CAN/ULC-S115 “Standard Method of Fire Tests of Firestop Systems”.

.2 Firestop system rating: minimum 2 hours, higher where indicated.

.3 Submit shop drawings consisting of product technical data and ULC or cUL listing.

Standard of Acceptance
- Hilti Firestop Systems
- 3M
- A/D Fire Protection System Inc.
- Eastern Wire + Conduit

.4 Other manufacturers having products with explicitly similar characteristics, listings or classifications and approvals are acceptable.

3.6 Installation:

.1 Submit a complete fire stopping and smoke seal schedule to the Consultant for review. Include details, cut sheets, system description and location for each proposed fire stopping and smoke sealing application.

.2 Install firestopping in accordance with the manufacturer’s recommendations and in accordance with the ULC or cUL listing.

.3 Firestopping to be installed only by personnel trained by the manufacturer on the installation of such systems.

.4 Firestop system manufacturer’s training and inspection services:

.1 Provide the services of the firestop system manufacturer to provide training to trades performing the fire stopping. Create and maintain a log of those personnel who obtain training.

.2 Provide the services of the firestop system manufacturer to inspect the installation of the firestopping while in progress and a final inspection at completion of work. Provide a manufacturer’s inspection report to the Authority and Consultant.

.5 Seal space between penetrating service and sleeve or opening in fire rated floors and walls with a fire stopping and smoke sealing system.

.6 At time of application of materials, surfaces to be clean, dry and free from dust, oil, grease, loose or flaking paint, loose concrete or masonry and foreign materials.

.7 Wiring may penetrate a fire rated assembly provided it is enclosed in non-combustible conduit, and the passage of the conduit in turn is suitably sealed to the assembly with fire stop material.

.8 Where wiring with a combustible covering and not enclosed in non-combustible conduit penetrates a fire resistance rated assembly, group the wiring into separate fire sealed penetrations to ensure the overall diameter of the combined wire(s) in each penetration does not exceed 25 mm.

.9 Arrange single conductor metal sheathed cables to individually penetrate the fire rated assembly and be individually fire stopped.

.10 Where wiring is installed in cable trays and penetrates a fire rated assembly;

.1 terminate and independently support the cable tray on each side of the fire rated assembly, and

.2 provide sufficient working room to properly install and inspect the fire stopping materials and penetration.

.11 Smoke seal and fire stop electrical boxes that penetrate a fire rated wall using fire rated putty pads, install putty pads on the outside of boxes.

.12 Co-ordinate installation of cast-in-place fire stopping devices with the Division responsible for the placement of concrete.

4 SPRINKLER PROTECTION

4.1 Materials

.1 Surface panelboards, switchboards and other electrical equipment in sprinklered areas to be fitted with watertight hubs with insulated throat, for each conduit entrance.

Standard of Acceptance

- Thomas & Betts Ltd. - Series 401
- Efcor of Canada Ltd. - Series 40-50B

.2 Provide equipment in sprinklered areas, with hoods or shields and gasketted doors for protection against entry of sprinkler discharge, and to comply with the requirements of the electrical code, alternatively, and where indicated, provide indoor weatherproof equipment.

.3 Ventilation openings to be overhanging drip proof type.

.4 Indoor weatherproof equipment, where noted in the specifications and/or drawings to have CSA type 3R enclosures in accordance with the requirements of CSA Standard C22.2 No. 94.

5 PENETRATIONS OF BELOW GRADE WALLS AND SLABS ON GRADE

5.1 Materials

.1 Expanding cement water stop material.

.2 Submit manufacturer’s literature.

Standard of Acceptance

- WATERSTOP-RX or acceptable equivalent

5.2 Installation

.1 Fit each cable, conduit and duct passing through floor slab in contact with ground or walls below grade, with a water stop.

.2 Submit schedule showing location, service.

.3 Install water stop in accordance with the manufacturer's instructions.

.4 Encircle each cable, conduit and duct and the perimeter of the wall opening with the water stop material.

.5 Fill the wall openings around the cables, conduits or ducts with hydraulic cement injected for the full width of the wall.

.6 Seal the exterior of the wall around the cables, conduits or ducts with a waterproof coating. Waterproof coating to be compatible with any existing waterproofing.

6 EQUIPMENT SUPPORTS, AND BASES

6.1 Supports for electrical work

.1 Equipment supplementary supports to be provided by this Division.

.2 Concrete housekeeping bases for electrical equipment to be provided by this Division.

.3 Work to be done by firms specializing in these fields.

.4 Submit shop drawings for steel and concrete work, prepared by licensed Professional Engineers.

6.2 Supplementary supports and support brackets:

.1 Fabricated from structural grade steel with anchor bolts and fastenings.

.2 Designed in consultation with building structural consultant to transfer live loads and dead loads to building structural elements.

.3 Constructed as frames bracketed from walls, and/or supported from building structure above, and/or floor below.

6.3 Concrete bases for housekeeping pads:

.1 Constructed using plywood form work and 20 Mpa (3000 lb) concrete,

.2 Dowelled to concrete floor slab with steel rods not less than 13 mm (1/2 in) in diameter.

.3 Finish to make flat, level, smooth, neat surfaces.

.4 Chamfer corners 25 mm (1 in).

.5 Dimensions:

.1 75 mm (3 in) larger all around than base of apparatus for non-seismic applications,

.2 200 mm (8 in) larger all around than base of apparatus for seismically restrained equipment,

.3 Height: 100 mm (4 in)

6.4 Installation - General

.1 Locate supporting steel to permit service or repair, and to allow clear access to junction boxes and equipment.

.2 Set equipment on supporting frames and brackets and install hangers, anchor bolts, and vibration mountings.

.3 Install anchor bolts, and vibration mountings between equipment and housekeeping pad.

.4 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.5 Provide anchorage, dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Supply items for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 After completion of erection, touch-up field welds, bolts and burnt or scratched surfaces with primer.

.9 Where gratings or trench covers are cut in field or damaged, touch up with zinc rich paint.

7 GENERAL WIRING REQUIREMENTS

7.1 Wiring Terminations

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

.2 Manufacturers' and CSA labels to be visible and legible after equipment is installed.

7.2 Location of Outlets

.1 Locate outlets in accordance with Architectural Requirements.

.2 Do not install outlets back-to-back in wall.

.3 Do not install back boxes on opposite sides of a wall within the same stud space, stagger them by at least one stud space;

.1 Where the above is not achievable in select locations, request approval from the Architect to allow back boxes on opposite sides of a wall to occupy the same stud bay and apply acoustical putty pads to the outside of the boxes in these instances.

.4 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

7.3 Mounting Heights

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 For Barrier Free areas verify the mounting heights with the authority having jurisdiction prior to rough-in.

.4 Install electrical equipment at following heights unless indicated otherwise.

Description	General Area	Barrier Free
Local switches	1200 mm (47")	1050 mm (41")
Wall receptacles: General	300 mm (12")	450 mm (18")
Wall receptacles: Hospitals	450 mm (18")	450 mm (18")
Wall receptacles: above top of continuous baseboard heater	200 mm (8")	200 mm (8")
Wall receptacles: above top of counters or counter splash backs	175 mm (7")	175 mm (7")
Wall receptacles shown above top of counters where there is no counter: height above finished floor	1200 mm (47")	1050 mm (41")
Wall receptacles: In Mechanical rooms	1200 mm (47")	1050 mm (41")
Fire alarm pull stations	1500 mm (59")	1200 mm (47")
Fire alarm bells	2100 mm (83")	2100 mm (83")
Wall mounted speakers	2100 mm (83")	2100 mm (83")
Wall or floor mounted, vertical panel type door operator controls	from ≤200mm to ≥900mm (from ≤7.9" to ≥36")	from ≤200mm to ≥900mm (from ≤7.9" to ≥36")
Clocks	2100 mm (83")	2100 mm (83")
Other controls	1200 mm (47")	1050 mm (41")
Panelboards	As required by code or as indicated	As required by code or as indicated

7.4 Conduit and Cable Installation

.1 Install embedded conduit prior to pouring of concrete.

.2 Arrange for holes through exterior walls and roof to be flashed and made weatherproof under Division 7.

.3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.4 Supply and deliver inserts to site in ample time to be built into work of other trades. Provide necessary templates and adequate instructions and assistance to locate and install inserts.

.5 Secure inserts firmly to form work before concrete is poured.

.6 Provide insert drawings as required.

7.5 Plywood Backboards

.1 Provide plywood backboards in electrical rooms and closets where indicated or specified for mounting of equipment.

.2 Plywood to be securely attached to the building structure.

.3 Plywood to be 19mm, void free, good one side, mounted with good side exposed.

.4 Selected products and installation to be in compliance with LEED Gold Certification. Provide necessary documentation to support LEED credit application process.

END OF SECTION

PAINTING FOR ELECTRICAL SERVICES
26 05 02

1 GENERAL

1.1 Scope

.1 Provide industrial anti-corrosion coatings for electrical building services and related construction elements including:

.1 electrical services and supporting elements as specified under other sections of Divisions 26 to 28,

.2 concrete curbs, housekeeping pads, floor trenches and containment floor areas.

.2 General painting of service room floors and decorative finish painting of building services is provided under Division 09.

1.2 Related Sections

.1 26 01 01 Electrical General Requirements

.2 26 05 01 Electrical Basic Materials and Methods

1.3 Submittals

.1 Submit product data sheets which demonstrate compliance with LEED VOC requirements.

1.4 Applicable Codes and Standards

.1 Legislation:

.1 SOR/2009-264 Canadian Environmental Protection Act, *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations*

.2 Installation standards and codes:

.1 LEED Gold Certification.

.2 SSPC Society for Protective Coatings, Surface Preparation Standards

.3 Product standards:

.1 Green Guard GC-03 Green Seal Environmental Criteria for Anti-Corrosion Paints

2 PRODUCTS

2.1 Industrial anti-corrosion coatings – carbon steel materials and structural steel support components

.1 Outdoor applications:

.1 top coat: industrial urethane alkyd enamel top coat, or single compound 100% acrylic coating,

.2 primer coat: as per manufacturers' recommendation for coating of steel piping,

.3 colour: Sherwin Williams No SW4027 (Galvano), unless specified elsewhere,

.4 VOC limit: 340 g/L of product less water and excluded compounds.

Standard of Acceptance
- Sherwin Williams – Pro Industrial Urethane Alkyd Enamel
- Sherwin Williams – Pro Industrial Acrylic

.2 Indoor applications:

.1 top coat: single compound 100% acrylic coating,

.2 primer coat: as per manufacturers' recommendation for coating of steel piping,

.3 colour: Sherwin Williams No SW4027 (Galvano), unless specified elsewhere,

.4 LEED: certified to Green Guard standard GC-03 for anti-corrosion coatings,

.5 VOC limit: 250 g/L of product less water, U.S. EPA method 24.

Standard of Acceptance

° Sherwin Williams – Pro Industrial Acrylic

.3 Zinc rich primer applications for field painting of carbon steel material, or touch-up of galvanized steel material:

.1 top coat: as specified for interior or exterior applications,

.2 primer: single or multi-part zinc rich coating,

.3 colour: gray-green,

.4 LEED compliance: certified to Green Guard standard GC-03 for anti-corrosion coatings,

.5 VOC limit: 250 g/L of product less water, U.S. EPA method 24.

Standard of Acceptance

° Sherwin Williams – Zinc Clad III HS 100

2.2 Industrial coatings – poured concrete

.1 For field painting of concrete floor trenches, housekeeping pads, curbs and containment floors in service rooms:

.1 resistant to fuel oil, general solvents and water,

.2 top coat: water based urethane floor enamel,

.3 primer coat: water based epoxy,

.4 colour: Sherwin Williams Deck Gray,

.5 colour: Sherwin Williams Safety Yellow where shown,

.6 VOC limit: 250 g/L of product less water, U.S. EPA method 24.

Standard of Acceptance

° Sherwin Williams – Armorseal Floor Plex 7100 Primer / Amorseal 1K Topcoat

3 EXECUTION

3.1 General

.1 Refer to requirements for services to be painted in the relevant sections of Division 26 to 28 and as follows.

.2 Touch up any damage to factory prime coat resulting from shipping or installation with appropriate primer for indoor/outdoor installation with appropriate top coat, of colour to match existing. Materials to be compatible with the original factory finish.

.3 Touch up any damage to factory galvanized finish resulting from site welding, shipping or installation with zinc rich primer.

3.2 Installation

.1 Surface preparation

.1 Clean surfaces to be painted in accordance with paint manufacturer recommendations and as follows.

.2 Surfaces to be clean, dry and free from dust, oil, grease, loose or flaking paint and foreign materials at time of application of paint materials.

.3 For carbon steel materials, remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter by hand chipping, scraping, sanding, and wire brushing in accordance with SSPC-SP2 Hand Tool Cleaning.

.4 For galvanized steel material, solvent clean to SSPC-SP1 Solvent Cleaning. If galvanized surface is already rusty, remove loose rust and dirt in accordance with SSPC-SP2 and prime the exposed metal the same day as being cleaned.

.5 For concrete materials, clean surfaces to SSPC-SP13/NACE 13 by mechanical, chemical or thermal methods.

.6 Tape-off adjacent materials which are not to be painted. Provide drop sheets to protect other surfaces from falling paint or over-spray.

.2 Application - General

.1 Apply one coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer.

.3 Apply top coat in the number of coats recommended by the manufacturer, to obtain 100% coverage to the minimum recommended thickness, free of streaks, drips and sags.

.4 Do not paint when temperature is lower than 7^{o}C.

.3 Application – Galvanized base metal finish

.1 Where material is galvanized, touch up welded sections or other locations where protective galvanized surface has been damaged, with zinc rich primer.

.2 Apply a top coat to match base material colour.

.4 Application – Concrete trenches, housekeeping pads, curbs and containment floors

.1 Apply one coat of primer and two top-coats.

.2 After paint has dried, seal joints between curbs and containment floors with a silicone based industrial caulking in matching colour.

End of Section

EXCAVATION AND BACKFILL
26 05 05

1 GENERAL

1.1 General Requirements

.1 Coordinate with the site services work to be performed under other Divisions of the Work.

1.2 References

.1 Occupational Health and Safety Act and Regulations for Construction Projects and Industrial Establishments as applicable.

1.3 Work Included

.1 Provide labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

2 PRODUCTS

2.1 Aggregates

.1 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.2 Fine aggregates to be one, or blend of the following:

.1 Natural sand,

.2 Manufactured sand,

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.3 Coarse aggregates to be one of or blend of the following:

.1 Crushed rock,

.2 Gravel composed of naturally formed particles of stone.

2.2 Asphalt Material

.1 Anionic emulsified asphalt to CAN/CGSB-16.2, grade SS-1.

.2 Aggregate material of crushed stone or gravel.

.3 Thoroughly mixed to achieve a uniform coating of asphalt over the aggregate.

2.3 Concrete

.1 As specified in Division 3, Cast-in-Place Section.

2.4 Warning Tapes

.1 Non-Detectable Warning tape:

(a) Suitable for direct burial,
(b) Polyethylene,
(c) 150 mm (6”) wide,

(d) continuous black lettering on red background, indicating buried electrical services below.

.2 Detectable warning tape:

(a) Waterproof and corrosion proof, suitable for direct burial,
(b) Detectable from grade using a metal detector,
(c) Metallic core encased in polyethylene or polyester
(d) continuous black lettering indicating buried electrical services below.

3 EXECUTION

3.1 Preparation Prior to Excavation

.1 Carefully review drawings of other trades.

.2 Examine Architectural Drawings to determine where excavations for this Work interfere with new or existing paved areas, curbs, walks, concrete floors and other finished floors.

.3 Obtain current “locates reports” for existing buried services from:

.1 local government source,

.2 service providers as applicable, or

.3 a professional locate service.

.4 Review “locates reports” for any interferences with the Work.

.5 Carefully check on site, the actual locations of existing services shown on the drawings and report any serious discrepancies.

.6 Layout the final routing of services.

4 EXCAVATION

.1 Saw cut pavements, curbs and sidewalks before proceeding with excavation.

.2 Excavate as required for the Work, both inside and outside the building.

.3 Remove and dispose of concrete, masonry paving, walks, demolished foundations, rubble, and other obstructions encountered in course of excavation.

.4 Shore and brace excavations exceeding 1200 mm (48 in) in depth in accordance with applicable Occupational Health and Safety Act and provincial regulations.

.5 Provide bracing, shoring and underpinning as required to prevent movement or settlement of adjacent structures, earth, services, walks, paving, trees, curbs, adjacent grade.

.6 Carefully check and avoid disturbing or damaging any existing underground piping, conduit or other services uncovered during execution of the Work.

.7 Prior to any excavation close to building footings, obtain approval from project structural engineer.

.8 Do not excavate within the 45 degree splay of bearing from the bottom of any footing without written permission from the project structural engineer.

.9 Do not disturb soil within branch spread of trees or shrubs that are to remain. Where excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

.10 Make good at no cost to the Authority any damage caused by settlement resulting from the excavation.

.11 Cleanly cut and trim banks of excavations and shore as required to prevent caving in.

.12 Replace, in an acceptable manner, excavation which has been carried to a depth greater than shown or authorized, with10 MPa concrete, at no additional expense to Authority, to give a bearing value equal to that provided by undisturbed soil.

.13 Prepare excavation for underground services so that no portion of any conduit, duct, cable or duct bank bears directly against any rock or other hard surface.

.14 Form bottoms of trenches so that pipes, conduits, duct banks, etc. are supported on undisturbed soil and will not be subject to undue strain.

.15 Grade bottoms of excavation for conduits, ducts or duct banks to provide drainage.

.16 Report to the Authority any unsuitable sub grade conditions.

.17 Remove rock encountered by drilling and wedging. Blasting will not be allowed unless approved and authorized in writing.

.18 Break up rocks and boulders removed from excavations as required to permit handling.

4.2 Protection

.1 Store excavated materials in acceptable locations and in a manner so as to minimize damage to existing surfaces.

.2 Cover excavated materials and provide protection to prevent runoff into local drainage facilities.

.3 Protect from freezing, excavated earth that is to be used for backfilling.

.4 Grade around excavations to prevent surface water runoff into excavated area.

.5 Keep excavations dry by bailing, pumping or other acceptable means.

.6 Cleanly cut and trim banks of excavations and shore as required to prevent caving in.

.7 Keep sides and bottoms of excavations from freezing and protect as required to prevent damage to the Work or to existing services, by weather or other conditions.

4.3 Backfilling

.1 Prior to backfilling, remove formwork, shoring etc.

.2 Do not commence backfilling until approval has been obtained.

.3 Backfill as required for the Work, both inside and outside the building

.4 Provide detectable warning (tracer) tape directly above centerline of buried services.

.5 Provide non-detectable warning (marker) tape midway between buried services and finished grade.

.6 For trenches exceeding 500 mm (20") in width, provide two non-detectable warning (marker) tapes, one laid 100 mm (4") from each trench edge, midway between buried services and finished grade.

.7 Backfill excavations, required in close proximity to, or below footing level with 10 MPa concrete up to the top of highest adjacent footing.

.8 Where solid undisturbed soil is not obtainable at the trench level eg: adjacent to a foundation wall or maintenance hole, provide granular 'A' material from undisturbed soil, compacted in 300mm (12") layers up to bottom of trench.

.9 Do not use frozen earth for backfilling nor place any backfilling on or against frozen earth.

.10 Repair, at no cost to the Authority, any of the Work and existing services damaged during backfilling.

.11 Backfill trenches under building floors, roads and paved areas with sand placed in layers and compacted in an approved manner to achieve 95% modified Proctor compaction. Do not use material from excavation for backfilling.

.12 For conduits, ducts and cables;

- .1 provide a base layer of sand at least 100mm (4") deep,
- .2 tamp sand around and over conduits, ducts and cables, in 150 mm (6") layers to a height of at least 300 mm (12") above top of conduits, ducts and cables.
- .3 compact each sand layer,
- .4 fill remainder of trench in 300 mm (12") layers with approved excavated material, free from stone,
- .5 compact each layer to prevent undue settlement.

.13 For duct banks at maintenance holes and foundation walls;

- .1 backfill in 300mm (12") layers with Granular 'A' material to height of at least 300 mm (12") above top of duct banks,
- .2 compact each layer,
- .3 fill remainder of space in 300 mm (12") layers with approved excavated material, free from stone,
- .4 compact each layer to prevent undue settlement.

.14 Where excavations interfere with new or existing paved areas, curbs, walks, concrete floors and other finished floors, backfill with sand.

.15 Patch paved areas, walls, walks, lawns and road surfaces, damaged by the Work, in an acceptable manner.

.16 Make up settlement of backfilling as soon as possible. Fill depressions to restore the correct grade after a period, adequate to reveal settlement, has passed. Make good any subsequent settlement of such fill.

.17 Pay costs to make good paving, lawns, curbs and any other surfaces damaged by settlement and subsequent restoration.

.18 Dispose of excess excavated material and leave the site clean.

4.4 Traffic Control

.1 Comply with requirements of Acts, Regulations and By-Laws in force for the regulation of traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment.

.2 When working on traveled way:

.1 Place equipment in positions to present minimum of interference and hazard to traveling public,

.2 Keep equipment units as close together as working conditions permit and preferably on same side of traveled way,

.3 Do not leave equipment on traveled way overnight.

.3 Do not close any lanes of road without approval of Authority.

.4 Before re-routing traffic erect suitable signs and devices.

.5 Keep traveled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.

4.5 Informational and Warning Devices

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from the Work that requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as required by the Provincial Standards.

.3 Place signs and other devices in acceptable locations.

.4 Meet with the Consultant prior to commencement of the Work to prepare a list of signs and other devices required. If the situation on site changes, revise the list, acceptable to the Consultant.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs frequently for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance,

.2 Relocating, removing or covering signs and other devices which do not apply to the prevailing conditions,

.3 Adding signs and other devices to suit the prevailing conditions.

4.6 Control of Public Traffic

.1 Provide flag persons, trained in accordance with, and properly equipped as specified in, MUTCD and Provincial Standards for Roadways and Public Works, in the following situations:

.1 When public traffic is required to pass working vehicles or equipment which block all or part of traveled roadway,

.2 When it is necessary to institute one-way traffic system through the construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use,

.3 When workmen or equipment are employed on traveled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning,

.4 Where temporary protection is required while other traffic control devices are being erected or taken down,

.5 For emergency protection when other traffic control devices are not available,

.6 In situations where it is deemed necessary for the protection of workmen, equipment and public traffic.

.2 Where a roadway, carrying two-way traffic, is restricted to one lane, for 24 h each day, provide a portable traffic signal system. Adjust, as necessary, and regularly maintain the system throughout the period of restriction. Signal system to meet requirements of Provincial Standards.

4.7 Restoration of Roads

.1 Restore roads in accordance with the requirements of the Provincial Standards for roadways and public works. Place and compact aggregate sub-base over duct banks and excavation.

.2 Do not place frozen material.

.3 Place material only on clean unfrozen surfaces, free from snow and ice.

.4 Shape each layer to smooth contour and compact to density of not less than 98% corrected maximum dry density.

.5 Place and compact asphalt material on base surface in a layer of uniform depth and width. Compact to achieve the required density.

END OF SECTION

HIGH VOLTAGE CABLES
26 05 13

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.2 Shop Drawings and Product Data

.1 Submit shop drawings and product data in accordance with Section 26 05 01 Electrical General Requirements.

1.3 References

.1 Latest edition of:

.1 CSA C68.5, Primary Shielded and Concentric Neutral Cables for Distribution Utilities,

.2 CSA C68.10, Shielded Power Cable for Commercial and Industrial Applications,

.3 IEEE 48 Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations.

1.4 Work Included

.1 Provide labour, materials, and equipment as required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

2 PRODUCTS

2.1 High Voltage cables

.1 Construct and test to the applicable standards for the system voltage specified.

2.2 Single Conductor Cables

.1 Type: TECK 90.

.2 Nominal Voltage rating: 15 kV.

.3 Conductor Material: Copper/or Aluminum.

.4 Stranding: Compact or compressed round.

.5 Conductor Shield: Semi-conducting extrusion.

.6 Insulation:

.1 90^{o}C rated,

.2 cross-linked polyethylene,

.3 tree retardant.

.7 Insulation Thickness: 100% of thickness required for rated voltage.

.8 Insulation Shield: Strippable semi-conducting extrusion.

.9 Metallic Insulation Shield: Concentric ground (neutral), bare copper

.10 Inner jacket:

.1 PVC,

.2 FT4 flame retardant,

.3 low temperature (-40°C) rated.

.11 Armour: interlocked aluminum.

.12 Outer Jacket:

.1 PVC

.2 FT4 fire retardant

.3 low temperature (-40°C) rated,

.4 sunlight (UV) resistant,

.13 Fault Current Withstand: maximum available Amps for 10 cycles without damage.

.14 Ground Fault Current Withstand: maximum available Amps for 10 cycles without damage.

2.3 Three Conductor Cables

.1 Type: TECK 90.

.2 Nominal Voltage rating: 15 kV.

.3 Conductor Material: Copper.

.4 Size: As shown on drawings.

.5 Stranding: Compact or compressed round.

.6 Conductor Shield: Semi-conducting extrusion.

.7 Insulation:

.1 90°C rated,

.2 cross-linked polyethylene,

.3 tree retardant.

.8 Insulation Thickness: 100% of thickness required for rated voltage.

.9 Insulation Shield: Strippable semi-conducting extrusion.

.10 Metallic Insulation Shield: overlapped copper tape

.11 Bonding (ground) conductor: Bare copper in contact with copper tape shields.

.12 Fillers: as required, non hygroscopic material.

.13 Binding tape: as required.

.14 Inner jacket:

.1 PVC,

.2 FT4 flame retardent ,

.3 low temperature (-40°C) rated.

.15 Armour: interlocked aluminum.

.16 Outer Jacket:

.1 PVC ,

.2 FT4 fire retardant,

.3 low temperature (-40°C) rated,

.4 sunlight (UV) resistant,

.17 Fault Current Withstand: maximum available Amps for 10 cycles without damage.

.18 Ground Fault Current Withstand: maximum available Amps for 10 cycles without damage.

2.4 Testing

.1 Manufacturer to test cables prior to shipping. Tests to include:

.1 manufacturer's standard quality control testing to verify cable construction parameters,

.2 insulation resistance,

.3 tests as called for in the applicable CSA standard.

2.5 Delivery

.1 Deliver cables on reels in a manner to suit the installation requirements of the Electrical Contractor.

Standard of Acceptance

- Aetna Insulated Wire
- General Cable
- Nexans
- Okonite Cables
- Prysmian
- Southwire
- United Wire and Cable

2.6 Terminations

.1 3M QT-III cold shrink packaged kits, constructed as per the cable manufacturer's recommendations.

.2 Moulded rubber cold shrink type:

.1 to IEEE Standard 48, Class 1,

.2 one piece construction,

.3 for both indoor and weather protected applications,

.4 exposed outer components UV protected for direct sunlight exposure,

.5 BIL of not less than 110kV,

.6 stress control sleeve with a dielectric constant > 15,

.7 insulator of track resistant silicone rubber with silicone top seal.

.3 Packaged kits to include all components necessary for the termination, including:

.1 instructions,

.2 cable preparation (cleaning) materials,

.3 ground braid assemblies,

.4 constant force spring(s),

.5 mastic strips,

.6 stress control sleeve,

.4 Fault current rating of the ground braids to match the rating of the cable.

Standard of Acceptance

- 3M

2.7 Cable Lugs

.1 Two hole long barrel compression type, Burndy YA-2N series.

2.8 FireProofing Tape

.1 Scotch 77 elastomeric, 75 mm (3") wide.

.2 Scotch 69 glass cloth electrical tape.

3 EXECUTION

3.1 Installation

.1 Install cables in accordance with the cable manufacturer's instructions.

.2 Determine cable lengths with care, using field measurements where possible so that wastage is kept to a minimum.

.3 Clean and test ducts prior to pulling cable into ducts, by pulling a steel wire brush through ducts followed by a steel bound mandrel made up of four discs having an overall length of not less than 200 mm (8"). Diameter of the discs to be not less than 6 mm (¼") less than the nominal inside duct diameter.

.4 Take necessary precautions in handling cable on reel as well as when installing in duct or tray, to ensure that no damage will result.

.5 Pull cables in accordance with best standard practices.

.6 Use a pulling eye attached directly to conductors that make up the cable, except for short runs provided that the Consultant is in agreement.

.7 Use CSA approved cable lubricants, suitable for the ambient temperature during the pull.

.8 While cable is being pulled, inspect jacket for any visible cracks or other damage. If any damage is evident, stop the cable pull immediately.

.9 Replace damaged cables. Do not attempt to repair damaged cables unless the Consultant has agreed in writing.

.10 Install service entrance and unarmoured cables in rigid steel conduit except where installed in concrete encased ductbanks.

.11 Where high voltage cables are shown on cable tray, maintain a separation of 25 mm (1") between adjacent cables.

.12 Provide waterproof and weatherproof connectors for attachment of cables to equipment enclosures where applicable.

.13 Install terminations in accordance with the instructions of the manufacturer of the cable and the manufacturer of the termination kits.

.14 Seal cable ends to prevent entrance of moisture.

.15 Do not splice cables. Where a splice is believed to be essential review with the consultant and if acceptable provide a 3M cold shrink inline splice kit that is compatible with and equivalent to the cable.

.16 Terminations and splices (where essential) to be made by personnel skilled in this type of work. Submit evidence of this prior to commencing the work.

.17 Do not make terminations or splices during damp or inclement weather, except in an emergency. In an emergency, provide a tent or other satisfactory means of protection.

.18 Ground shielding at each termination, unless instructed otherwise and verified.

.19 Bond armour to ground.

.20 Fireproof cables, in maintenance holes and vaults, using one half lapped layers of Scotch 77 fireproofing tape with an overall protective layer of Scotch 69 glass cloth tape.

.21 Installation of cable, terminations and splices (if allowed) to be made by a firm specializing in this type of work.

Standard of Acceptance
- Black & McDonald Ltd.
- Keldon Electrc
- Houle Electric
- Approved equal

3.2 Site Testing

.1 Test high voltage cable installation before placing into regular service.

.2 High voltage cable testing to be done by the Independent Testing Organization.

.3 Testing to include:

.1 phase verification,

.2 grounding verification,

.3 Hi-Pot Test of insulation strength to I.C.E.A. Specifications (Leakage Curves to be obtained),

.4 verification of proper installation of terminations, and torquing of cable lug bolts.

.4 Conduct these tests with the Consultant present as a witness and at a time suitable to the Consultant.

.5 Witnessing of a successful test is mandatory before ownership of cable will be accepted.

.6 Include cost of testing.

END OF SECTION

WIRES & CABLES 0-1000 VOLTS
26 05 19

1 GENERAL

1.1 Product Data

.1 Submit product data in accordance with Section 26 05 01 Electrical General Requirements.

2 PRODUCTS

2.1 Building Wires

.1 Conductors: size as indicated, copper up to and including #1 AWG and for fire rated cables, aluminum alloy for #1/0 AWG and larger, excluding fire rated cables.Minimum wire size: No. 12 AWG.

.2 Stranded conductors for 10 AWG and larger.

.3 Insulation:

.1 chemically cross-linked thermosetting polyethylene material,

.2 RW90 or RWU90 to CSA C22.2 No. 38,

.3 1000V and 600V ratings.

.4 Conductors to be colour coded. Conductors to have colour impregnated into insulation at time of manufacture. Phase conductors No. 8 AWG and larger, with black insulation, may be colour coded with adhesive colour coding tape.

Standard of Acceptance

- Aetna Insulated Wire
- General Cable
- Nexans Canada Inc.
- Prysmian Cables & Systems Ltd.
- Southwire
- Approved Alternate

2.2 Armoured Cables

.1 Type: AC90, 600V 90C to CSA C22.2 No 51, FT4 rated.

.2 Conductors: copper, minimum size #12 with bare copper #12 bonding wire.

.3 Insulation: RW90 XLPE.

.4 Armour: interlocking type fabricated from galvanized steel or aluminum strip.

2.3 Armoured Cables with Insulated Bonding Conductor

.1 Type: AC90 ISO-BX, 600V 90C to CSA C22.2 No 51, FT4 rated.

.2 Conductors: copper, minimum size #12, with green insulated #12 copper bonding wire.

.3 Insulation: RW90 XLPE.

.4 Armour: interlocking type fabricated from galvanized steel or aluminum strip.

2.4 Armoured Cables Teck

.1 Type: TECK90, 600V to CSA C22.2 No 131.

.2 Conductors: insulated copper for sizes up to #1 AWG, aluminum for sizes #1/0 and larger, quantity and size as indicated.

.3 Insulation: RW90 XLPE.

.4 Inner jacket; FT-4 rated PVC.

.5 Armour: interlocking steel for multiconductor cable, interlocking aluminum for single conductor cables.

.6 Bonding conductor:

.1 bare in multiconductor cables,

.2 bare concentric in single conductor cables,

.3 same material as phase conductors.

.7 Outer jacket: FT-4 rating with rating permanently identified on jacket.

.8 Connectors:

.1 Watertight,

.2 Equal to T&B Star Teck type,

.3 Non-magnetic connectors for single conductor cables.

Standard of Acceptance (armoured, aluminium sheathed and TECK cables)

- Aetna Insulated Wire
- General Cable
- Nexans Canada Inc.
- Northern Cables Inc.
- Prysmian Cables & Systems Ltd.
- Southwire
- Approved Alternate

2.5 Fire Rated Mineral Insulated Cable

.1 Type: MI, 600V to CSA C22.2 No 124.

.2 Conductors: solid annealed copper, quantity and size as indicated.

.3 Insulation: compacted magnesium oxide.

.4 Sheath: seamless annealed copper.

.5 Terminations: as supplied by the cable manufacturer.

.6 Polymer jacket on cables that are to be buried or embedded, or installed in environments corrosive to copper.

.7 Fire rating: listed 2 hour rating to ULC S139-12, cables labelled accordingly.

.8 Cables to be shipped with ends sealed.

Standard of Acceptance
- Pentair/Pyrotenax System 1850

2.6 Instrumentation and Control Cabling

.1 Control cables to CSA Standard CAN3-C2.1-M86 Control Cables - 600 Volts.

.2 Control cables as follows:

Conductors	Quantity, arrangement and gauge shown on drawings or specified elsewhere.
Identification	Colour coded or numbered.
Insulation	XLPE
Armour	Steel (No armour required if installed in conduit or approved wireway).
Jacket	FT4 Flame Retardant, FT6 when installed in open style cable trays in ceiling spaces that are used as return air plenums.

.3 Shielded cables to provide 100% shield coverage complete with drain wire.

.4 Multipair twisted shielded cables to have individually shielded pairs, overall shield, drain wires and overall rated jacket.

Standard of Acceptance
- General Cable (Carol)
- Belden
- Nexans Canada Inc.
- Approved Alternate

3 EXECUTION

3.1 General

.1 Conductor colour coding to be as follows:
- Phase A - Red
- Phase B - Black
- Phase C - Blue
- Neutral - White
- Ground - Green
- Control - Orange

.2 Where colour coding tape is utilized, apply at least 50 mm (2") at terminations, junction boxes and pull boxes. Do not paint conductors.

.3 Use:

.1 1000 V insulation for 600 Volt systems,

.2 600 V insulation for 347/600 V and 120/208 V systems.

.4 Wiring installed underground: RWU90.

.5 Wiring in channel back of luminaires:

.1 600 volt type GTF or TEW,

.2 temperature rating as required by CSA and/or manufacturer requirements.

.6 Store wire and cable in a clean, dry, well ventilated area.

.7 Protect white insulated wire from exposure to NOx gas (eg: exhaust from propane fuelled equipment) by wrapping with shrink wrap, by locating away from sources of NOx and by maintaining adequate ventilation to minimize NOx levels.

.8 Where white insulated wire has discoloured:

.1 do not install,

.2 dispose of the wire,

.3 remove and replace wire that has been installed.

.9 Neatly train circuit wiring in cabinets, panels, pullboxes and junction boxes and hold with nylon cable ties.

.10 Splice wires:

.1 Up to and including No. 6 AWG: with nylon insulated expandable spring type connectors with moulded thermoplastic body and expandable square edge design spring.

.2 Larger than #6 AWG: with compression sleeve connectors and heat shrink insulating sleeves, voltage rating of sleeves equal to or greater than the cable.

.3 Aluminum Conductors: with long barrel compression sleeve connectors approved for use with aluminum conductors and heat shrink insulating sleeves, voltage rating of sleeves equal to or greater than the cable.

.11 Do not splice conductors used in parallel runs.

.12 Where the Consultant agrees that splicing of conductors in a parallel run is unavoidable, connect the paralleled runs of the feeder together in a junction box at the splice location, using:

.1 Copper bus bars of quantity and size to match the circuit,

.2 A two hole long barrel compression lug on each cable,

.3 Two nuts and bolts on each lug,

.4 Two oversized flat washers and a spring lock washer, or two Belleville washers, on each bolt,

.5 An oversized CSA Type 3R enclosure to house the above.

3.2 Installation of Building Wires

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 33.

.2 In wireways and auxiliary gutters in accordance with Section 26 05 37.

.2 Home runs, of 15 and 20 Ampere circuits to lighting and receptacle panels, which exceed:

.1 25 m (75') in length: No. 10 AWG or larger,

.2 40 m (120') in length: No. 8 AWG or larger,

.3 60 m (180') in length: No. 6 AWG or larger.

.3 Increase the size of branch circuit conductors and home runs as required so that the total voltage drop, from panelboards to loads, does not exceed 3% under load.

.4 For branch circuit wiring provide a dedicated neutral conductor for each phase conductor

.5 Provide UPS distribution network feeders and branch circuiting with double neutral(s) capacity.

.6 Provide feeders and branch circuiting with double neutral(s) capacity for loads in the following areas:

.1 Campus Communication Hub (CCH)

.2 Entrance Facility

.3 Telecommunication Rooms

.7 Where wires are damaged or contaminated during installation, remove and dispose of wires, swab out conduits and pull in new, clean conductors.

3.3 Installation of Armoured Cables AC90 (BX)

.1 May be used for drops to surface and recessed mounted luminaires.

.2 May be used for wiring concealed within walls provided that horizontal runs within the ceiling space do not exceed 3m.

.3 Do not use in patient care areas.

.4 Terminate cables in accordance with Section 26 27 28 - Wire and Box Connectors - 0 - 1000 V.

3.4 Installation of Armoured Cables AC90 ISO-BX

.1 May be used for drops to surface and recessed mounted luminaires in patient care areas.

.2 May be used for wiring to outlets, receptacles and light switches in patient care areas, provided that the wiring is concealed within walls and that horizontal runs within the ceiling space do not exceed 3m.

.3 May be used for wiring to isolated ground receptacles, provided that the wiring is concealed within walls and that horizontal runs within the ceiling space do not exceed 3m.

.4 Terminate cables in accordance with Section 26 27 28 - Wire and Box Connectors - 0 - 1000 V.

3.5 Installation of Teck Armoured Cables

.1 Install and terminate cables in accordance with manufacturer's recommendations.

.2 Use non-magnetic connectors for single conductor cables.

.3 In systems that serve patient care loads, use only cables with copper ground conductors.

.4 For single conductor cables in circuits rated up to and including 400Amperes:

.1 Space cables one cable diameter apart throughout the run,

.2 Cut an opening in the enclosure at each end of the run, opening to be large enough for all cables of the circuit to pass through with spacings maintained,

.3 Provide a 6mm thick aluminium termination plate at each end of the run,

.4 Size the termination plates to overlap the openings by at least 20mm on all sides,

.5 Seal the plates to the enclosures with silicone sealant and secure to the enclosures with nuts, bolts and lock washers every 150mm,

.6 Terminate all cables of the circuit on the same terminal plate,

.7 Connect the cable bonding conductors to the enclosure bonding lug or bus at each end of the run,

.8 Bond each aluminium termination plate to its associated enclosure.

.5 For single conductor cables in circuits rated greater than 400Amperes:

.1 Space cables one cable diameter apart throughout the run,

.2 Cut an opening in the enclosure at each end of the run, opening to be large enough for all cables of the circuit to pass through with spacings maintained,

.3 At the supply end of the run:

(a) Provide a 6mm thick aluminium termination plate,
(b) Size the termination plate to overlap the opening by at least 20mm on all sides,
(c) Seal the plate to the enclosure with silicone sealant and secure to the enclosure with nuts, bolts and lock washers every 150mm,
(d) Terminate all cables of the circuit on the terminal plate,
(e) Connect the cable bonding conductors to the enclosure bonding lug or bus,
(f) Bond the aluminium termination plate to the enclosure.

.4 At the load end of the run:

(a) Provide a 6mm thick non-conductive fire-resistant FRP (Glastic) termination panel,
(b) Size the termination panel to overlap the opening by at least 20mm on all sides,
(c) Seal the panel to the enclosure with silicone sealant and secure to the enclosure with nuts, bolts and lock washers every 150mm,
(d) Terminate all cables of the circuit on the terminal panel,
(e) Cut off the cable bonding conductors at the connector and cover with insulating tape, ensure that the cable bonding conductors do not make any electrical contact.
(f) Ensure that the cable connectors do not make electrical contact with the enclosure.

.5 Install a separate bonding conductor for the circuit:

(a) Copper,
(b) Sized per the Electrical Safety Code,
(c) Run from the bonding lug or bus in the supply end enclosure to the bonding lug or bus in the load end enclosure,
(d) Separated from the phase cables throughout the run, by a distance of not less than the spacing between the phase cables,
(e) Securely fastened throughout the run.

.6 For single conductor cables in direct buried circuits:

.1 Space cables apart per Diagram B4-1 of the electrical code,

.2 Maintain cable spacing throughout the run,

.3 Cut an opening in the enclosure at each end of the run, opening to be large enough for all cables of the circuit to pass through with spacings of not less than one cable diameter,

.4 At the supply end of the run:

(a) Provide a 6mm thick aluminium termination plate,
(b) Size the termination plate to overlap the opening by at least 20mm on all sides,
(c) Seal the plate to the enclosure with silicone sealant and secure to the enclosure with nuts, bolts and lock washers every 150mm,
(d) Terminate all cables of the circuit on the terminal plate,
(e) Connect the cable bonding conductors to the enclosure bonding lug or bus,
(f) Bond the aluminium termination plate to the enclosure.

.5 At the load end of the run:

(a) Provide a 6mm thick non-conductive fire-resistant FRP (Glastic) termination panel,
(b) Size the termination panel to overlap the opening by at least 20mm on all sides,
(c) Seal the panel to the enclosure with silicone sealant and secure to the enclosure with nuts, bolts and lock washers every 150mm,
(d) Terminate all cables of the circuit on the terminal panel,
(e) Cut off the cable bonding conductors at the connector and cover with insulating tape, ensure that the cable bonding conductors do not make any electrical contact,
(f) Ensure that the cable connectors do not make electrical contact with the enclosure.

.6 Install a separate bonding conductor for the circuit:

(a) Insulated RWU90 copper,
(b) Sized per the Electrical Safety Code,
(c) Run from the bonding lug or bus in the supply end enclosure to the bonding lug or bus in the load end enclosure,
(d) Separated from the phase cables throughout the run, by a distance of not less than the spacing between the phase cables.

3.6 Installation of Mineral Insulated Cables

.1 Provide fire rated mineral insulated cables unless non-fire rated cables are indicated.

.2 Store cables under dry conditions.

.3 Handle cables with care to avoid cable kinks; it is recommended that cable be uncoiled from supply reel by rolling. Do not install kinked cables.

.4 Install and terminate cables in accordance with the manufacturer's recommendations.

.5 Install fire rated cables in accordance with ULC S139-12 and in accordance with the manufacturer's recommendations.

.6 Install cables in trays, on hangers or on channels secured to walls, beams or floor slabs, using clamps supplied by or recommended by the manufacturer.

.7 Support cables with clamps, straps, clips of:

.1 Copper,

.2 Stainless steel,

.3 Steel material.

.8 Secure cables so that they cannot contact any dissimilar metals other than the approved supporting materials.

.9 In damp or wet areas wrap cables with electrical tape where the cable contacts the supporting materials unless the supporting materials are copper or stainless steel. For non-fire rated cables only, clamps with integral rubber insets may be used in lieu of tape.

.10 Support fire rated cables:

.1 directly from fire rated structure per ULC FHITC.1850 or, where ULC FHITC.1850 cannot be applied, support cables in accordance with written instructions from the Consultant,

.2 on centres not exceeding:

(a) 1219 mm (4') for cables less than or equal to 7.6mm (0.3") in diameter,
(b) 1828 mm (6') for cables greater than 7.6mm (0.3") in diameter,

.3 with stainless steel clamps or straps on cable groups midway between supports, for single conductor cables.

.11 For non-fire rated cables provide supports on centres not exceeding 2000mm (6.56').

.12 Bend cables using a suitable hickey with a bending radius of not less than six times the cable diameter.

.13 Protect embedded cables from punctures and mechanical damage.

.14 For unjacketed single conductor cables that form a circuit or form one run of a feeder with parallel runs, install the cables with their sheaths in contact with one another throughout their length, excluding 1m at each point of connection to equipment or box.

.15 For single conductor cables in circuits rated 200 A and higher:

.1 Cut an opening in the enclosure at each end of the run, opening to be large enough for all cables of the circuit to pass through with spacings maintained,

.2 Provide a 6mm thick brass termination plate at each end of the run,

.3 Size the termination plates to overlap the openings by at least 20mm on all sides,

.4 Seal the plates to the enclosures with silicone sealant and secure to the enclosures with nuts, bolts and lock washers every 150mm,

.5 Terminate all cables of the circuit on the same termination plate,

.6 Provide a copper bonding conductor, sized per Table 16 of the electrical code, from each brass termination plate to the equipment ground lug or bus in the associated enclosure,

.7 Connect to the termination plate and to the equipment ground lug or bus using Burndy YA compression connectors with 12mm stainless steel bolts and matching hardware.

.16 For parallel runs, install cable groups at least 2.15 cable diameters apart.

.17 Terminate cables using glands and seals as supplied by the cable manufacturer. Install gland and seal assemblies using tools specifically designed for the purpose.

.18 Upon completion of cable terminations and prior to energization, test the insulation resistance of each cable with an insulation tester. Where measured values are not acceptable to the Consultant, rework or replace the cable until satisfactory results are obtained.

.19 For fire rated cables, provide the services of the cable manufacturer to inspect the cable installation and termination methods and provide a written report documenting that the cables have been installed in accordance with the requirements of the ULC standard and the ULC listing and in accordance with the manufacturer's recommendations. Submit the report to the Consultant.

3.7 Installation of Instrumentation, Communication and Control Cabling

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 33.

.2 In wireways and auxiliary gutters in accordance with Section 26 05 37.

.3 In open style cable trays in ceiling spaces, using FT6 plenum rated cable assemblies.

.4 In open style cable trays in ceiling spaces, using FT6 or FT4 rated cable where the ceiling space is not used as a return air plenum, as directed by the Consultant.

.2 Neatly train circuit wiring in cabinets, panels, pullboxes and junction boxes and hold with nylon cable ties.

.3 Run instrumentation, communication and control cabling point to point and terminate on terminal strips. Do not splice communication or control cabling. Where long runs make a continuous point to point installation impractical, make splices on labelled terminal blocks in an accessible labelled terminal cabinet, installed at 1200 mm (48") above floor, and indicate cabinet location, terminal and wire numbers on the As-built drawings.

.4 Terminate control cables in equipment with suitable connectors.

.5 Clearly identify cables at both ends, with permanent PVC wire markers, Weiland type Z or equal, indicating cable number and wire numbers.

END OF SECTION

GROUNDING AND BONDING PRIMARY
26 05 26

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

.1 26 01 01, Electrical General Requirements.

.2 26 05 01, Basic Materials and Methods.

.3 26 05 53, Identification for Electrical Systems.

1.3 References

.1 ANSI/IEEE 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 ANSI/IEEE 80, IEEE Guide for Safety in AC Substation Grounding.

1.4 Submittals

.1 Submit shop drawings and product data in accordance with Section 26 01 01 Electrical General Requirements.

1.5 Applicable Codes and Standards

.1 Latest edition of CSA C22.2 No 41 Grounding and Bonding Equipment.

1.6 Work Included

.1 Provide labour, materials, and equipment as required for installation, testing and putting into proper operation complete systems as shown, as specified and as otherwise required.

1.7 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 01 01 Electrical General Requirements.

2 PRODUCTS

2.1 Clamps:

.1 conductor to water main clamps suitable for grounding connections,

.2 type and size as required to make electrically conductive connections to underground water pipe,

.3 non-corroding copper, bronze and/or stainless steel construction.

2.2 Connections

.1 For:

.1 conductor to conductor,

.2 conductor to rod electrode,

.3 conductor to perimeter ground bus,

.4 conductor to structural column.

.2 Compression connectors:

.1 made from wrought copper.

Standard of Acceptance:
- Burndy Hyground series
- Approved alternative

.3 Exothermic welded connections:

Standard of Acceptance:
- Thomas & Betts - Furseweld
- Erico -Cadweld
- Burndy - BURNDYWeld

2.3 Electrodes

.1 Rod electrodes:

.1 material: steel with a bonded copper cladding not less than 254 µm (10 mils) thick or stainless steel,

.2 size: 19 mm dia by 3 m long (¾" dia by 10' long),

.3 CSA labelled to C22.2 No 41.

2.4 Conductors

.1 Buried grounding conductors:

.1 bare, stranded, tinned, soft annealed copper,

.2 size 4/0 AWG except where indicated otherwise.

.2 Exposed grounding conductors:

.1 bare, stranded, tinned, soft annealed copper,

.2 size #4/0 AWG except where indicated otherwise.

.3 Insulated bonding conductors:

.1 stranded, soft annealed copper,

.2 green insulation, type RW90,

.3 size #4/0 AWG except where indicated otherwise.

2.5 Accessories

.1 Accessories including but not limited to:

.1 grounding and bonding bushings,

.2 protective type clamps,

.3 bolted type conductor connectors,

.4 exothermic welded type conductor connectors,

.5 bonding jumpers, straps,

.6 pressure wire connectors,

to be of non-corroding copper, bronze and/or stainless steel construction.

.2 Ground rod inspection boxes:

.1 cylindrical with removable lid to provide access to ground rod connections,

.2 250 mm diameter x 300 mm deep (10” diameter x 12” deep),

.3 hot dipped galvanized steel.

Standard of Acceptance
- Thomas & Betts #51629
- Approved alternative

2.6 Perimeter Ground Bus

.1 Bus:

.1 6 mm x 50 mm (¼” x 2") copper,

.2 mounted 150 mm (6") above floor,

.3 mounted on insulating spacers, 600 mm (24") on centre.

.2 Mounting spacers:

.1 stand off insulators to UL 891,

.2 25 to 32 mm high waterproof glass fibre reinforced polyamide,

.3 750V insulated,

.4 UL 94VO self extinguishing,

.5 zinc plated threaded steel inserts.

Standard of Acceptance
- Erico ISO I series c/w insulator mounting kits
- Approved alternative

3 EXECUTION

3.1 Grounding Installation

.1 Install continuous grounding system including, electrodes, conductors, connectors and accessories in accordance with the electrical code, ANSI/IEEE Standards 80 and 142, and requirements of local authority having jurisdiction.

.2 Use not less than No. 4/0 AWG bare conductors for ground grid, electrode interconnections, transformers, switchgear, ground grid to perimeter ground bus connections.

.3 Use not less than No. 2/0 AWG bare conductors for lightning arrestors, metal structures, motors, perimeter ground bus to equipment connections.

.4 Use not less than No. 4 AWG insulated conductors for bonding cable sheaths, raceways, pipe work, screen guards, potential transformers.

.5 Install connectors in accordance with manufacturer's instructions.

.6 Protect exposed grounding and bonding conductors from mechanical injury.

.7 Make buried connections, and connections to electrodes, structural steel work, conductive water main in accordance with ANSI/IEEE 837, using permanent mechanical connectors or exothermic welded connections.

.8 Provide removable connectors for connections to the following:

.1 metallic water mains,

.2 line neutral conductor.

.9 Use mechanical connectors for connections to equipment provided with lugs.

.10 Use tinned copper conductors for buried installations.

.11 Use tinned copper conductors where the conductors are in contact with zinc coated or aluminium structures.

.12 Provide inspection boxes at connections to ground rods to provide access to the ground grid for testing purposes and to check the condition of the connections.

3.2 Electrode Installation

.1 Install at least four ground rod electrodes around each transformer and each switchgear location.

.2 Connect separate, multiple electrodes together.

.3 Where rock or sand terrain prevails, provide:

.1 additional electrodes,

.2 deep electrodes,

.3 soil enhancement,

.4 satellite electrodes, etc.,

as required until acceptable resistance value to ground is obtained.

3.3 System Grounding

.1 Coordinate requirements with City of New Westminister for incoming line neutral conductor grounding. For incoming line neutral conductors that require grounding, use bare copper with an ampacity not less than that of the neutral conductor.

.2 For high resistance grounded systems, install grounding resistor in the circuit between the secondary neutral terminals of transformers and ground and connect with not less than #4/0 bare copper.

.3 Do not ground the neutral terminals of autotransformers unless specifically shown.

.4 Install grounding conductors in PVC conduit.

3.4 Equipment Bonding

.1 Bond the following to the main ground grid:

.1 metallic raceways,

.2 switchboard enclosures and ground busses,

.3 potential transformers,

.4 meter and relay cases,

.5 pothead bodies,

.6 transformer enclosures,

.7 frames of gang-operated switches,

.8 switch and fuse bases,

.9 outdoor lighting,

.10 any other conductive items.

.2 Bond hinged doors to main frame of electrical equipment enclosure with flexible jumpers.

3.5 Cable Sheath Bonding

.1 Bond single conductor, metallic sheathed cables together at one end only. Break sheath continuity by inserting insulating sleeves in cables.

.2 Use not less than No. 4 AWG flexible copper wire secured to cable sheath in accordance with the cable manufacturer's instructions.

.3 Connect sheaths to ground with not less than No. 2/0 AWG copper conductor.

3.6 Miscellaneous Bonding

.1 Bond the following to the main ground grid:

.1 metallic piping (water, oil, air, etc) inside station at several locations, including at each service location within station,

.2 metallic water main, at the entry and exit points of the ground grid and every 12m (39'),

.3 any exposed building metal, within or forming part of a station enclosure.

3.7 Field Quality Control

.1 Perform tests in accordance with Section 26 01 01 - Electrical General Requirements and Section 26 08 05 - System Co-ordination, Verification and Testing.

.2 Verify completed installation as follows:

.1 Dynamic ground resistance measurements at the high voltage substation using the drop of potential method.

.2 Dynamic bonding verification of the switchgear, power transformers, substation enclosure, and associated apparatus using 60 Hz AC excitation current method.

.3 Perform tests before energizing the electrical system.

END OF SECTION

GROUNDING AND BONDING SECONDARY
26 05 27

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

1.2 Related Sections

.1 26 01 01, Electrical General Requirements.

.2 26 05 01, Basic Materials and Methods.

.3 26 05 53, Identification for Electrical Systems.

1.3 References

.1 IEEE 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.

1.4 Submittals

.1 Submit shop drawings and product data in accordance with Section 26 01 01 Electrical General Requirements.

.2 Submit list of nameplates.

1.5 Applicable Codes and Standards

.1 Latest edition of CSA C22.2 No 41 Grounding and Bonding Equipment.

.2 Latest edition of CSA-Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.6 Work Included

.1 Provide labour, materials, and equipment as required for installation, testing and putting into proper operation complete systems as shown, as specified and as otherwise required.

1.7 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 01 01 Electrical General Requirements.

2 PRODUCTS

2.1 Clamps:

.1 conductor to water main clamps suitable for grounding connections,

.2 type and size as required to make electrically conductive connections to underground water pipe,

.3 non-corroding copper, bronze and/or stainless steel construction.

2.2 Electrodes

.1 Rod electrodes:

.1 material: steel with a bonded copper cladding not less than 254 µm (10 mils) thick,

.2 size: 19 mm dia by 3 m long (¾" dia by 10' long),

.3 CSA labelled to C22.2 No 41.

2.3 Conductors

.1 Buried grounding conductors:

.1 bare, stranded, tinned, soft annealed copper,

.2 size #4/0 AWG unless indicated otherwise.

.2 Insulated grounding and bonding conductors:

.1 bare, stranded, soft annealed copper,

.2 type RW90 green insulation.

2.4 Accessories

.1 Accessories including but not limited to:

.1 grounding and bonding bushings,

.2 protective type clamps,

.3 bolted type conductor connectors,

.4 exothermic welded type conductor connectors,

.5 bonding jumpers, straps,

.6 pressure wire connectors,

to be of non-corroding copper, bronze and/or stainless steel construction.

2.5 Perimeter Ground Bus

.1 Bus:

.1 6 mm x 50 mm (¼" x 2") copper,

.2 mounted 150 mm (6") above floor,

.3 mounted on insulated spacers 600 mm (24") on centre.

.2 Mounting spacers:

.1 stand off insulators to UL 891,

.2 25 to 32 mm high waterproof glass fibre reinforced polyamide,

.3 750V insulated,

.4 UL 94VO self extinguishing,

.5 bichromated zinc plated threaded steel inserts.

Standard of Acceptance

- Erico ISO I series c/w insulator mounting kits
- Approved equal

3 EXECUTION

3.1 Installation

.1 Ground electrical systems in accordance with the Electrical Safety Code and the latest edition of ANSI/IEEE Standard 142.

.2 Bond electrical equipment in accordance with the Electrical Safety Code and the latest edition of ANSI/IEEE Standard 142.

.3 Install connectors in accordance with manufacturer's instructions.

.4 Protect exposed grounding and bonding conductors from mechanical injury.

.5 Make buried connections, and connections to conductive water main and electrodes, using copper welding by exothermic process.

.6 Use mechanical connectors for grounding and bonding connections to equipment provided with lugs.

.7 Soldered joints not permitted.

.8 Provide a bonding wire for flexible conduit, connected at both ends to bonding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.9 Provide a separate bonding conductor in each conduit:

- .1 sized as per Table 16A of the ESC,
- .2 not less than #12 AWG copper,
- .3 with one bond conductor for every three line conductors.

.10 Bond building structural steel and metal siding to ground by welding copper to steel.

.11 Make grounding connections in radial configuration only, with connections terminating at a single grounding point. Avoid loop connections.

.12 Install grounding conductors outside electrical rooms and electrical closets in PVC conduit and conceal where possible. Where PVC conduit is not permitted use EMT and bond the EMT to the conductor at both ends.

3.2 Electrodes

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Provide a 4/0 AWG copper water meter shunt.

.3 Install rod electrodes and make grounding connections.

.4 Bond grounding electrodes together with 4/0 AWG copper conductors.

.5 For main electrical rooms on grade, provide a rod electrode at each corner of the room and connect to perimeter ground bus.

.6 For main electrical rooms on a suspended slab, provide:

.1 two runs of 4/0 AWG copper conductor,

.2 connect runs to opposite corners of the perimeter ground bus,

.3 install in PVC conduit,

.4 run via separate routes,

.5 connect to opposite corners of the building ground grid.

.7 Where high resistivity soil conditions exist such as rock or sand, provide:

.1 additional electrodes,

.2 deeper electrodes,

.3 soil enhancement material or,

.4 chemically filled grounding rods,

as required to achieve an acceptable resistance to ground value.

3.3 System Grounding

.1 Provide system grounding connections to neutral point of secondary systems using not less than #6 copper conductor unless indicated otherwise.

.2 Install insulated copper grounding conductor for service raceways and service equipment as required by the electric utility company.

.3 Install grounding conductors in PVC conduit.

3.4 Equipment Bonding

.1 Install insulated copper bonding connections:

.1 sized not less than #12 AWG and not less than indicated in Tables 16A and 16B of the electrical code,

.2 to typical equipment including, but not necessarily limited to the following list:

(a) service equipment,
(b) transformers,
(c) switchboards,
(d) panelboards,
(e) splitters,
(f) disconnect switches,
(g) junction and outlet boxes,
(h) receptacles,
(i) luminaires,
(j) transfer switches,
(k) UPS systems,
(l) battery enclosures,
(m) capacitor banks,
(n) frames of motors,
(o) frames of generators (alternators),
(p) motor control centres,
(q) starters,
(r) fire alarm systems,
(s) security systems,
(t) CCTV systems,
(u) audio systems,

(v) communications systems,
(w) control panels,
(x) outdoor lighting,
(y) elevators,
(z) other equipment that is supplied with electrical power.

.2 Where applicable, run bonding conductors as part of the feeder.

.3 Where bonding conductors are run separately, install in PVC conduit.

3.5 Communications Systems

.1 Install bonding connections for telephone, sound, fire alarm, intercommunication systems as follows:

.1 telephones: make telephone bonding system in accordance with telephone company's requirements,

.2 communications system bonding: in accordance with the latest revision of ANSI/EIA/TIA 607, 568, 569 standards,

.3 sound, fire alarm, intercommunication systems: as required by the electrical code except where indicated otherwise.

3.6 Bonding of Other Items

.1 Install insulated copper bonding connections:

.1 sized not less than #6 AWG,

.2 run in PVC conduit,

.3 to typical items including, but not necessarily limited to following list:

(a) metallic water piping systems,
(b) metallic waste water piping systems,
(c) metallic gas piping systems,
(d) metallic vacuum piping systems,
(e) metallic compressed air piping systems,
(f) building steel work.

.2 Review the design and installation of each piping system with the system installer and provide bonding jumpers where necessary to ensure that each piping system is electrically continuous.

3.7 Perimeter Ground Bus

.1 Provide exposed perimeter ground bus in main electrical rooms and generator rooms.

.2 Wall mount on stand off insulated spacers using zinc plated steel studs, washers, lock washers and nuts.

.3 Connect exposed metal work in electrical rooms and generator rooms to perimeter ground bus with insulated stranded copper bonding conductors in PVC conduit, sized in accordance with Tables 16A and 16B of the electrical code but not less than 2/0 AWG copper, except where indicated otherwise.

.4 For switchgear lineups of four sections or more, provide at least two bonding conductors to the perimeter ground bus, one bonding conductor located at each end of the lineup.

.5 Protect ground bus with one coat of insulating varnish.

3.8 Field Quality Control

.1 Perform tests in accordance with:

.1 Section 26 01 01 - Electrical General Requirements.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction.

.3 Perform tests before energizing electrical system.

END OF SECTION

INSTALLATION OF CABLES IN DUCTS
26 05 38

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.2 Related Work

.1 Excavation and backfilling: Section 26 05 05 - Excavating, Trenching and Backfilling.

1.3 Work Included

.1 Provide labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

2 PRODUCTS

2.1 Cable Protection

.1 50mm (2”) thick poured concrete.

3 EXECUTION

3.1 Cable Installation in Ducts

.1 Install cables in accordance with the manufacturer’s instructions.

.2 Examine duct routing and ensure that duct size, radius of bends and maintenance hole sizing is compatible with cable manufacturer’s recommendations.

.3 Calculate pulling tensions and sidewall pressures and confirm that they do not exceed the manufacturer’s recommendations.

.4 Install cables as indicated in ducts.

.5 Use CSA approved lubricants of type compatible with cable jacket to minimize pulling tension.

.6 Monitor cable pulling tension and stop the pull if the tension exceeds the allowable limit.

.7 Do not pull spliced cables inside ducts.

.8 Install multiple cables in duct simultaneously.

.9 To facilitate matching of colour coded multiconductor control cables, reel off in same direction during installation.

.10 After installation of cables, seal duct ends with duct sealing compound.

3.2 Field Quality Control

.1 Perform tests in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Perform tests using qualified personnel.

.3 Provide instruments and equipment as required to conduct testing.

.4 Check phase rotation and identify each phase conductor of each feeder.

.5 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.6 Pre-acceptance tests.

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

.2 Check insulation resistance after each splice or termination to ensure that cable system is ready for acceptance testing.

.7 Acceptance Tests

.1 Disconnect terminations and accessory equipment.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 Leakage Current Testing;

(a) Raise voltage in steps from zero to maximum values as specified by ICEA for type of cable being tested,
(b) Hold maximum voltage for time period as specified by ICEA,
(c) Record leakage current at each step.

.8 Provide Consultant with list of test results showing location at which each test was made, circuit tested and results of each test.

.9 Remove and replace entire length of cable if cable fails to meet any of the test criteria.

END OF SECTION

CONCRETE ENCASED DUCT BANKS
26 05 43

1 GENERAL

1.1 Related Work

.1 Excavation and backfilling: Section 26 05 05 - Excavation and Backfill

1.2 General Requirements

.1 Conform to Section 26 05 01, Electrical General Requirements.

1.3 Shop Drawings

.1 Drawings to include listing and/or details of duct bank components.

1.4 Applicable Standard

.1 Latest version of CSA Standard C22.2 No. 211.1 Rigid Types EB1 and DB2/ES2 PVC Conduit.

1.5 Work Included

.1 Provide labour, materials, and equipment required for forming, construction, installation, testing and putting into proper operation complete duct bank installations as shown, as specified and as otherwise required.

1.6 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 PVC Ducts

.1 PVC ducts, type EB1 or DB2.

.2 100 mm (4”) nominal diameter except where noted otherwise.

2.2 PVC Duct Fittings

.1 Rigid PVC opaque solvent welded type fittings:

.1 couplings,

.2 5E angle couplings,

.3 Large radius elbows, 22.5E, 45E and 90E,

.4 bell end fittings,

.5 plugs,

.6 caps,

.7 conduit adaptors.

2.3 Duct Spacers

.1 Interlocking both horizontally and vertically.

.2 High density polyethylene.

.3 Base spacers with feet to provide stable support from the trench base.

.4 Intermediate spacers to fit between rows of ducts.

.5 Sized to maintain 190 mm center to center spacing of the ducts both horizontally and vertically.

2.4 Concrete and Reinforcing

.1 Portland cement: to CAN/CSA A3000 Type 10 .

.2 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.

.3 Minimum 28 day concrete compressive strengths and exposure classifications:32 MPa; C-2.

.4 Nominal size of coarse aggregate: Clause14 of CAN/CSA-A23.1 .

.5 Slump: to Table 6 of CAN/CSA-A23.1 .

.6 Air content: concrete to contain purposely entrained air in accordance with Table10 of CAN/CSA-A23.1.

.7 Admixtures: to Clause 6 of CAN/CSA-A23.1.

.8 Cure and protect concrete in accordance with CAN/CSA-A23.1.

2.5 Cable Pulling Equipment

.1 Pull Rope:

.1 Not less than 6 mm (¼") stranded nylon or polypropylene,

.2 Tensile strength not less than 5 kN.

3 EXECUTION

3.1 Installation

.1 Install underground duct banks including formwork.

.2 Provide concrete work.

.3 Protect existing cables and equipment when breaking into existing maintenance holes.

.4 Top of concrete encased duct banks to be not less than:

.1 1000mm below grade.

.5 Bottom of concrete to lie below frost line.

.6 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm (6") thick, compacted to not less than 95% of Proctor maximum dry density.

.7 Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are equal to factory-made ends.

.8 Clean ducts before laying.

.9 Install ducts with:

.1 configuration and reinforcing as indicated,

.2 a slope of not less than 1 in 400,

.3 slope away from the building,

.4 slope towards maintenance holes equipped with drainage,

.5 base spacers supporting the bottom row,

.6 intermediate spacers supporting rows other than the bottom row,

.7 watertight solvent welded joints,

.8 joints staggered at least 150mm (6”),

.9 manufactured curved segments for sweep bends,

.10 bell ends at duct terminations in maintenance holes and buildings,

.11 conduit to duct adapters when connecting to conduits,

.12 no duct encircled with a ferrous material,

.13 no ferrous material placed between ducts.

.10 For large radius bends use equal straight segments joined together with 5^{o} couplings.

.11 For offsets do not exceed the duct manufacturer’s maximum recommended offset.

.12 Install reinforcing:

.1 in the concrete below the first row of ducts,

.2 located between ducts,

.3 spaced approximately 190 mm apart,

.4 overlapped by not less than 300mm (1’) and wired together,

.5 supported by the duct spacers,

.6 with additional support as required to ensure that the reinforcing remains properly positioned during and after the pour,

.7 with not less than 38 mm (1.5”) of concrete cover.

.13 Where run rises through a floor slab or above grade, provide:

.1 galvanized rigid steel conduit elbows,

.2 threaded steel-to-PVC adapters at joint between conduits and ducts,

.3 concrete encasement extended 100 mm (4") above slab or grade,

.4 galvanized rigid steel conduit for sections extending above finished grade.

.14 When dead ending for future extension, terminate duct runs with duct coupling set flush with the end of concrete envelope. Overnight, when Work is temporarily suspended, during construction and after installation, protect ducts from entrance of water or other foreign matter with adequate and complete capping.

.15 When connecting duct bank to maintenance hole or building:

.1 Encircle each duct and the perimeter of the wall opening with an expanding cement water stop material (WATERSTOP-RX or equivalent).

.2 Fill the wall openings around the ducts with hydraulic cement injected for the full width of the wall.

.3 Seal the exterior of the wall around the ducts with a waterproof coating. Waterproof coating to be compatible with any existing waterproofing. Coordinate waterproofing with Architect.

.4 Where the span over disturbed soil does not exceed 1 m (3');

(a) drill four holes into the structure to align with the four corners of the duct bank,
(b) install a 15M dowel into each hole and secure with two part epoxy,
(c) install four 3 m (10') lengths of 15M reinforcing rods in the duct bank, one in each corner,
(d) support reinforcing rods from the duct spacers,
(e) wire the rods to the 15M dowels.

.5 Where the span over disturbed soil exceeds 1 m (3') but does not exceed 2m (6.5'), in addition to the requirements above, provide a 150 mm (6") thick reinforced concrete pad under the duct bank:

(a) drill four holes into the structure to align with the centerline of the pad,
(b) install a 15M dowel into each hole and secure with two part epoxy,
(c) install four 15M reinforcing rods along the length of the pad, located in the centre of the pad and equally spaced across the width of the pad,
(d) wire the rods to the 15M dowels,
(e) extend pad to obtain bearing length of not less than 600 mm (2 ft) on undisturbed ground.

.6 Where the span over disturbed soil exceeds 2 m (6.5') but does not exceed 3m (10'), in addition to the requirements above, increase the thickness of the pad to 230 mm (9").

.16 Provide 120 mm^2 (No.4/0 AWG) copper bonding conductor within duct bank concrete encasement.

.17 Terminate bonding conductor on a ground bus:

.1 in each maintenance hole throughout duct bank system,

.2 to ground busses at origin and destination.

.18 Provide anchors, ties and trench jacks and secure ducts and reinforcing to prevent moving during placing of concrete.

.19 Place concrete down sides of duct bank, filling space under and around ducts.

.20 Rod concrete with flat bar between vertical rows and eliminate voids.

.21 Encase duct bank with 75 mm (3") thick concrete envelope.

.22 Provide a sample of concrete for testing.

.23 Remove weights or wood braces before concrete has set and fill voids.

.24 Immediately after placing concrete, pull through each duct a steel mandrel not less than 300 mm (12") long and of a diameter 6 mm (¼") less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Work carefully while concrete has not set, do not disturb or damage ducts.

.25 Allow concrete to attain 50% of its specified strength before backfilling.

.26 In each duct, install pull rope continuous throughout each duct run with 3 m (10') spare rope at each end.

.27 Cap unused ducts watertight.

.28 Identify each duct at both ends utilizing permanent markers in each maintenance hole and at each end of the duct bank.

3.2 Inspections

.1 Advise Consultant at least 7 calendar days prior to:

.1 placing of ducts,

.2 placement of concrete,

.3 clean-out.

.2 Provide a sample of concrete used in duct bank for testing purposes.

END OF SECTION

MAINTENANCE HOLES
26 05 49

1 GENERAL

1.1 Related Work

.1 A system of drainage for maintenance holes, including provision of floor drains with backwater valves, sump and connections to drainage system will be provided under Division 22. Ensure that floors of maintenance holes are properly sloped toward floor drains or sumps.

.2 Excavation and backfilling: Section 26 05 05 - Excavating, Trenching and Backfilling

2 PRODUCTS

2.1 Cast-in-place Maintenance Holes

.1 Concrete shall have minimum compressible strength of 32 MPa at twenty-eight (28) days and shall be reinforced with steel bars.

2.2 Concrete and Reinforcing

.1 Portland cement: to CAN/CSA-A5, Type 10.

.2 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.

.3 Minimum 28 day concrete compressive strengths and exposure classifications: 32 MPa; C-2.

.4 Nominal size of coarse aggregate: Clause 14 of CAN/CSA-A23.1.

.5 Slump: to Table 6 of CAN/CSA-A23.1.

.6 Air content: all concrete to contain purposely entrained air in accordance with Table10 of CAN/CSA-A23.1.

.7 Admixtures: to Clause 6 of CAN/CSA-A23.1 94.

.8 Cure and protect concrete in accordance with CAN/CSA-A23.1

2.3 Precast Maintenance Hand-holes

.1 Precast concrete maintenance holes and auxiliary sections fabricated in steel forms.

.2 Aggregates: to CAN3-A23.1.

.3 Cement: to CAN3-A5, Type based on geotechnical survey.

.4 Steel welded wire fabric mesh reinforcing: to CSA G30.5. Openings and critical areas trimmed with steel reinforcing bars: to CSA G30.12.

.5 Pulling inserts and bolts for racks integrally cast in concrete: to ANSI/ACI-347-78.

.6 Neoprene gasket seals between maintenance hole sections: to ASTM D1056-85.

2.4 Drainage

.1 Floor drain fittings in each maintenance hole consisting of floor drain, back water valve, trap and pipe connection to drainage system dry sump as shown.

.2 Storm sewer connection: cast iron service saddle consisting of oil resistant gasket, stainless steel clamp and oil resistant 0 ring.

.3 Sump pit: 300 mm x 300 mm x 125 mm (12" x 12" x 5").

2.5 Maintenance Hole Necks

.1 Concrete maintenance hole neck to bring cover flush with finished grade in paved areas and 40 mm (1e) above grade in unpaved areas.

.2 Build up neck with concrete brick and mortar to achieve above if necessary.

2.6 Maintenance Hole Frames and Covers

.1 Cast iron maintenance hole frames and covers.

.2 Bolted on covers to prevent unauthorized entry.

2.7 Grounding

.1 Ground rods: copper clad steel 19 mm dia by 3 m long (¾" dia x 10' long).

.2 Conductors: bare, stranded, soft annealed copper wire, size No 4/0 AWG and 2/0 AWG for ground bus, electrode interconnections, metal components and ground connections.

.3 Conductors: PVC insulated, coloured green, soft annealed copper wire, size No. 4 AWG for grounding cable sheaths.

.4 Compression connectors for conductor to conductor; conductor to rod electrode; conductor to structural column, conductor to equipment: to be tinned copper Burndy Hyground series.

.5 Compression connectors for conductor to ground bus to be tinned copper Burndy YA series with non corroding durium hardware.

.6 Accessories: non-corroding, necessary for complete grounding system, type, size, material as indicated or as required.

.7 Install a tinned copper ground bus, 6 mm x 50 mm x 600 mm (¼" x 2" x 24") in each maintenance hole. Install four 3000 mm (10') copper clad 19 mm (3/4") ground rods, one at each exterior corner of maintenance hole. Interconnect ground rods with a #4/0 copper loop and run 2-4/0 connections into maintenance hole to ground bus. Terminate with tinned copper compression connectors and durium hardware.

2.8 Cable Racks

.1 Hot dipped galvanized steel cable racks, hooks, and supports.

.1 cable rack 1400 mm (55") vertical length mounted on 600 mm (24") centres on all walls around inside perimeter, anchored to wall with four 13 mm x 100 mm (½" x 4") expansion bolts

.2 hook holes on rack 37 mm (1½") apart

.3 cable support hooks with slots for lock clips, 457 mm (18")

(a) install 4 support hooks on each rack

.2 Heavy Duty 12 gauge galvanized steel preset concrete inserts equal to Unistrut P3780 series for mounting of cable racks or trays. Provide continuous insert from 150 mm (6") below top to 150 mm (6") above bottom of maintenance hole, on 600 mm (24") centres on all walls around inside perimeter.

.1 Refer to Section 26 05 36 Cabletroughs for cable tray details

2.9 Cable Pulling Equipment

.1 Pulling iron made of galvanized steel rods, 15M minimum, or size and shape as indicated.

.2 6 mm (¼") stranded polypropylene pull rope tensile strength 5 kN continuous throughout each duct run with 3 m (10') spare rope at each end.

2.10 Precast Maintenance Hand-holes

.1 Precast concrete maintenance handholes fabricated of reinforced concrete.

.2 Aggregates: to CAN3-A23.1.

.3 Cement: to CAN/CSA-A5/A8/A362-93, Type 10.

.4 Steel welded wire fabric mesh reinforcing: to CSA G30.5. Openings and critical areas trimmed with steel reinforcing bars: to CSA G30.12.

.5 Cast iron access hole frames and covers.

.6 Bolted on covers to prevent unauthorized entry.

2.11 Precast Maintenance holes

.1 Precast concrete maintenance holes and auxiliary sections fabricated in steel forms.

.2 Aggregates: to CAN3-A23.1.

.3 Cement: to CAN3-A5, Type based on geotechnical survey.

.4 Steel welded wire fabric mesh reinforcing: to CSA G30.5. Openings and critical areas trimmed with steel reinforcing bars: to CSA G30.12.

.5 Pulling inserts and bolts for racks integrally cast in concrete: to ANSI/ACI-347-78.

.6 Neoprene gasket seals between maintenance hole sections: to ASTM D1056-85.

3 EXECUTION

3.1 Installation

.1 Provide complete concrete maintenance holes as shown and as specified.

.2 Verify exact location of maintenance holes. If it is necessary to move some of them within a short distance, this shall be done without additional expense to the Authority.

.3 Locate maintenance holes in paved areas, unless noted otherwise.

.4 Build cast-in-place maintenance holes.

.5 Install precast maintenance holes.

.6 Place concrete in two lifts with slab and sump in first, walls, roof and neck in second lift. Provide key in walls to slab. Place 100 mm x 6 mm (4" x ¼") PVC water bar vertically in key. Install ground rod before placing slab and place reinforcing steel, inserts for cable rack, pulling irons, drain, duct outlets, duct run dowels before casting walls. Make maintenance hole to duct connection as indicated.

.7 Provide 115 mm (4½") deep window to facilitate cable bends in wall at each duct connection. Terminate ducts in bell-end fitting flush with window face. Provide four 10M steel dowels at each duct run connection to anchor duct run.

.8 Alternately connect large duct runs by leaving a square opening in wall, later pouring duct run and wall opening in one pour, and install 10 m x 3 m (33' x 10') reinforcing rods in duct run at maintenance hole connection.

.9 Install maintenance hole frames and covers for each maintenance hole. Set frames in concrete grout onto the maintenance hole neck.

.10 Drain floor towards sump with 1 to 48 slope minimum and install drainage fittings as indicated.

.11 Install cable racks, anchor bolts and pulling irons as indicated.

.12 Grout frames of maintenance holes. Cement grout to consist of two parts sand and one part cement and sufficient water to form a plastic slurry.

.13 Ensure filling of voids in joint being sealed. Plaster with cement grout, walls, ceiling and neck.

.14 Spray paint an "X" on ceiling of maintenance hole above floor drain or sump pit.

END OF SECTION

IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 05 53

1 GENERAL REQUIREMENTS

1.1 Scope

.1 Provide identification and warning signs for complete electrical systems as shown, as specified, as intended, and as otherwise required.

1.2 Shop Drawings

.1 Submit list of nameplates with proposed wording, prior to engraving.

.2 Submit list of labels with proposed wording, prior to printing.

.3 Submit representative samples of nameplates, labels and warning signs.

2 PRODUCTS

2.1 Warning Signs

.1 As required to meet requirements of Electrical Safety Authority.

.2 Outdoor signs:

.1 fibreglass,

.2 minimum size 250 mm x 360 mm (10" x 14").

.3 Indoor signs;

.1 aluminum,

.2 baked enamel finish,

.3 minimum size 180 mm x 250 mm (7" x 10").

Standard of Acceptance

- Brady
- Seton

2.2 Equipment Identification

.1 Nameplates for panels and equipment:

.1 To be in accordance with Fraser Health Equipment Labelling Scheme.

.2 3 mm (⅛") thick laminated plastic plates,

.3 engraved lettering,

(a) first line: 11 mm (7/16”) high lettering,
(b) second line: 7mm (1/4”) high lettering,
(c) third line: 5mm (3/16”) high lettering,

.4 colour coded as per Fraser Health Equipment Labelling Scheme:

Power Source	Label Colour	Label Text Colour
Vital	Red	White

Delayed Vital	Blue	White
Conditional	Yellow	Black
Normal	Black	White
Uninterruptible Power	Gray	Black

.5 with bevelled edges,

.6 mechanically attached with self-tapping stainless steel screws.

.2 Labels for warnings, instructions etc on panels and equipment:

.1 printed on white polyester background,

.2 7 mm (¼") high letters unless specified otherwise,

.3 UV resistant inks,

.4 clear polyester over lamination,

.5 pressure sensitive adhesive.

Standard of Acceptance
- Brady
- Ideal Industries
- Safety Sign

.3 Do not commence manufacture of nameplates and labels until wording has been reviewed by the Authority.

2.3 Wiring Identification

.1 Colour coded phasing tapes:

.1 7 mil poly vinyl chloride,

.2 pressure sensitive adhesive,

.3 compatible with wire insulation,

.4 permanent colour,

.5 electrically insulating,

.6 UV and moisture resistant,

.7 to CSA C22.2 No. 197

Standard of Acceptance
- 3M Scotch 35
- Electro Tape Specialties 103/103C Series

.2 Wire markers:

.1 heat shrink, military grade polyolefin sleeves, permanent printed wire identification.

or

.2 adhesive self laminating, white vinyl print area, permanent thermal transfer printing.

Standard of Acceptance
- Brady
- Panduit

3 EXECUTION

3.1 Equipment Identification

.1 Identify electrical equipment with nameplates, directories and labels.

.2 Nameplates:

.1 secure to top exterior of equipment except where indicated otherwise,

.2 switchboards: indicate name, voltage and ampacity,

.3 rear of switchboard cubicles or cells: indicate name of cell or cubicle,

.4 panelboards: indicate name, voltage and source of power,

.5 terminal cabinets: indicate name, system and voltage,

.6 disconnects, starters and contactors: indicate equipment being controlled and voltage,

.7 transformers: indicate name, capacity, primary and secondary voltages,

.8 pull boxes and junction boxes: indicate system, circuit numbers and voltage,

.9 cabinets for low voltage systems, such as signals and communications: indicate name and system,

.10 equipment not listed above, such as, instruments, fire alarm, clock and program equipment and control panels: identify in a similar manner showing name and number of the equipment, voltage and load information.

.11 Typical identification standard:

(a) Lighting, Receptacle and Power Panels: each identified with an engraved lamicoid nameplate secured to top interior trim as follows:

0834-03V01	11 mm (7/16") high lettering
FED FROM	7 mm (1/4") high lettering
0833-01-2V01	5 mm (3/16") high lettering

.3 Directories:

.1 Supply each panelboard with a directory card holder welded to inside of door, complete with a neatly typewritten list showing information as follows:

Panelboard Name 0834-03V01	
Panel Voltage 120/208 Volts	
Circuit Number	Description
1	Lighting Room #34
2	Receptacles Room #34
3	Ice Machine Room #17

.2 Cabinets for low voltage systems, such as signals and communications: as for panelboards with a directory showing circuit numbers and room locations plus a blank column for "Remarks".

.3 Cover directory list with a 0.8mm (1/32") minimum thick clear plastic sheet to protect it.

.4 Pull Boxes and Junction Boxes

.1 Identify feeder pull boxes and junction boxes:

(a) lettering stamped on brass or aluminum tags,
(b) showing the name of the feeder or system,
(c) voltage involved,
(d) data for both termination points whether equipment or panel,
(e) secure tag under box lid screws using steel wire.

3.2 Service Rough-in Identification

.1 Apply a small dab of paint to inside of each outlet box, pull box and panel as it is installed, using colour code as follows:

Red	Fire Alarm System and Emergency Voice Communication System
Dark Blue	Intercom and Public Address
Dark Green	Telephone and Data Systems
Black	Annunciator and Buzzer System
Grey	Clock System
White	Central Dictation
Orange	Nurse Call
Yellow	Alarm Systems
Pink	Computer Systems
Light Green	TV Systems

.2 Junction boxes in furred ceilings to have colour identification on both inside and outside.

.3 As an alternative to applying paint dabs, prepainted conduit/EMT may be used where applicable.

.4 Colour coding is not required for lighting and power circuits.

3.3 Wiring Identification

.1 Identify feeders and branch circuit wiring with wire markers;

.1 at each end of run,

.2 in each junction box,

.3 wherever they are introduced into ducts or equipment.

.2 Identify incoming utility service lines by Red - Phase "A", Black - Phase "B", Blue - Phase "C", with colour coded phasing tape.

.3 Band buswork in each;

.1 switchboard,

.2 unit substation cubicle,

.3 power panel,

.4 lighting and receptacle panel,

with colour coded phasing tape as follows:

Red	Phase A
Black	Phase B
Blue	Phase C
White	Neutral
Green	Ground

.4 Band feeder and sub-feeder bus and conductors as above.

.5 Maintain phase sequence and colour coding throughout.

.6 Connections in equipment to be Phase A, B, C from left to right when viewing from front or accessible direction.

.7 For control conductors for motors and equipment, schedule and chart marker numbers with corresponding machine numbers and locations and include with Record Drawings and Operation and Maintenance Data.

.8 Use colour coded wires in communication cables, matched throughout system. Schedule and chart, marker numbers and wire colours with corresponding equipment and include with Record Drawings and Operation and Maintenance Data.

3.4 Conduit and Cable Identification

.1 Label;

.1 incoming service cables,

.2 bus ducts,

.3 feeder conduits/EMT,

.4 feeder cables,

.5 communications cables.

.2 Locate labels as follows;

.1 at every end of every conduit, duct or cable run, adjacent to item of equipment serviced,

.2 on each exposed conduit, duct or cable passing through a wall, partition or floor (one on each side of such wall, partition or floor),

.3 at intervals of not more than 15 m (50') along every exposed conduit, EMT, duct or cable run exceeding 23 m (75') in length,

.4 at every access point on concealed conduit, EMT, duct or cable runs,

.5 visible from 1.5 m (5') above adjacent floor or platform.

.3 Provide electrical pipe banding in accordance with Fraser Health Electrical Pipe Colours standard.

3.5 Fire Stopping Identification

.1 Provide a warning card adjacent to each opening exceeding 25mm (1") in diameter, indicating the following;

.1 a warning that the opening is protected by a fire stopping material,

.2 the fire stop system used, ULC or cUL,

.3 F rating or FT rating,

.4 specific fire stop product(s) used,

.5 name and telephone number of the contact person should any changes to the fire stopping be required.

.2 Provide warning labels for each fire stopped penetration as follows;

.1 permanently attached to walls, floors, underside of slabs, adjacent to the penetration,

.2 on each side of the penetration,

.3 vinyl panel, white and red background with black lettering,

.4 self adhesive with permanent pressure sensitive adhesive,

.5 stating:

WARNING
THROUGH PENETRATION FIRESTOP SYSTEM - DO NOT DISTURB
NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE

3.6 Single Line Electrical Diagrams

.1 Provide a single line schematic diagram in each Electrical room to illustrate every component including;

.1 main service,

.2 transformers,

.3 grounding,

.4 switchgear,

.5 unit substations,

.6 generators,

.7 circuit breakers,

.8 fuses,

.9 capacitor banks,

.10 surge protective devices,

.11 disconnect switches,

.12 transfer switches,

.13 panelboards,

.14 major items of equipment such as chillers,

.15 feeders,

.16 key interlocks,

.17 interlocking schemes,

.18 protective relays,

.19 metering,

.20 transformer winding arrangements,

.21 voltage levels, including number of phases and wires,

.22 equipment ratings such as: Amperes, kW, kVA, kVAR.

.2 Diagram:

.1 print of an AutoCAD drawing using the latest version of AutoCAD,

.2 not less than 600 mm x 600 mm (2' x 2'),

.3 in a wood frame,

.4 plexiglass covered.

.3 Submit diagram to Electrical Inspection Authority and incorporate all requirements indicated in their comments.

.4 Submit diagram as shop drawing for review.

.5 Provide an electronic version of the drawing file to the Authority for the Authorities future use.

3.7 Fire Alarm Diagrams

.1 Provide at the fire alarm control panel and annunciator;

.1 a fire alarm riser diagram,

.2 Diagrams:

.1 print of an AutoCAD drawing using the latest version of AutoCAD,

.2 not less than 600 mm x 600 mm (2' x 2'),

.3 in a wood frame,

.4 plexiglass covered.

END OF SECTION

ELECTRICAL ENERGY AND POWER MANAGEMENT SYSTEM
26 09 43

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

.3 All metering devices to be UL 508 listed.

.4 All metering devices to be CSA approved.

1.2 Applicable Standards

.1 The Power Monitoring and Control systems are to be in accordance with the applicable sections of the current revision of the following documents. Where a conflict arises between these documents and statements made herein, the statements in this specification to govern.

.1 UL 508

1.3 References

.1 General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition or revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

.2 All metering devices shall be UL 508 listed, CSA approved, and have CE marking.

.3 The system shall comply with the applicable portions of NEMA standards. In addition, the control unit shall comply with FCC emission standards specified in Part 15, Sub-Part J for Class A application.

.4 The Energy and Power Management System and components shall comply with codes and standards as applicable.

.5 ANSI C12.1

.6 ANSI C12.20

.7 IEC62052-11

.8 IEC62052-22

.9 IEC62052-23

.10 IEEE C.37-90.1

.11 IEC61000-4-2 (EN61000-4-2/IEC801-2)

.12 IEC61000-4-3 (EN61000-4-3/IEC801-3)

.13 IEC61000-4-4 (EN61000-4-4/IEC801-4)

.14 IEC61000-4-5 (EN61000-4-5/IEC801-5)

.15 IEC61000-4-6 (EN61000-4-6/IEC801-6)

.16 IEC61000-4-12 (EN61000-4-12/IEC801-12)

.17 IEEE C62.41

.18 ICES-003, Class B

1.4 Work Included

.1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as specified and as otherwise required.

1.5 Submittals

.1 Shop Drawings

.1 Include:

(a) All product catalog sheets
(b) All Technical data sheets specifying physical data and electrical performance, electrical characteristics, and connection requirements of each device.

.2 Provide one additional set of drawings shipped with the equipment for startup and maintenance use.

.2 Spare Parts List

.1 Complete spare parts list, including parts location diagrams or drawings to be included with the manufacturer's quotation.

.2 Supply a list of priced spare parts which manufacturer recommends to be on-hand during start-up and the first two year's operation.

.3 Installation, Operating, and Maintenance Instructions

.1 Provide installation, operating, and maintenance instructions to cover the equipment furnished.

1.6 Plant Assembly

.1 Low voltage components, except manual switches, shall be factory assembled and housed in a suitable enclosure.

.2 Provision shall be made to terminate incoming and outgoing wiring on identified screw-type terminals to which all internal wiring has been connected and is ready for final connection.

.3 The complete assembly shall be factory assembled, tested and certified prior to shipment.

1.7 Identification

.1 Panels shall be identified with lamacoid plate with shall include panel designation (12 mm lettering), voltage and phase (5 mm lettering) and where panel is fed from (5 mm lettering).

2 PRODUCTS

2.1 Overview Description

.1 Provide a Power Management System (PMS) as specified herein.

.2 The system provided will be fully compatible with and integrated to the Authority's existing Energy and Power Management System (EPMS) network, *Schneider StruxureWare Power Monitoring Expert*, and work seamlessly providing data-transfer and analytics functionality for:

.1 energy performance optimization

.2 power reliability and availability, and

.3 sustainability metrics.

.3 Metering provided will enable real-time monitoring, alarming and event management, energy, power, and sustainability data analytics and visualization to facilitate the following functions at a high level:

.1 Analyze energy usage and uncover savings opportunities.

.2 Meet and exceed energy efficiency and sustainability standards and certifications.

.3 Measure return on investment of energy capital projects.

.4 Allocate and bill energy costs accurately to processes, tenants, cost centers, and departments.

.5 Decrease the frequency and duration of unplanned outages.

.6 Improve workplace safety by minimizing exposure to electrical hazards.

.7 Provide accurate and automated documentation for regulatory compliance.

.8 Improve the effectiveness of equipment maintenance activities.

.9 Manage multiple power generation sources effectively.

.10 Increase the return on electrical distribution assets.

.11 Measure and achieve sustainability targets.

.4 The work specified in this Section includes but shall not be limited to the following:

.1 Hardware—such as metering devices for monitoring, protection, and control; device communication interface hardware; servers; mobile or workstation devices; and ancillary equipment.

.2 Software— as required, such as on premise installed software and cloud based software-as-a-service (SaaS) applications.

.3 Services, support, and training.

.5 The PMS shall use Ethernet as the high-speed backbone network for device communications.

.6 The high-speed network shall allow direct access to data provided by the power monitoring devices for implementing automatic control.

.7 Data and analytics provided by the PMS system for centralized display, analysis, logging, alarming, event recording, and other PMS operations shall be accessible from a computer workstation with supported operating system and interface software.

.8 The PMS shall be manufactured by Schneider Electric or approved equal.

2.2 Quality Assurance

.1 Manufacturer Qualifications: Manufacturer shall be a firm engaged in providing EPMS systems, and shall be able to prove an installed base of such systems successfully operating in at least one hundred customer sites for a minimum of five years.

.2 The EPMS vendor shall bear full responsibility to ensure that the EPMS system performs as specified.

.3 The EPMS solution shall be fully tested in a test-bed environment with hardware devices representative of a large scale functional power distribution system (including both physical and simulated devices) such as advanced power quality meters, low voltage main meters, low voltage feeder meters, circuit breaker trip units, transformer monitoring units, protective relays, branch circuit power meters, etc. Documented test results including system response times, network performance, and recommended network architectures shall be published and provided upon request.

.4 No products shall violate patents filed in any country.

2.3 Advanced Power Quality Metering

.1 The Power Quality Meter (PQM) shall comply with the following:

.1 Safety/construction standards:

(a) CSA C22.2 No. 1010-1.
(b) UL 61010B-1.

.2 Electromagnetic immunity standards:

(a) ANSI/IEEE C37.90.1 (all inputs tested).

.3 Electromagnetic emission standards:

(a) FCC Part 15 Subpart B, Class A (Class A Digital Device, Radiated Emissions).
(b) ICES-003, Industry Canada (Class A Digital Device, Radiated/Conducted Emissions)

.4 Measurement standards:

(a) ANSI C12.20, Class 10 and Class 20.

.5 Communications standards:

(a) EIA/TIA-485.
(b) IEEE 802.3 - 2012.
(c) Modbus Interoperability.

.2 The PQM shall have the following features:

.1 "Out of the Box", native, device integration with StruxureWare Power Monitoring Expert or Power SCADA Expert software.

.2 Voltage Inputs:

(a) No less than four (4) voltage inputs and five (5) current inputs.
(b) Accept voltages up to 347 VLN / 600 VLL

.3 Control Power:

(a) 85 V AC to 240 V AC +/- 10% (47 to 63 Hz) or 110 V DC to 300 V DC +/- 10%.

.4 Environmental:

(a) Operating temperature rating of -20 to 70 ºC (-4 to 158 ºF).

- For Low Voltage DC Power Supply: -20 to 50 ºC (-4 to 122 ºF)

(b) Installable in environments with relative humidity of 5% to 95% non-condensing.

.5 Measured Values:

(a) Voltage: L–L per-phase, L-L three-phase average, L–N per-phase, L-N three-phase average, percent unbalanced.
(b) Current: per phase, neutral (measured), three-phase average, percent unbalanced.
(c) Power: real power (per phase, three-phase total), reactive power (per phase, three-phase total), apparent power (per phase, three-phase total).
(d) Power Factor: true (per phase, three-phase total), displacement (per phase, three-phase total).
(e) Energy: accumulated energy (kWh, kVARh, kVAh), incremental energy (kWh, kVARh, kVAh)
(f) Min/Max: shall be able to provide a minimum/maximum value for any measured parameter

.6 Derived Values:

(a) Arithmetic functions: division, multiplication, addition, subtraction, power, absolute value, square root, average, max, min, RMS, sum, sum-of-squares, unary minus, integer ceiling, integer floor, modulus, exponent, PI.
(b) Trigonometric functions: COS, SIN, TAN, ARCCOS, ARCSIN, ARCTAN, LN, LOG10
(c) Logic functions: =, =>, <=, <>, <, >, AND, OR, NOT, IF
(d) Thermocouple linearization functions: Type J, Type K, Type R, Type RTD, Type T
(e) Temperature conversion functions: C to F, F to C.

.7 Sampling:

(a) Sample continuously at 1024 samples per cycle.

.8 Power Quality:

(a) Perform waveform capture across all voltage and current inputs
(b) Perform sag/swell detection of voltage disturbances on a half-cycle basis.
(c) Perform transient detection of voltage disturbances on a 17 micro-second basis.

.9 Memory:

(a) Have at least 5 MB of non-volatile memory.
(b) Store critical internal and revenue data upon sudden power loss.
(c) Retain all data in non-volatile memory.
(d) A time-stamped event log:

- Time stamps shall have a resolution of 1 millisecond.
- Time stamps can be synchronized to within +/- 1 millisecond (GPS serial input).
- Minimum event recording response time shall be 1/2 cycle (8.3 ms 60 hertz, 10 ms 50 hertz) for high speed events and 1 second for other events.

.10 Alarming

(a) Millisecond time stamp resolution on alarm entries.
(b) Initiate data log captures on alarm conditions.
(c) Automatically or manually adjust alarm set points based on recommended settings derived by understanding normal system behaviour

.11 Communication Ports

(a) Ethernet 10/100 Switch (copper or fiber)
(b) Integrated Ethernet to RS-485 serial gateway
(c) Serial RS-485 (2 ports).
(d) Serial RS-232 (1 port).
(e) Modem
(f) I/R

.12 Communication Protocols

(a) Ethernet (multiple, concurrent connections)

- Modbus TCP, ION TCP, DNP 3.0 TCP, SNTP (time synchronization).

(b) Serial

- Modbus RTU, ION, DNP 3.0

.13 I/O

(a) 16 digital inputs capable of ½ cycle timing resolution.
(b) Support up to four (1) field installable option module to expand digital and analog I/O capabilities without need for additional control power sources.

.14 Web Pages

(a) Power Quality (PQ) data views
(b) Real-time and historical data views (tabular and graphical formats).
(c) Graphical trend for voltage, current, frequency and power.

.15 Display

(a) Two (2) graphical display options: integrated or remote mounted
(b) Multiple languages, including, but not limited to, English, French, Spanish.

2.4 Advanced Power Quality Metering - Generator Main Breakers

.1 The metering device used to monitor generators for purposes of automated generator test documentation, Emergency Power Supply System (EPSS) Test Automation, shall have at minimum the following features:

.1 High-visibility display.

.2 Supported monitoring parameters—full range of 3-phase voltage, current, power and energy measurements, total harmonic distortion (THD), individual current and voltage harmonics readings, waveform capture, and voltage and current disturbance (sag/swell) detection.

.3 Communications Capability—multi-port serial and Ethernet communications with at least two Modbus serial ports and one (1) Ethernet port. The Ethernet port offers e-mail on alarm, web server and an Ethernet-to-serial RS-485 gateway.

.4 On-board logging—non-volatile time stamped on-board logging of I/O conditions, minimum/maximum values, energy and demand, maintenance data, alarms, and any measured parameters; trending and short-term forecasting of energy and demand; custom alarming with time stamping; trigger alarms on at least 50 definable power or I/O conditions; use of Boolean logic to combine alarms.

.5 I/O—at least four (4) digital inputs and four (4) digital outputs for equipment status/position monitoring and equipment control or interfacing, four (4) analog inputs (4-20 mA) to monitor engine parameters such as oil pressure, coolant temperature, etc.

.6 High accuracy standards—meet stringent IEC and ANSI measurement accuracy standards such as IEC 62053-22 Class 0.2S, ANSI C12.20 0.2 Class 10 and 20.

.7 Digital fault recording—simultaneously capture voltage and current channels for sub-cycle disturbance, transients, as well as multi-cycle sags, swells and outages; 512 samples per cycle waveform recording, 40/33 µs transient capture (50/60 Hz).

.8 Power quality analysis and compliance monitoring—a choice of THD metering, individual current and voltage harmonics readings, waveform capture, and voltage and current disturbance (sag/swell) detection.

.9 Disturbance direction detection—determines the location of a disturbance more quickly and accurately by determining the direction of the disturbance relative to the meter. Analysis results are captured in the event log, along with a timestamp and confidence level indicating level of certainty.

.10 Integration of fuel parameters—communications with the fuel monitoring system shall provide integration of parameters such as fuel level, water content, run time remaining with fuel on hand, etc. Communications shall be direct or through a protocol converter.

.11 Battery Health Monitoring—the system shall be capable of capturing the voltage of the engine start battery during engine starting with a minimum sampling rate of one sample per millisecond for purposes of signature analysis.

2.5 Power Quality Metering – LV Switchgear Mains

.1 The Power Quality Meter (PQM) shall comply with the following:

.1 Safety/construction standards:

(a) CSA C22.2 No. 1010-1.
(b) UL 61010B-1.

.2 Electromagnetic immunity standards:

(a) ANSI/IEEE C37.90.1 (all inputs tested).

.3 Electromagnetic emission standards:

(a) FCC Part 15 Subpart B, Class A (Class A Digital Device, Radiated Emissions).
(b) ICES-003, Industry Canada (Class A Digital Device, Radiated/Conducted Emissions)

.4 Measurement standards:

(a) ANSI C12.20, Class 10 and Class 20.

.5 Communications standards:

(a) EIA/TIA-485.
(b) IEEE 802.3 - 2012.
(c) Modbus Interoperability.

.2 The PQM shall have the following features:

.1 "Out of the Box", native, device integration with StruxureWare Power Monitoring Expert or Power SCADA Expert software.

.2 Voltage Inputs:

(a) No less than four (4) voltage inputs and five (5) current inputs.
(b) Accept voltages up to 347 VLN / 600 VLL

.3 Control Power:

(a) 85 V AC to 240 V AC +/- 10% (47 to 63 Hz) or 110 V DC to 300 V DC +/- 10%.

.4 Environmental:

(a) Operating temperature rating of -20 to 70 ºC (-4 to 158 ºF).

- For Low Voltage DC Power Supply: -20 to 50 ºC (-4 to 122 ºF)

(b) Installable in environments with relative humidity of 5% to 95% non-condensing.

.5 Measured Values:

(a) Voltage: L–L per-phase, L-L three-phase average, L–N per-phase, L-N three-phase average, percent unbalanced.
(b) Current: per phase, neutral (measured), three-phase average, percent unbalanced.
(c) Power: real power (per phase, three-phase total), reactive power (per phase, three-phase total), apparent power (per phase, three-phase total).
(d) Power Factor: true (per phase, three-phase total), displacement (per phase, three-phase total).
(e) Energy: accumulated energy (kWh, kVARh, kVAh), incremental energy (kWh, kVARh, kVAh)
(f) Min/Max: shall be able to provide a minimum/maximum value for any measured parameter

.6 Derived Values:

(a) Arithmetic functions: division, multiplication, addition, subtraction, power, absolute value, square root, average, max, min, RMS, sum, sum-of-squares, unary minus, integer ceiling, integer floor, modulus, exponent, PI.
(b) Trigonometric functions: COS, SIN, TAN, ARCCOS, ARCSIN, ARCTAN, LN, LOG10
(c) Logic functions: =, =>, <=, <>, <, >, AND, OR, NOT, IF
(d) Thermocouple linearization functions: Type J, Type K, Type R, Type RTD, Type T
(e) Temperature conversion functions: C to F, F to C.

.7 Sampling:

(a) Sample continuously at 1024 samples per cycle.

.8 Power Quality:

(a) Perform waveform capture across all voltage and current inputs
(b) Perform sag/swell detection of voltage disturbances on a half-cycle basis.
(c) Perform transient detection of voltage disturbances on a 17 micro-second basis.

.9 Memory:

(a) Have at least 5 MB of non-volatile memory.
(b) Store critical internal and revenue data upon sudden power loss.
(c) Retain all data in non-volatile memory.

(d) A time-stamped event log:

- Time stamps shall have a resolution of 1 millisecond.
- Time stamps can be synchronized to within +/- 1 millisecond (GPS serial input).
- Minimum event recording response time shall be 1/2 cycle (8.3 ms 60 hertz, 10 ms 50 hertz) for high speed events and 1 second for other events.

.10 Alarming

(a) Millisecond time stamp resolution on alarm entries.
(b) Initiate data log captures on alarm conditions.
(c) Automatically or manually adjust alarm set points based on recommended settings derived by understanding normal system behaviour

.11 Communication Ports

(a) Ethernet 10/100 Switch (copper or fiber)

- Integrated Ethernet to RS-485 serial gateway

(b) Serial RS-485 (2 ports).
(c) Serial RS-232 (1 port).
(d) Modem
(e) I/R

.12 Communication Protocols

(a) Ethernet (multiple, concurrent connections)

- Modbus TCP, ION TCP, DNP 3.0 TCP, SNTP (time synchronization).

(b) Serial

- Modbus RTU, ION, DNP 3.0

.13 I/O

(a) 16 digital inputs capable of ½ cycle timing resolution.
(b) Support up to four (1) field installable option module to expand digital and analog I/O capabilities without need for additional control power sources.

.14 Web Pages

(a) Power Quality (PQ) data views
(b) Real-time and historical data views (tabular and graphical formats).
(c) Graphical trend for voltage, current, frequency and power.

.15 Display

(a) Two (2) graphical display options: integrated or remote mounted
(b) Multiple languages, including, but not limited to, English, French, Spanish.

2.6 Metering – LV Power Circuit Breakers

.1 Breaker shall be equipped easily with MODBUS communication.

1. the following information shall be accessible:
   a. Open / Close position / fault-trip indication (SDE) / Ready to close/ Position in the Chassis (Withdrawable version).
2. the following commands shall be possible
   a. Open / close.
3. When trip units with measurement functions are used the following information shall be accessible:

a. Instantaneous and demand values, Energy, Current demand and power demand.
b. Timestamp trip and alarm histories and event table.
c. Maintenance indicators.

.2 Communications functions shall be independent of the control unit.

.3 Manufacturer should supply data acquisition medium to gather all the Metering / Protection Settings parameters from trip units of the breaker which with integrated metering function.

.4 Trip unit measurement function

.1 If required by the application, the trip unit shall offer measurement (including energy) without additional module whatever the protection type (LI, LSI, LSIG).

(a) Minimum measurements shall be:
(b) Currents & Energy
(c) Demand Current, Maximum Demand Current
(d) Voltage, active power, reactive power, power factor,
(e) Demand Power, Maximum Demand Power

.2 Accuracies of the entire measurement system, including the sensors: shall be

(a) Current: 1,5%
(b) Voltage: 0.5 %
(c) Power and energy: 2%

.3 Rogowski current transformers shall be used to ensure accurate measurements from low current up to high currents

.4 For safety reason, protection functions shall be electronically managed independently of measurement function by a dedicated ASIC.

.5 The measurements shall be displayed on the breaker itself and on a remote system via Modbus communication. In addition to these solutions it shall be possible to connect a remote display

2.7 Metering – Molded Case Circuit Breakers 100A to 630A

.1 These trip units shall offer measurement without additional module. Measures shall be either:

.1 Currents, (Phases, Neutral, average, max)

.2 Accuracies of the entire measurement system, including the sensors: shall be

(a) Current: Class 1 as per IEC 61557-12
(b) Voltage: 0.5 %
(c) Power and energy: Class 2 as per IEC 61557-12

.3 Rogowski current transformers shall be used to ensure accurate measurements from low current up to high currents

.4 For safety reason, protection functions shall be electronically managed independently of measurement function by a dedicated ASIC.

.5 The measurements shall be displayed on the breaker itself and on a remote system via Modbus communication. In addition to these solutions it shall be possible to connect a remote display.

3 EXECUTION

3.1 Installation

.1 System components, including meters, electronic trip units, sensors, motor protection devices, relays, etc. included within power equipment line ups, shall be factory installed, wired, and tested prior to shipment to the job site.

.2 All control power, CT, PT, and data communications wiring shall be factory wired and harnessed within the equipment enclosure.

.3 Where external circuit connections are required, terminal blocks shall be provided with manufacturer drawings clearly identifying any interconnection requirements and wire types.

.4 All external wiring required to connect equipment lineups shall be installed by the electrical contractor.

.5 Contractor interconnection wiring requirements shall be clearly identified on the system drawings.

.6 Vendor field technicians shall verify accuracy of installation prior to commissioning.

3.2 System Commissioning and Acceptance

.1 On-site commissioning shall be performed by factory trained personal who shall also use automated commissioning tools wherever metering equipment is involved to improve consistency and quality of commissioning for clients.

.2 Central engineering resources in conjunction with onsite factory trained personal shall be involved in preparing a client's system for startup.

.3 If needed, a trained and certified project manager shall be provided during project installation and commissioning.

.4 Engineering drawings shall be made available to the client for all EPMS projects.

.5 On-site commissioning and initial user training of the EPMS shall be included in the project bid.

.6 Commissioning shall include a detailed scope of work checklist document with delivered functionality listed and checked.

.7 Commissioning shall include a full working demonstration of the system under normal operating conditions and simulated scenarios.

.8 For control applications such as automatic transfer, commissioning shall include a thorough verification of the approved sequence of operation in both manual and automatic modes. Testing of source outage and breaker exercising shall be included in test procedures.

.9 For control applications, such as automatic transfer, source interruptions are necessary. The Authority must schedule appropriate times for such commissioning, and must plan for time (typically a day) for system pre-testing and a day for acceptance testing. Weekends are preferred due to minimized impact on operations.

3.3 Training

.1 The vendor shall have capabilities to deliver a full suite of training solutions focused on the operation, maintenance, and optimization of the customer's EPMS system. These training solutions shall address both initial and ongoing training needs for the customer and shall include the following:

.1 Training delivered by experienced instructors with direct experience with the installed equipment and teaching proficiency.

.2 Majority of the training is hands-on (up to 80%) with the equipment. Each student has access to their own mini power monitoring system through an electrical metering demo case, Ethernet communications, and laptop running applicable metering software, or through a virtual server if attending remotely (not applicable for self-paced on-demand training).

.3 Training manuals including agenda, defined objectives for each lesson, detailed content organized by lesson, and descriptive labs to complete hands-on exercises shall be provided.

.4 Training content (depending on class) will cover functionality and operation of electric meters, definition and use of various metering data (such as energy, demand, power factor, load profile, time of use, KYZ, etc.), communication methods applied in various design topologies, and capabilities and operation of applicable software.

.2 Training options may include but are not limited to:

.1 Self-paced on- demand training on energy management, metering infrastructure, and power quality.

.2 Hands-on training at client's site using metering and communications hardware, equipment and relevant software to implement, operate and maintain the power monitoring system.

.3 Instructor led remote web based training with real time interaction with trainer and hands on training using virtual servers to perform labs and exercises.

.4 At Schneider facility, hands-on training on how to design, implement, and operate the EPMS system.

.5 Video recording services to complement custom client onsite training with professional post-production services to provide the customer with a professional customized training DVD.

END OF SECTION

SWITCHGEAR – 12,470V
26 11 13

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

.3 Refer to section 26 32 13, Power Generation Diesel

.4 Refer to section 26 36 23, High Voltage Transfer Switches.

1.2 Work Included

.1 Work to be done under this Section to include providing of labour, materials, and equipment required for manufacture, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

.2 The services to be provided by the supplier under this section to include but not to be limited to the following, for a complete and satisfactory operating system:

.1 Shop drawings, fabrication and assembly as per "reviewed" shop drawings.

.2 Interface control wiring diagrams, schedules and wire running lists between all components supplied.

.3 Factory testing and supplementary witness testing. Witness testing procedure to be submitted as a shop drawing for review by the Engineer.

.4 Delivery schedule and delivery F.O.B. Job site in a manner suitable to the electrical contractor.

.5 Technical supervision of unloading, site assembly, installation of all power and control cable connections, connections, and all other work normal to the electrical trade.

.6 Determining appropriate settings based on these specifications and co-ordinated with the requirements of the emergency generator set supplier, the Independent Testing Agency, City of New Westminister and the Engineer.

.7 Commissioning, site testing including witness testing.

.8 Performance tests and verification tests shall be completed at the manufacturing facility in conjunction with the Authority, Engineer, Independent Testing Organization and the Commissioning Agent. Following successful completion of factory witness tests and sign-off from the Engineer, the switchgear shall be shipped to the generator supplier’s testing facility for dynamic testing of the automatic transfer system. Include all necessary allowances.

.9 Providing technical staff and manuals for factory and field training of Authority's staff in the complete operation of the system.

.10 Data book including schematic diagrams of all circuit boards.

.11 Services of a technical representative to review production schedule, delivery dates, shop drawing changes, shop and field testing and training programs.

.12 Include for the services of qualified factory trained technicians and service representatives to be on site for commissioning of systems and components and during the on-site "witness" testing program as long as necessary to make final adjustment for acceptance of the system.

.13 Include for the services of qualified factory trained technicians and service representatives to conduct training of the facility operating staff in the operation and maintenance of the overall

emergency power system. Include for a total of four separate full day training sessions. Should equipment fail during a training session, conduct a repeat session.

.14 All on-site testing/commissioning, and site work requiring shutdowns, shall be performed at Authority approved times.

.15 Complete systems to be left ready for continuous and efficient satisfactory operation.

.3 Manufacturer to correct deficiencies which occur during the 2 year warranty period at no additional cost to the Authority. Include all costs for material, labour, travel and accommodation. The manufacturer's technical representative to call back within 1 hour and be available on site on a priority basis i.e. within 2 hours of being notified of a deficiency requiring repair.

1.3 Standards

.1 Equipment to be designed, factory assembled and tested in accordance with latest applicable EEMAC,ANSI, CSA and IEEE standards, including but not limited to:

.1 EEMAC Standards G8-2, G11-1

.2 CSA Standards C22.1, C22.2 No. 31-M1983, C105, C235

.3 ANSI Standards C37.06, C37.20,

.2 Where requirements of this Specification exceed those of above mentioned standards, this Specification to govern. Equipment must be acceptable to Supply and Inspection Authorities.

.3 Submit drawings of switchboard to local utility and inspection department and Consultant and obtain their approval before fabrication is commenced.

.4 Utility, Authority and Consultant reserve the right to inspect the switchboard in factory before final test and shipment and will witness factory tests as specified elsewhere.

.5 Provide lamacoid or reverse etched aluminum nameplates in accordance with Article "Equipment Identification" and as required by Supply and Inspection Authorities' regulations. Submit a list of nameplate designations for approval.

1.4 Shop Drawing and Product Data

.1 Submit shop Drawings and product data in accordance with Section 26 05 01 - Electrical General Requirements.

.2 All drawing and product data provided for the equipment to show equipment as specified and ordered; typical drawings are not acceptable.

.3 Physical Construction Drawings, completely dimensioned, showing:

.1 Arrangement.

.2 Plan, front view, and elevation views.

.3 Required clearances for opening doors and for removing breakers.

.4 Conduit or cable trays entrance locations and dimensions for both top and bottom entrance.

.5 Bus bar locations and configurations.

.6 Incoming and outgoing power cable terminator positions.

.7 Field wiring terminal block locations, and all other terminal block locations.

.8 Anchor bolt locations.

.9 Grounding connections.

.10 Weight of equipment.

.4 Three line diagrams, with ANSI device function numbers used throughout, to show all:

.1 Instrument transformers.

.2 Relays.

.3 Meters and meter switches.

.4 Other pertinent devices.

.5 Elementary Diagrams

.1 Elementary (schematic) wiring diagrams to be furnished for the electrically-operated breaker control scheme.

.2 Each elementary diagram to show all control devices and device contact, each of which to be labelled with its proper ANSI device function number.

.3 Each elementary diagram to show device and terminal block terminal numbers.

.6 Control Switches

.1 Provide control switch development tables.

.7 Detailed Connection (Wiring) Diagrams showing:

.1 Approximate physical location of all items in each unit.

.2 All wiring within each unit.

.3 All interconnecting wiring between units.

.4 Identification of all terminals, terminal blocks, and wires.

.5 Clear identification, by some distinguishing method, of all wiring which is to be installed by Purchaser. This to include, but not be limited to, leads from external current transformers, trip circuits from remote devices, auxiliary contacts to remote devices, incoming DC control power, and separate incoming AC power. This to also include spare auxiliary contacts and relay contacts which to be wired to terminal blocks for future use.

.6 Provide one additional set of drawings shipped with the switchgear for maintenance use, installed in a suitable permanent drawing pocket inside one of the control cubicle doors.

.8 Spare Parts List

.1 Complete spare part list, including parts location diagrams or drawings to be included with the manufacturer's quotation.

.2 List of priced spare parts which manufacturer recommends should be on hand during start-up and the first two year's operation.

.9 Material List

.1 A material list to be furnished listing the quantity, rating, type, and manufacturer's catalogue number of all equipment on each unit.

.10 Installation, Operating, and Maintenance Instructions

.1 Installation, operating, and maintenance instructions to cover all the equipment furnished including all protective relays, power fuses, auxiliary relays, etc., and to include characteristic curves of each different protective relay and power fuse.

.11 Warranty

.1 Supplier to provide a warranty for the equipment supplied under this Section, for a period of 2 years following final site acceptance, against

(a) faulty or inadequate design, manufacture or operation,
(b) defective material or workmanship, or both,
(c) breakage or other failure that occurs under normal and proper operation of the equipment

.12 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

1.5 Shipping

.1 If shipped separately, the power circuit breaker to be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.

.2 Relays to be shipped installed in the stationary structures and to be securely blocked and braced to prevent damage during shipment if required.

.3 Each "shipping section" of stationary structures to be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

.4 Shipping splits shall be broken down into single cubicles.

1.6 Preparation for Shipment

.1 Preparation for Shipment to be in accordance with manufacturer's standards, unless otherwise noted. The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide materials and their destination in ex-works condition when handled by commercial carrier systems.

1.7 Seismic

.1 Equipment to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for nonstructural equipment as identified in the British Columbia Building Code for the geographic location of installation

.2 Equipment to be will be designed, certified and installed in accordance with the International Building Code (IBC) chapters 16 and 17 and tested in accordance with the shake table testing standard ICC-ES AC-156.

.3 Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification for “seismic withstand capability” and, to maintain the certification, anchor such equipment according to the manufacturer’s instructions.

1.8 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

1.9 Maintenance Materials

.1 Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements.

1.10 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions as specified in Section 26 05 01 Electrical General Requirements.

1.11 Submittals with RFP Submission

.1 Submit preliminary Physical Construction Drawings, completely dimensioned, showing:

.1 Arrangement.

.2 Plan, front view, and elevation views.

.2 Submit information on proposed vacuum circuit breakers.

2 PRODUCTS

2.1 General Description

.1 The switchgear assembly to be heavy duty indoor industrial type metalclad construction 15 kV class, with stored energy roll out vacuum circuit breakers complete with operating mechanism, copper bus bars, bus supports and inserts, instrument transformers, instruments, control devices, barriers and supporting framework, incoming line compartments and any other items required.

.2 Equipment and components to be coordinated as to electrical functions, insulation values, mechanical and electrical design, completely equipped and ready to place into service.

2.2 Ratings

.1 Rated Voltage: 15 kV

.2 System Voltage: 12.47 kV

.3 Bus Work: 1200 A, 3 Phase, 3 wire

.4 Interrupting Capacity: 25 kA

.5 B.I.L.: 95 kV

.6 Supply System:

.1 solidly grounded (normal/utility feed)

.2 low-resistance grounded (emergency generator feed)

2.3 Structure and Components

.1 The metalclad units to contain all equipment as hereinafter specified. Main structure to be fabricated of minimum No. 11 gauge steel with smooth finished surfaces welded together and reinforced with structural members. Structures to be rigid and self-supporting. Enclosure shall be Type1 with drip shield. Suitable for installation in a sprinkled room.

.2 Front and rear of each cubicle to be completely accessible through formed hinged gasketted doors. Doors to have T-handle 3 point locking system complete with latches and provision for pad locking. Front doors to be suitably reinforced for mounting of relays, instruments and switches. Hinges to be concealed, adjustable type with removable pins. Breaker cubicles to be segregated into separate compartments by close fitting sheet steel barriers designed to prevent the flow of ionized gases between compartments. Compartments to have separate removable panels for individual servicing without exposing circuits in adjacent compartments.

.3 The entrance to the primary stationary disconnecting devices to be automatically covered by a shutter when a breaker is withdrawn to the test/disconnect position, or removed from the cubicle.

.4 The entire switchgear to be designed for mounting on a channel iron base to ensure proper alignment of all cubicles.

.5 Adequate lifting angles or channels to be provided for each shipping section, and each cubicle to be braced and re-enforced as required to prevent distortion during shipping and handling.

.6 Feeder cable exit to be from top - confirm cable routing on elevation drawings, and the rear compartment design to provide adequate space and proper orientation of terminals to:

.1 prevent cross phasing of unshielded conductors;

.2 provide adequate space for terminating of stress cones;

.3 provide full air clearance phase to phase and to ground on all unshielded phase conductors;

.7 The distance allowed for stress cones from point of cable entrance to terminal connector to be no less than 910 mm.

.8 The complete switchboard (metering sections, and circuit breaker sections shall be constructed as a series of single cell shipping splits in order to be installed and moved through the existing corridors. These are to be fully interconnected at the factory for factory testing, and then disconnected and individually prepared for shipment to site and installation. Each shipping split shall be complete with bolted bus joints to connect to the adjacent cell per paragraph 2.10 Busses, and terminal blocks for interconnection of all control wiring.

2.4 Compartmentation

.1 Provide separate compartments for each of the following formed by #11 gauge sheet steel barriers:

.1 instrument compartments

.2 circuit breakers

.3 incoming or outgoing cables

.4 potential transformers

.5 control power or station power transformers

2.5 Access Doors

.1 Hinged access doors to be provided for each of the following:

.1 Circuit breakers

.2 Incoming and outgoing cables

.3 Metering transformers

.2 Access doors to have padlock hasps minimum 28 mm x 6 mm (1¼" x ¼") capable of accepting a padlock with 8 mm (5/16") shackle.

2.6 Viewing Windows

.1 Viewing windows to permit viewing of each voltage indicator..

.2 Provide three (3) IR windows for each vacuum breaker in switchgear.

.3 IR windows are to be shipped loose from the factory to the site and are to be installed on site once all power cabling has been completed. IR windows are to be installed on site such that cable connections and bus connections are visible through the IR window for thermal scanning.

.4 IR windows shall be suitable for medium voltage applications, CSA listed with 68mm viewing aperture diameter.

*Standard of Acceptance*s
° Fluke CLKTO

2.7 Voltage Indicators

.1 Voltage indicators shall be provided on each incoming and outgoing high voltage conductor to indicate conductor is alive. Voltage indicators shall be LED type in polymer housing.

Standard of Acceptance
° Tedco YZ-2

2.8 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 53 – Equipment Identification.

.2 Provide a nameplate on each Switchgear lineup. Nameplates to be 3 mm (1/8") thick, with bevelled edges.

.3 High engraved high quality plastic nameplates with white letters suitably inscribed on red background for cubicle and circuit identification to be provided on front and rear sections.

.4 Also provide on all rear doors and removable panels, nameplates with red letters suitably inscribed on white background, reading "DANGER - 12,470 VOLTS", and "DO NOT ENTER" as per Canadian Electrical Code. Engraved letters to be 9.5mm minimum except "DANGER" which to be 19mm minimum. 6mm minimum height may be provided for meters, relays, switches and other similar devices.

.5 Provide on all rear doors and removable panels, nameplates with red letters suitably inscribed on white background, reading "WARNING – MULTIPLE SOURCES". Engraved letters to be 9.5mm minimum.

.6 Confirm wording of nameplates before manufacture.

.7 All nameplates to be permanently affixed with stainless screws.

2.9 Painting

.1 Prior to painting, exterior metal surfaces will be cleaned with phospheric acid and then iron phosphate coated. A prime coat of zinc chromate and iron oxide to be applied followed by two finish coats of oil base alkyd.

.2 Powder coat finish to UL50 3R with ANSI 61 grey.

.3 Manufacturer to provide a liter matching touch-up paint to touch-up small areas marred during installation.

2.10 Busses

.1 Main busses to be designed and rated for the maximum current density at any point and to not be tapered throughout their entire length.

.2 Busses to be constructed of flat bar rounded edge tin plated electrical grade copper bars, insulated for 15,000 V, 95 kV, BIL, designed for continuous current rating of 1200 A, non-ventilated and to have a minimum momentary rating of 39,000 A RMS asymmetrical and a 3 second rating of 25,000 A RMS coordinate with breaker rating asymmetrical amperes in conformance with standards.

.3 Busses to be rigidly supported and braced to withstand repeated stresses caused by faults equivalent to the maximum interrupting and momentary ratings of the breaker.

.4 Joints for busses, interconnections, and disconnecting devices to have silver to silver contacts.

.5 Except for CTs, bus connections to be bolted with a minimum of two bolts per lap properly torqued and locked in place with belleville washers to provide full and uniform pressure under all operating conditions. Where a splice plate is used to joint abutting bars, 4 bolts minimum are required. Connection and joint bolts must be tightened with a torque wrench to manufacturer's specifications.

.6 Bus bars must make full contact at joints; no packing out will be permitted.

.7 Primary and secondary stationary and fixed contacts associated with breakers and switches to be copper.

.8 Busses to be fully insulated with a Class 105 or better non-hygroscopic, flame-retardant, track-resistant insulation and to have a current carrying capacity at least equal to the main breaker rating with a "hottest spot" temperature rise and total temperature not to exceed that specified in ANSI Standard C37.20 (Temperature Limits for Busses and Connections). Bolted joints to be fully insulated with tapes or covered with insulating boots, which to not cover insulators.

.9 All busbar connections to be secured by the use of cadmium plated high tensile bolts inserted into cadmium plated pressure plates having a minimum depth of 10 mm (13/32"). These pressure plates to provide uniform pressure throughout the joint. All bolts to be tightened with a calibrated torque wrench to a pressure in order of 28Nm for 10 mm (13/32") bolts, 45Nm for 12 mm (½") bolts.

.10 Where the busbars are drilled the cross section through the bars at the point of drilling the cross sectional area to be capable of taking the full rated current. Busbars to be de-burred and cleaned after drilling and coated on the joint face with conducting grease before assembly.

.11 Provision for bus extensions for future units to be drilled and plated.

.12 Bus support insulation for 15 kV equipment to be high strength porcelain or polyester glass laminate or molded epoxy and where busses pass through isolation barriers, inserts to be provided to maintain full insulation integrity throughout.

.13 Where indicated to provide for future extension of switchboard, busses to be predrilled and plated for bus extension, and bus insulation to not cover the connection/contact surface. Provide a removable molded boot over this connection, to maintain insulation integrity of bus.

.14 A continuous copper ground bus of adequate cross-sectional area to be provided, 12mm x 50mm minimum, extending the full length of the switchgear assembly and securely bolted to the structural members of the enclosure. Equipment requiring ground connections to be connected to this bus - using approved pressure indent type solderless connectors. Ground bus to be readily accessible from the rear and to be extended adjacent to cable terminations for grounding of the cable shielding and ground wires. Ground bus to be continuous without joints except at shipping splits where joint to require a minimum of two bolts. The frame of each housing to be grounded to this bus.

.15 Each Feeder Breaker line bus to be drilled to accept two connectors per phase and to be provided with one (1) cast copper double indent connector Burndy #YA-2N per phase for 500 MCM conductors (confirm size prior to installation), unless otherwise specified. Adequate space to be available for the connection of one extra outgoing feeder and to build up the necessary stress cones. Connector lugs to be double indent, long barrel, tin plated copper suitable for use at 15 kV. The line side terminals with breaker racked out, to be designed to withstand a 15 kV AC for 1 minute HiPot, in order to be able to HiPot the feeder cables without having to disconnect the cable terminations.

2.11 Circuit Breakers

.1 The circuit breakers to be three pole, vacuum, electrically operated, mechanically and electrically trip-free, motor wound stored energy closing, drawout truck-mounted with ratings not less than the following:

- .1 Rated Voltage: 15 kV
- .2 Frequency: 60 Hz
- .3 Minimum symmetrical interrupting capacity at rated voltage: 25kA
- .4 Rated current: 1200 A
- .5 Momentary current rating (close & latch): 65 kA Peak
- .6 Short time current rating (3 seconds): 25 kA rms
- .7 60 Hz withstand test (1 min): 36 kV
- .8 Impulse withstand (BIL): 95 kV
- .9 Total break time at rated capacity (arc extinguished): 5 cycles or less (Note: that circuit breakers may be used for closed-transition transfers (not exceeding 100ms) ensure break times and close times are such that 100ms paralleling is not exceeded).
- .10 Spring charging motor voltage: -125 VDC
- .11 Control voltage: -125 VDC
- .12 Tripping mode: -125 VDC
- .13 Breaker to be of the horizontal roll-out type. Positive stops to be provided for the following positions:
  - (a) Test/Disconnect position
  - (b) Connected position

.2 In the Test/Disconnect position the primary disconnecting devices to be separated by a safe distance from line and load contacts.

.3 A mechanical operated automatic shutter to be provided to close the entrance to the high voltage stationary line and load contacts when the breaker is in the "disconnect" position.

.4 A device to enable breakers to be padlocked in the "test/disconnect" position to be provided. Mechanical interlocks to be provided to positively prevent the racking of the breaker to or from any position unless the breaker is open. Mechanical interlock to allow only the correct rating breaker to be inserted.

.5 The breaker stored energy spring mechanism to be designed so that the closing speed is independent of both control voltage and the operator. Mechanisms using fluid or air power for operation are not acceptable. Safety features to be incorporated to ensure that the spring is automatically discharged before the breaker is withdrawn from the cell.

.6 Each breaker to have six primary drawout power disconnecting devices, three on the line side and three on the load side. The removable element to consist of a flexibly mounted self-aligning assembly of bridging segments, formed such that each segment to make a high pressure contact with the fixed terminal at one end and the circuit breaker terminal at the other end. All contact surfaces to be heavily silver plated to prevent reduction in current-carrying due to oxidation.

.7 Each circuit breaker to be provided with a multi-pole plug and socket low voltage coupling complete with flexible conductor to be used for connection of control circuits between the breaker unit and the housing. Flexible conductor to be protected from physical damage and kept away from moving parts. Provide sufficient slack to prevent breakage from movement or vibration.

.8 Breakers to be equipped with an operation counter.

.9 At least eight convertible 'a' or 'b' auxiliary switch contacts to be mounted on breaker. Contacts to be positively operated by the breaker contact assembly operating mechanism.

.10 A rugged copper bar-type grounding device to be provided on the breaker element to positively ground the breaker frame to the switchgear ground bus in the 'test' and 'connected' positions.

.11 Breaker mechanical design to be such as to minimize the number of parts requiring lubrication.

.12 Breakers to be at least capable of meeting the applicable ANSI and NEMA operational requirements under no load and full load conditions, without maintenance. The most rigid requirements to apply.

.13 Breaker to be provided with front mounted manual close or trip pushbuttons to operate breaker in case of loss of control power.

2.12 Control and Secondary Wiring (Breaker Element and Cubicle)

.1 Redundant 125 VDC control power will be provided to each breaker. Provide a 125 VDC automatic transfer between the two sources to ensure availability of control power.

.2 Control and secondary wiring to be enclosed in metallic raceway.

.3 Wiring to outgoing circuits at shipping splits and devices mounted in hinged instrument panels, to terminate at terminal blocks. Terminal blocks to have numbered points for circuit identification.

.4 Terminal blocks to be General Electric Type EB or equal. Terminal blocks for current circuits to be shorting block type.

.5 Provisions to be made for the installation of control conduits to the metalclad units and connections to be brought to a terminal board furnished and installed by the switchgear manufacturer.

.6 Wiring to be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG size single conductor minimum, stranded, tinned copper extra flexible type throughout.

.7 Wires to be tagged at both ends with permanent plastic sleeve type markers. Insulation to be 600 V, working and 1500 V test.

.8 Secondary and control wiring within the high voltage compartment to be completely shielded in a protective metal covering.

.9 Wiring from CT's to be minimum #10 AWG.

.10 Fuse and terminal blocks to be easily accessible. Fuses of the proper type and rating to be supplied by the switchgear manufacturer. Fuses to be Class J HRC. DC fuses (one per pole) to be in dead front enclosure.

.11 Auxiliary wiring checks to be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.

.12 Final checkout of wiring to be made with the complete switchgear lineup assembly to assure wiring correctness and continuity. Polarity of current and potential transformers and devices to be checked to assure proper functioning of all protective devices and instrumentation.

2.13 Protective Relays

.1 The protective relays to be utility grade with ModBus Ethernet communication port.

.2 Relay current ranges selected to be coordinated with the coordination scheme, in consultation with the Engineer and in accordance with the recommendations of the co-ordination study.

.3 Relays to have properly coordinated characteristics. Time current characteristic curves for each relay type to be furnished upon request to the Engineer.

.4 Include the cost for the services of the manufacturer's representative to review the relay protection system along with options with the Engineer.

Standard of Acceptance

- Schweitzer Engineering Laboratories

.5 One relay test plug for relay to be furnished as part of this Specification.

.6 Voltage and current test blocks to be provided on each cell similar to ABB Type FT1 with clear full length covers that can installed with the switchblades in the fully open or closed positions. Incorporate a barrier into cover to prevent knife switches from being left partially open.

.7 Device 86 Lock out relays to be Electro Switch 30 A, 600 V, Type LOR with clear protective hinged lift cover.

.8 Provide for communication system to provide metering and status

2.14 Control devices

.1 Control and instrument switches to be of the rotary cam-type with dial plates engraved as required.

.2 Control switches to be Westinghouse Type W2, General Electric Type SBM, I.T.E. type Imperial C77, or equal.

.3 Breaker control switches are not to be mounted adjacent to meter switches.

.4 Each breaker to have white, green, amber and red heavy duty push to test LED type indicating lamps for operation on -125VDC.

.1 Red lamp breaker closed

.2 Green lamp breaker open

.3 White lamp to indicate that the 'Stored Energy Spring' is charged.

.4 White lamp breaker tripped

.5 Blue lamp to for voltage indication

.5 All control wiring for tripping, closing and dry contacts for each condition to terminate on terminal blocks for wiring to remote control panels.

2.15 Instrument Transformers

.1 Potential transformers and current transformers required to operate relays, meters and other devices indicated in the drawing and specifications to be coordinated so that the ratio and accuracy are suitable for each individual application, taking into account the burdens imposed.

.2 Construction of transformers to conform to ANSI Standards.

.3 All terminals to have permanent polarity designations and to be wired accordingly.

.4 All applicable requirements of ANSI Standard C57.13 to apply.

.5 Primary potential bus or cable tap leads to be designed with the same design integrity as the primary bus. Full air clearances to be maintained utilizing porcelain standoff insulators and/or inserts throughout. Clamping leads to flat surfaces without porcelain standoffs or inserts is not acceptable.

.6 All bus type current transformers and potential transformers to be 15 kV class rated 95 kV BIL and to have been hi-potential tested prior to installation in accordance with the requirements established in ANSI Standard C37.20.

.7 Both current and potential transformers to be wired through test switches to provide quick and easy multi-circuit testing of switchboard relays, meters and instruments.

.8 Instrument transformers to have multi-tapped secondary windings.

2.16 Potential Transformers

.1 Potential transformer draw out or tilt-out compartments to incorporate two viewing windows in front panel, one on each side, for maintenance check on alignment of primary disconnecting devices.

.2 Potential transformers to be housed in a separate compartment in the circuit breaker cubicle or superstructure and to be protected by current limiting fuses in the primary circuit. The supporting structure for the draw out carriage on the potential transformers to be so constructed as to withstand all forces when in the withdrawn position without causing bending or distortion. In this position, the fuses and potential transformers to be disconnected and positively grounded to permit safe inspection or replacement.

.3 Potential transformers to be of the 0.3 accuracy class, per ANSI Standards and of sufficient capacity to serve the maximum burden imposed.

.4 Each potential transformer to be protected with current limiting primary fuses, and to be designed to withstand the basic impulse level of the switchboard.

.5 Each potential transformer to be equipped with secondary fuse protection and test blocks.

2.17 Current Transformers

.1 Current transformers to be easily removable and accessible and of the ring or bar-type and fully insulated from the high voltage bus.

.2 Ring-type current transformers to be used where burden and accuracy permit.

.3 Current transformers associated with differential protective schemes shall be matched in burden and accuracy characteristics with those provided on the 12,470V switchboard. Use bar type current transformers if necessary in order to obtain the required burden characteristics.

.4 Primary terminals on bar-type current transformers to be silver plated and rigidly (2 bolt minimum) connected to the bus structure.

.5 Secondary connections of all current transformers to have provisions for short circuiting when not connected to instruments and to be solidly grounded.

.6 Current transformers to be capable of carrying at least 150% of CT rating continuously and have a short time rating at least equivalent to that of the switchgear bus. Accuracy class: C100/ 0.6 B-1.

.7 CT Ratios, Burden Capabilities and Accuracy Class to be determined in accordance with the Independent Testing Organization report. Note this will not be available until the contract has been awarded.

2.18 Phase Designations

.1 Coloured phase designations or numbering markings to be readily visible in each bus compartment, current transformer compartment, circuit breaker compartment and line and feeder cable compartment. Refer to Electrical General Requirements: "Equipment Identification".

2.19 Mimic Bus

.1 A red mimic bus single line diagram to be rivetted on front of switchboard.

.2 Run bus through breaker handles and show every piece of equipment on board.

.3 Symbols used to be industry standards for each device.

2.20 Grounding

.1 In addition to grounding requirements as specified in CSA 22.2 No. 31, a readily accessible ground connection to be provided in each section of cable termination compartments.

2.21 Accessories

.1 Accessories to include necessary devices required for operation and maintenance for the equipment as herein described. These to be comprised of the following:

.1 necessary cranks, lift motors, wrenches, dollies or other tools required to manipulate the movable carriage structure - including a maintenance closing lever,

.2 a counterbalanced hoists on wheels with swivel boom, heavy duty winch with positive locking safety latch and lockable wheels, lifting yoke with hooks to allow lifting of a breaker element.

.3 an electrically operated breaker remote racking device with minimum 7.6m (25'-0") long umbilical cord and operator pendant. Remote racking device to be capable of being locked-on to the breaker without opening the cubicle door and allow the operator to remotely open/close and rack in/out the breaker. Remote racking device to operate on an external 120V AC power supply

.4 instruction and maintenance books for equipment furnished and copies of relay calibration, and final 'as left' settings,

.5 test plugs for relays.

.2 Control jumpers, when required, to be furnished to connect from the secondary device on the stationary structure, to the removable element when it is in the disconnected position, thereby permitting electrical operation of the circuit breaker. Each jumper to consist of a receptacle and plug assembly, with interconnecting flexible cable.

.3 Two sets of spare fuses of each rating.

.4 One wall mounted breaker test cabinet to enable testing of the 15kV breakers outside of the cell in the Building D Emergency Synchronizing Switchboard Room.

2.22 125V DC Control Power System

.1 125V DC control power system consisting of redundant dc chargers, dc batteries and dc distribution to be provided.

.2 Batteries shall be 12 - 15 year warranted life, sealed gas recombination, valve regulated lead calcium (no cadmium content) gel type, operating at a float voltage of 2.23 to 2.27 volts per cell. Containers and lids shall be polypropylene, flame retardant to UL94VO, 28% L.O.I. Cells to be spill proof and able to operate in a horizontal position. Cycling performance of 1200 cycles to 80% DOD. Batteries shall be BAE OGiV, Enersys Powersafe VX series, or C & D Liberty 2000 series.

.3 Batteries shall be housed in a separate, ventilated compartment, with hinged lockable doors.

.4 Battery charger shall be of the automatic constant voltage silicon diode type, utilizing silicon controlled rectifier control and zener diode reference. With input voltage variation within ± 10% from a nominal 208 volt three phase 60 Hz supply, the output voltage of the load charger shall vary not more than ± 1% from no load to full load.

.5 With the battery supplying a normal load current under normal float operation of the charger, the charger shall be capable of providing a full charge to the battery in 8 hours after battery discharge to 1.6 volts per cell, without damage to battery. Submit calculations to be submitted with shop drawings.

.6 Float current and boost voltage shall be field adjustable and shall be set in accordance with the battery manufacturer's recommendations.

.7 In addition to the above, the battery charger shall have the following features:

.1 Current limiting

.2 Short circuit protection

.3 Reverse polarity protection

.4 Convection cooling

.8 The battery charger shall be equipped with the following panel-mounted devices, flush-mounted wherever possible:

.1 Voltmeter, 0 - 120 V D.C.

.2 Charging Ammeter, 0 - 30 A D.C.

.3 Discharging Ammeter, 0 - 150 A D.C.

.4 Suitable-sized main breaker for incoming A.C. supply wired to trip out when battery equalizer voltage exceeds 105% of value set by adjustment.

.5 Momentary contact type push-button to initiate equalizer charger cycle. Equalizing charging shall be time-limited adjustable from 0 - 12 hours, followed by automatic return of charger to full float charging.

.6 High charge indicator

.7 Ground fault alarm lamp to indicate ground on positive or negative bus with reset button.

.8 Low voltage alarm lamp to indicate battery voltage lower than 115 volts, with reset button. Alarm to be suitable for remote indication.

.9 Power "ON" pilot lights.

.10 Each of the above operations or indicating items shall be clearly identified by means of a permanent white on black lamicoid nameplate

.9 Supplier shall submit calculations for the maximum expected draw (under non-steady state conditions) and steady state draw for all devices including indicating lights, relays, charging, closing ,tripping mechanisms, high voltage transfer switches and control power requirements for generator controls. Consider all operations with no power supply to battery chargers from loss of utility power to restoration of the utility power after 8hours.Use control sequence for load profile. Calculations to be submitted with shop drawings. Submit control power requirements and load profile in accordance with IEEE Std 485-1987.

.10 Provide the following DC control power components:

.1 Two (2) Best Battery Selector (BBS) Units for dual battery, single load configurations delivering current from either one (1) of two (2) 125VDC battery sources. Should one battery source fail (shorted, open or weak) the other battery source will continue to power the load automatically and without interruption. The BBS unit must be sized to carry the worst-case loads anticipated from one (1) battery source. BBS unit shall come complete with:

(a) Two (2) solid state blocking diodes installed in common cathode configuration, mounted on oversized heat sinks to provide isolation of battery sources.
(b) Transient MOV protection
(c) NEMA-3R enclosure

.2 BBS unit shall be rated up to 125VDC, two (2) pole, operating nominally at 125VDC, with peak amp and continuous load ratings to meet switchboard control power requirements.

Standard of Acceptance
- Stored Energy Systems - Model BBS-4800

.3 Positive and negative BBS unit load terminals shall be wired to the line side of a breaker panel.

.4 Two (2) breaker panels shall be rated for 125VDC, two (2) pole, operating nominally at 125VDC, with a suitable quantity of two (2) pole branch breakers sized to provide individual DC control branch circuits to switchboard. At minimum, twenty (20) two (2) pole breakers shall be provided with 25% spare breakers. Spare breaker sizes shall match size of most commonly used installation branch circuit breaker.

Standard of Acceptance

- Eaton
- Schneider
- Siemens

.11 A separate DC control circuit breaker shall be provided for each medium voltage circuit breaker in addition to any other control power circuit required.

.12 The following accessories shall be supplied:

.1 Cell lift complete with strap and spreader

.2 Set connecting bolts

.3 Set intercell connectors

.4 Set inter-rack and load terminal lugs

.5 Complete schematic diagram of the charger circuitry mounted on the inside of the cabinet enclosure.

.6 Nameplate containing manufacturer's type and serial number, complete rating information and wiring diagram reference number.

.7 Operating/Maintenance manuals with list of replacement parts for battery and charger.

.13 DC system shall be housed in two independent free-standing CEMA 4 cabinet finished matching the switchgear paint colour on the outside. Each cabinet shall contain one set of Batteries, charger, panel and other components.

2.23 Provisions For Handling And Field Erection

.1 Each "shipping section" of stationary structures to be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

.2 Each "shipping section" to also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

2.24 Basic Unit Type "A"

.1 Basic unit type "A" to be comprised of the following:

.1 Vacuum drawout-type power circuit breaker 3 pole, single throw rated at specified voltage and interrupting rating. Circuit breaker to be electrically operated by stored energy at 125VDC with separately fused trip and close circuits.

.2 Breaker position-changing mechanism for horizontal draw-out of breaker.

.3 Set of primary disconnecting devices.

.4 Set of secondary disconnecting devices.

.5 Circuit breaker control switch.

.6 Set of indicating lamps.

.7 Set of 3 phase insulated 1200 A bus.

.8 Set of 3 phase insulated connections.

.9 Set of necessary terminal blocks, small wiring, control bus, grounding connections.

.10 8 spare auxiliary breaker contacts wired to a terminal block (convertible a/b).

.11 3 voltage indicators to be fastened to each leg of incoming and outgoing cables or bus.

.12 Set of IR windows

.13 Fusible "Battery" type knife switch and fusing for 125VDC control wiring complete with blocking diodes for transferring control power from two dc power sources.

.2 Meters and relays as specified and as shown on the Drawings.

.3 Current transformer wiring to be terminated on identified terminal strips in front of switchboard complete with shorting blocks.

2.25 Main Incoming Line Breaker Unit : SWGR-1U

.1 Construction shall meet all the requirements of City of New Westminster

.2 Metal Clad Basic Unit Type "A".

.3 3 current transformers 2.5L100 accuracy to over-current relay with ampere ratio as required for proper relay co-ordination. (Verify ratios before actual installation).

.4 3 Current transformers, 2.5L100 accuracy or better connected to bus differential relay

.5 3 current transformers for meters (billing accuracy)

.6 Set of 3 – potential transformers with current limiting fuses of the draw-out type, wired to terminal blocks for field wiring to generator voltage regulator in control console.

.7 Current and voltage test blocks for over-current relays and meters.

.8 1 – SEL multi-function protection relay, model number 751.

.9 1- Bus differential relay.

.10 1- Digital microprocessor meter

.11 Voltmeters

.1 matching appearance and same manufacture as ammeters

.2 semi-flush mounted, with HRC fuses on primary three potential transformers if required, secondary wiring and transfer switch

.3 transfer switch to have 4 positions for 3 wire systems.

.12 Lock-out relay, rated 125 VDC.

.13 termination for 13,800 volt 1/c cables with 3M stress cones entering from bottom, with Burndy YA-2N lugs.

.14 Set of 3 Station class lightening arrestors.

2.26 Primary Metered indoor switchgear

.1 Construction shall meet all the requirements of City of New Westminster.

2.27 Incoming Unit : SWGR-1N & SWGR-1E

.1 Metal Clad Basic Unit Type "A".

.2 3 Current transformers, 2.5L100 accuracy or better connected to bus differential relay.

.3 Bus differential relay.

.4 3 Current transformers, 2.5L100 accuracy or better connected to protection relay

.5 3 Current transformers, Cl 0.3 accuracy or better connected to protection relay

.6 1- Digital microprocessor meter

.7 1 – SEL multi-function protection relay, model number 751 for protection

.8 Set of 1200A 3 phase insulated bus

.9 Set of 3 phase insulated connections

.10 Set of 3 potential transformers with current limiting fuses of the draw-out type, wired to protection relay.

.11 Control transformer with current limiting fuses for connection to battery charger. Only for normal breaker for swgr-1N)

.12 Termination for 13,800 volt 1/c cables with 3M stress cones entering from bottom, with Burndy YA-2N lugs.

.13 Ground stirrup in cable termination compartment

2.28 Generator Breaker Units G1, G2, G3, G4: Generator Paralleling Switchgear

.1 Metal Clad Basic Unit Type "A".

.2 3 current transformers for SEL Generator protection relay

.3 3 current transformers for metering and Generator load control & synchronizing unit

.4 1 current transformer for generator voltage regulator

.5 3 current transformers free issued for generator windings prior to neutral connection for full differential protection.

.6 3 current transformers for the bus differential protection.

.7 Coordinate requirements and interconnecting wiring with Generator Supplier.

.8 1 – SEL multi function generator protection relay, model number 700G1+, I/O expansion modules,

.9 1- Digital microprocessor meter

.10 Device 94-1 auxiliary relay, -125VDC, semiflush, 2N/O, 2N/C

.11 Device 94-2 auxiliary relay, -125VDC, semiflush, 2N/O, 2N/C

.12 Voltmeter, 1% accuracy, with 3 phase selector, for line and load side of generator breaker

.13 Current and voltage test blocks

.14 Set of 3 – potential transformers with current limiting fuses of the draw-out type, wired to terminal blocks for field wiring to generator voltage regulator.

.15 Set of 3 potential transformers on line side of generator breaker, with current limiting fuses of the draw-out type, wired to protective relays and to terminal blocks for field wiring to generator load control unit.

.16 termination for 13,800 volt 1/c cables with 3M stress cones entering from bottom, with Burndy YA-2N lugs.

.17 Ground stirrup in cable termination compartment.

2.29 Bus Tie Unit : Generator Paralleling Switchgear

.1 Metal Clad Basic Unit Type 'A'.

.2 3 Current Transformers connected to relay and meters.

.3 Lock-out relay, rated 125V D.C.

.4 3 current transformers 2.5L100 accuracy or better, connected to overcurrent relay, ampere ratio as required for proper relay operation (verify ratios before installation).

.5 3 current transformers 2.5L100 accuracy or better, connected to differential protection relay, ampere ratio as required for proper relay operation (verify ratios before installation).

.6 Zero sequence current transformer, 2.5L100 accuracy or better

.7 Set of 2- potential transformers on the bus side, with current limiting fuses of the draw-out type, wired to protective relays and to terminal blocks for field wiring to generator load control unit.ontrol console.

.8 1- SEL multi-function protection relay, model number 751 with 25 Function.

.9 1- SEL Bus Differential relay.

.10 Current and voltage test blocks

.11 Termination for 13,800 volt 1/c cables with 3M stress cones entering from bottom, with Burndy YA-2N lugs.

.12 Semi-flush mounted, three single thermal type and instantaneous ammeter, dual scales and half scale selector switch:

Standard of Acceptance
- Westinghouse - Type KNAD
- Crompton Parkinson - Type 16FULK

2.30 Outgoing feeder Breakers: SWGR-1A, SWGR-1B, GEN SWGR, SWGR-1U

.1 Metal Clad Basic Unit Type "A".

.2 3 current transformers 2.5L100 accuracy or better, connected to overcurrent relay, ampere ratio as required for proper relay operation (verify ratios before installation).

.3 3 current transformers 2.5L100 accuracy or better, connected to differential protection relay, ampere ratio as required for proper relay operation (verify ratios before installation).

.4 Zero sequence current transformer, 2.5L100 accuracy or better

.5 Current and voltage test blocks.

.6 1- SEL multi-function protection relay, model number 751.

.7 Termination for 13,800 volt 1/c cables with 3M stress cones entering from bottom, with Burndy YA-2N lugs.

.8 Ground stirrup in cable termination compartment.

.9 Set of 2- potential transformers on the bus side, with current limiting fuses of the draw-out type, wired to protective relays and to terminal blocks for field wiring to relays

.10 Device 86 Lockout Relay

2.31 Manufacturers

.1 Vacuum breaker

Standard of Acceptance
- ABB
- Eaton
- Schneider Electric
- Siemens

2.32 Factory Test and Inspection

.1 Equipment to be production and quality control tested in accordance with industry standards.

.2 Certified copies of standard production tests to be submitted upon request.

.3 Factory verification tests to be performed in the presence of the Engineer, Independent Testing Agent, and the Owner's representative, after completion of assembly in factory and following standard factory testing procedures, in accordance with applicable ANSI, NEMA and EEMAC Specifications, and as described herein.

.1 Tests to include hi-pot testing, operation of breakers, operation of relays, meters and switches.

.2 BIL tests of the complete switchboard assembly.

.3 Corona tests.

.4 Completed switchboard to be connected to an appropriate AC or DC power supply (or multiple power supplies as required) to permit operation of all electrically operated devices including but not limited to switches and pushbuttons, indicating lights, meters, and automatic transfer and breaker interlock schemes to prove that they are wired correctly, that contacts make and break and that all devices and meters perform satisfactorily before shipment of switchboard.

.5 Test the overcurrent and other protective devices on each breaker to prove that trip unit and breaker function satisfactorily.

.6 Undertake primary current injection testing of each switchboard for verification of protective schemes.

.7 Racking in and out of breakers and manual operation of equipment to be tested to prove that items work freely.

.8 Verification of key interlock schemes.

.4 Correct deficiencies noted during the factory test prior to shipment.

.5 Submit certified copies of successful completion of the above tests prior to shipment of the equipment.

.6 Performance tests and verification tests shall be completed at the manufacturing facility in conjunction with the Owner, Engineer, Independent Testing Organization and Commissioning Agent. Following successful completion of factory witness tests and sign-off from the Engineer, the switchgear shall be shipped to the generator supplier's testing facility for dynamic testing of the paralleling system. Make all necessary allowances for factory witness testing in both facilities. Switchgear supplier/manufacturer shall provide on-site representation at generator supplier's testing facility.

3 EXECUTION

3.1 Installation

.1 Not used.

3.2 On-site Testing

.1 Conduct an acceptance test in presence of and to satisfaction of Consultant, after completion of installation, but before switchboard is permanently put into service.

.2 Test to include operation of breakers manually and electrically, racking in and out, and checking that meters and relays function properly. Correct defects at no additional cost to Owner. Replace defective equipment immediately with new factory equipment.

.3 In addition to above, include work associated with field testing, cleaning and calibration of relays and trip devices in Bid cost.

.4 Dynamic system verification tests shall be completed on site following installation of the equipment. These include simulating power outages and verifying operation of the automatic transfer system in the presence of the Independent Testing Organization. Include all necessary allowances in the bid price.

END OF SECTION

DRY TYPE TRANSFORMERS PRIMARY +1000 V
26 12 16

1 GENERAL

1.1 References

.1 CSA C22.2 No. 47

.2 CSA C9.

.3 CSA 802.2

1.2 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

.3 Transformers to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the BC Building Code for the geographic location of installation.

1.3 Shop Drawings and Product Data

.1 Submit shop drawings and product data in accordance with Section 26 05 01 Electrical General Requirements.

.2 Nameplates shall be in accordance with Article "Equipment Identification”.

1.4 Work Included

.1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

.2 Necessary connection box shall be provided by bus duct manufacturer, where transformers are connected to a bus duct, to connect to throat provided on transformer.

1.5 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

1.6 Maintenance Materials

.1 Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements.

1.7 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions as specified in Section 26 05 01 Electrical General Requirements.

1.8 Source Quality Control

.1 Certified copies of the manufacturer's standard production tests on each transformer shall be provided to the Authority for review prior to shipping.

.2 In addition to the manufacturer's standard production tests the transformers to be subjected to supplementary factory testing to be witnessed by the Authority.

.3 Factory witness testing to include:

.1 Heat run.

.2 BIL test.

.3 Applied potential

.4 Induced potential

.5 Ratio, polarity and phase angle

.6 Resistance

.7 Excitation losses

.8 Iron losses

.9 Impedance

.10 Review of efficiency curves from no load to full load, kW & KVAR.

.11 Verification of tap voltage ratios including voltmeter recording at the various tap positions.

.12 Visual inspection of fan controls and fans

.13 Verification of operation of all alarm and protective devices

.4 All test results and report data to be factory certified and provided to the Authority in report format. Correct deficiencies noted during factory witness testing prior to shipment.

1.9 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 General

.1 Transformers shall have voltage and kVA rating indicated.

.2 Transformer windings and all current carrying parts shall be copper.

.3 Transformers shall be self-contained, free standing units suitable for floor mounting.

.4 Core constructed of high quality non ageing cold rolled grain orientated silicon steel lamination.

.5 Coil to be disc wound construction designed to minimize eddy losses and provide high short circuit strength

.6 Primary and secondary coils subjected to two oven cured vacuum pressure impregnating stages of VPI epoxy resin or polyester resin

.7 Transformer core shall be manufactured with insulated through bolts through laminations or be provided with perimeter external clamping arrangement to support the core and provide strength to withstand stresses due to short circuits. Core shall be fully insulated from the frame and enclosure with high strength, high temperature glastic (NEMA GPO-3 or better) of minimum 3mm (1/8") thickness to minimize the possibility of a magnetic short circuit. Ground core in one location only.

.8 Transformers shall have provisions for incoming and outgoing conductor entry shown on Drawings.

.9 Transformers shall be equipped with grounding provision specified in Table 3 of CSA Standard C9.

.10 Transformers to have 4-2½% full capacity primary taps, two above and two below nominal voltage.

.11 Three phase transformers shall have delta connected primary and WYE secondary unless otherwise noted.

.12 Cooling fans to be resiliently mounted beneath the transformer coils, and be capable of providing at least 33% additional capacity. Fan motors to be single phase, 120 volt 60 Hz.

Standard of Acceptance
- Square D.

2.2 Ratings

.1 KVA capacity indicated to be based on Class 220 degree C insulation, 150 degree C rise.

.2 Transformers shall be type ANN/ANF.

.3 Unless shown otherwise, impedance of transformers shall not be less than the values and tolerances indicated in Table 7 of CSA C9 Standard corresponding to their kVA rating. Impedance of transformers shall not exceed 7%.

.4 Transformer full load voltage regulation not more than 5% at 80% power factor

.5 Transformers to have a noise level 3 dB below that shown on Table 8 of CSA Standard C9.

.6 Transformer BIL: 125kV

2.3 Transformers Forming Part of Substations

.1 Fully coordinated with same and shall match BIL of substation.

.2 Have a flexible gasketted connection to prevent vibration transmission to switchboard.

.3 Mimic bus single line diagram on front of transformers, aligned with switchboards.

.1 Bus to show every piece of equipment, using industry standard symbols for each device.

.2 Mimic bus to be white lamicoid fastened securely with screws or rivets. Mimic shall be complete with detailed descriptive lamicoid nameplates to indicate origin or destination of all incoming and outgoing feeders and bus ducts.

2.4 Lightning Arrestors

.1 Three 8.4 kV Ohio Brass Dynavar MCOV porcelain station class surge arrestors shall be connected to the primary terminals with a 4 hole NEMA pad.

.2 Provide 4/0 AWG copper ground jumper to ground bus. Keep jumper length to a minimum.

2.5 Monitoring and Alarms

.1 Transformers to be provided with thermocouples embedded in each phase winding connected back to a temperature controller.

.2 Provide an electronic microprocessor-based temperature controller with integrated fan control and remote alarm functions. Temperature controller to have the following features:

.1 LED display of present and recorded peak winding temperatures

.2 Initiate alarm if open circuit is detected in any thermocouple circuit

.3 Produce an audible signal on alarm that can be silenced from a local switch.

.4 Programmable setpoints for:

(a) Stage-1: turning ON cooling fans, and programmable differential temperature for switching fans OFF
(b) Stage-2: high temperature alarm
(c) Stage-3: very-high temperature alarm

.5 Separate dry contacts for each of the above stages, interfaced to the Building Management System (BMS) to perform the following control functions:

(a) On first stage, start the fans, and signal BMS that transformer is in fan mode.
(b) On second stage, activate the local audible alarm, and signal 'transformer high-temperature alarm' to BMS.
(c) On third stage, signal 'transformer very-high temperature alarm' for BMS to initiate load shedding sequence.

.6 Manual fan control capability to force fans to turn ON.

.7 Fan exerciser circuit that will turn the fans ON for a short time at periodic intervals. Exercise schedule and interval to be field programmable.

.8 Modbus RTU communication capability.

2.6 Control Cabinet

.1 A sprinkler-resistant control cabinet with hinged and gasketted doors to be integrated into the front of transformer enclosure at a height readily accessible to an operator standing at ground level.

.2 Control cabinet to house the following equipment:

(a) Terminal block pre-wired and connected to transformer secondary neutral point, for extending the system neutral to the neutral grounding resistor located in the remote high-resistance grounding system panel.
(b) Control equipment necessary for cooling fans.
- Power supply for fans to be derived from the secondary windings of the transformer, via a 600V-120V step-down control transformer with dead front HRC fuses in the primary circuit. Wire leads from transformer winding to dead front HRC fuse block shall be as short as feasible and rated for 1000V.

(c) All wiring and connections to be vibration proof with all terminations and splices made in accessible cabinets and boxes.

.3 The control cabinet to be used to terminate all leads to circuits external to the transformer.

2.7 Support and Isolation

.1 Support transformers core and coil assembly on in-shear vibration isolation mounting. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 6mm static deflection.

.2 In addition, each transformer is to be set on 2 layers of 9mm} {3/8"} ribbed or waffle pattern neoprene pads of not more than 50 durometer. A stainless steel plate of not less than 16 gauge for full size of each pad shall be provided on top of and between pad isolator plates. Pads shall be similar to Peabody Noise Control Model "NP". Installed mountings shall provide a uniform deflection under weight and weight distribution of supported equipment.

2.8 Enclosure and Finish

.1 Enclosure: Type 2 suitable for use in a sprinklered area. Include drip shield and provide overhanging drip-proof louvres at ventilation openings.

.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of enamel paint.

.3 Finish equipment as follows:

.1 basic rust-inhibiting metal process

.2 Interior in white

.3 Exterior shall be finished with paint in accordance with EEMAC 2Y-1 standard: ASA No. 61 Grey

.4 Manufacturer to provide quart of touch-up paint to touch-up small areas marred during installation.

2.9 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Label size: 7. Submit nameplate wording.

3 EXECUTION

3.1 Installation

.1 Provide dry type transformers as shown and as specified.

.2 Provide a 100mm reinforced concrete pad with bevelled edges for all floor mounted transformers. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Pads to be provided under this division.

.3 Ensure adequate clearance around transformer for ventilation.

.4 Install transformers in level upright position.

.5 Provide suitable mounting hardware complete with vibration isolation pads.

.6 Provide wiring from transformer temperature alarm contacts to BMS

.7 Remove shipping supports only after transformer is installed and just before putting into service.

.8 Loosen isolation pad bolts until no compression is visible.

.9 Make primary and secondary connections in accordance with wiring diagram.

.10 Ground transformer casing with 2/0 AWG green insulated copper grounding conductor installed in conduit to the grounding system.

.11 Connect transformer secondary wye point to the electrical grounding system with minimum #6 AWG green insulated copper installed in conduit.

.12 Energize transformers after installation is complete.

.13 Adjust transformer taps as required to achieve suitable secondary voltage at loads.

.14 Touch up small areas marred in transit or during installation with touch up paint. Repaint entire transformer using electrostatic process where large areas of significant damage to factory finish has occurred.

.15 Provide and install new rubber mats 3' wide 1/4" thick 17,000 volt rating, American Biltrite Canada Ltd., in front and rear of transformers for a continuous and neat appearance. Do not place mats until work is completed and room has been thoroughly cleaned. Clean or replace any existing mats dirtied or damaged during the installation.

3.2 Site Acceptance Testing

.1 Conduct Site Acceptance Testing (SAT) in presence of and to satisfaction of Authority's representative, after completion of installation, but before transformer is permanently put into service.

.2 Include the following:

- .1 Thorough physical inspection
- .2 Verify operation of temperature controls and fan operation
- .3 Ratio, polarity and phase angle test
- .4 Insulation power factor and polarization index tests
- .5 Insulation power factor and polarization index tests

.3 Correct defects at no additional cost to the Authority. Replace defective equipment immediately with new factory equipment.

.4 Energize transformers after installation is complete

END OF SECTION

DRY TYPE TRANSFORMERS UP TO 600 V PRIMARY
26 22 13

1 GENERAL

1.1 General Requirements

.1 General Conditions as applicable.

.2 Section 26 05 01, Electrical General Requirements.

1.2 Applicable Codes and Standards

.1 Latest edition of:

.1 CSA C22.2 No. 47 Air-Cooled Transformers (dry type),

.2 CSA C9 Dry-Type Transformers,

.3 CAN/CSA C802.2 Minimum Efficiency Values for Dry-Type Transformers.

1.3 Scope

.1 Provide labour, materials, and equipment for the installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

1.4 Submittals

.1 Submit shop drawings and product data for each type and rating of transformer.

.2 Provide operation and maintenance data for incorporation into the Operating and Maintenance Manual.

1.5 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions.

1.6 Quality Control

.1 Type tests:

.1 to have been conducted in accordance with CSA C9 for the following:

(a) temperature rise,
(b) sound level.

.2 submit certified copies of reports of type tests.

.2 Production tests:

.1 conduct in accordance with CSA C9 for the following:

(a) Voltage ratio, including all taps,
(b) polarity or angular displacement,
(c) dielectric, applied potential and induced potential,
(d) partial discharge (cast-coil transformers only).

.2 submit certified copies of reports of production tests.

.3 Energy efficiency:

.1 Submit the energy efficiency reports to show compliance with the specified efficiency values.

1.7 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process

2 PRODUCTS

2.1 General

.1 Constructed in accordance with the referenced standards except where indicated otherwise.

.2 Self-contained, free standing units suitable for floor mounting.

.3 Up to and including 75 kVA to also be suitable for wall mounting.

.4 Supply wall mounting brackets for transformers shown to be wall mounted.

.5 Vacuum impregnated epoxy or polyester resin construction.

.6 Type ANN.

.7 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.

.8 Windings: copper.

.9 Buswork and all current carrying parts, other than the windings: copper.

.10 Primary and secondary voltages and kVA ratings as indicated.

.11 Delta connected primary and 120/208 volt Wye or, where indicated, a Zigzag connected secondary.

.12 Secondary neutral terminals, suitable for the connection of:

.1 a double neutral conductor,

.2 #6 AWG copper grounding conductor and

.3 bonding conductor.

.13 Taps: four (4) @ 2.5% full capacity primary taps, two above and two below nominal voltage.

.14 Provisions for incoming and outgoing conductor entry of sizes shown.

.15 Front accessible primary and secondary conductor entry and connections, unless indicated otherwise.

.16 System bonding lugs, connected to the enclosure for:

.1 primary feeder bonding conductor,

.2 secondary feeder bonding conductor and

.3 bonding conductor to the secondary neutral terminal.

.17 System bonding lugs sized to accommodate cables sizes in accordance with Table 16 of the Electrical Code.

.18 Core bonded to the enclosure, either inherently by design or by a bonding strap.

.19 Seismic certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the Building Code for the geographic location of the installation.

.20 Labelled to warn of an arc flash potential in accordance with the Electrical Code.

Standard of Acceptance
- Atlas Transformer Inc.
- Bemag
- Delta Transformers Inc.
- Hammond Manufacturing Co. Ltd.
- STI

2.2 Ratings

.1 kVA capacity based on Class 220 degree C insulation, with 150 degree C rise.

.2 K-Rating: K13

.3 Impedance:
- .1 per Table 7 of CSA C9, except where indicated otherwise,
- .2 not less than 3% up to and including 75kVA,
- .3 not less than 4% for 112.5kVA,
- .4 not less than 5% for 150kVA and above,
- .5 not to exceed 6%.

.4 Full load voltage regulation at 80% power factor:
- .1 ≤ 300 kVA: ≤3%,
- .2 > 300 kVA, ≤ 600 kVA: ≤4%,
- .3 > 600 kVA: ≤5%.

.5 Noise levels:
- .1 Per Table 8 of CSA C9 for ratings ≤300 kVA, unless noted otherwise.
- .2 3 dB below the values shown in Table 8 of CSA C9 for ratings > 300 kVA.

2.3 Transformers Forming Part of a Substation

.1 Fully coordinated with the design of the switchgear/switchboard including:
- .1 matching height and depth,
- .2 matching enclosure type,
- .3 matching finish,
- .4 matching BIL.

.2 Flexible connections to prevent vibration transmission to switchgear/switchboards.

.3 Mimic bus:

.1 showing the single line diagram,

.2 showing every piece of equipment, using industry standard symbols for each device,

.3 constructed of white lamicoid fastened securely with screws or rivets,

.4 mounted on front of transformer,

.5 aligned with mimic bus on switchgear/switchboards,

.6 with detailed descriptive lamicoid nameplates to indicate source/load of incoming and outgoing feeds.

2.4 Monitoring and Alarms

.1 Transformers rated 300 kVA and larger to be equipped with a temperature monitoring device, indicating average coil temperature, with:

.1 2 stages of dry Form “C” alarm contacts,

.2 communications capability: modbus.

.2 Thermometer display, alarm contacts, controls and communications port to be accessible without exposure to the transformer voltages.

2.5 Support and Isolation

.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection underweight and weight distribution of supported equipment. Pads to provide a minimum of 6mm static deflection.

.2 In addition, each transformer is to be set on 9mm ribbed or waffle pattern neoprene pads of not more than 50 durometer. Pads to be similar to Peabody Noise Control Model "NP". Installed mountings to provide a uniform deflection underweight and weight distribution of supported equipment.

.3 Include vibration isolation pads (to give minimum 6 mm static deflection) for each unit.

2.6 Enclosure and Finish

.1 Enclosure: Transformer enclosure to be CSA type 2 self-contained, free standing unit suitable for floor mounting. Include drip shield and angled sprinkler resistant louvers at ventilation openings. Where shown or required to be wall mounted, necessary mounting hardware to be included.

.2 Finish:

.1 rust-inhibiting metal treatment process,

.2 powder coat finish to UL50 3R,

.3 colour: ANSI #61 grey.

.3 Provide a quart of matching paint to touch-up small areas marred during installation.

2.7 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Label size: 7.

.3 Submit nameplate wording.

3 EXECUTION

3.1 Installation

.1 Mount dry type transformers up to 75 kVA suspended or on floor as indicated.

.2 Mount dry type transformers above 75 kVA on floor.

.3 Provide a 4" reinforced concrete pad with bevelled edges for all floor mounted transformers. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Concrete pads to be provided under this division.

.4 Provide suitable mounting hardware complete with external vibration isolation pads for both floor mounted (between enclosure and pad) and suspended (between enclosure and support frame) transformers.

.5 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 6mm static deflection.

.6 Each transformer is to be set on 2 layers of 9mm ribbed or waffle pattern neoprene pads of not more than 50 durometer. Pads to be similar to Peabody Noise Control Model "NP". Installed mountings shall provide a uniform deflection under weight and weight distribution of supported equipment.

.7 Install transformers in level upright position.

.8 Ensure adequate clearance around transformer for ventilation.

.9 Remove shipping supports only after transformer is installed and just before putting into service.

.10 Loosen isolation pad bolts until no compression is visible.

.11 Make final primary and secondary connections using flexible steel conduits.

.12 Make primary and secondary connections in accordance with wiring diagram.

.13 Provide green insulated copper ground conductor in conduit, sized as follows, from transformer ground bus to the building grounding system, in accordance with Table 17 of the Electrical Code: Below 30 kVA transformer: #8AWG in 13mm conduit; 30 kVA transformer: #6AWG in 13 mm conduit; Up to 45 kVA transformer:#4 AWG in 19mm conduit; Up to 75 kVA: #2 AWG in 19mm conduit: up to 112.5 kVA: #2/0 AWG in 25mm conduit; over 112.5 kVA: 3/0 AWG in 25mm conduit.

.14 Energize transformers after installation is complete.

.15 Adjust transformer taps as required to achieve suitable secondary voltage at loads

END OF SECTION

LOW VOLTAGE SWITCHGEAR
26 24 14

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.2 Standards

.1 Low voltage switchboard equipment to be designed, factory assembled and tested in accordance with latest applicable CSA, ANSI and UL Standards, in particular:

.1 CSA Standard C22.2 No. 31

.2 ANSI C37.20.1

.3 UL 1558

.2 Low voltage switchgear to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for nonstructural equipment as identified in the British Columbia Building Code for the geographic location of installation

.3 Low voltage switchgear to be will be designed, certified and installed in accordance with the International Building Code (IBC) chapters 16 and 17 and tested in accordance with the shake table testing standard ICC-ES AC-156.

.4 Where requirements of this Specification exceed those of above mentioned standards, this Specification to govern.

.5 Provide coloured phase designations for all phases to suit CSA, NEMA and Supply Authority Standards.

1.3 Shop Drawings and Product Data

.1 Submit shop drawings electronically.

.2 All drawing and product data provided for the equipment to show equipment as specified and ordered. Typical drawings are not acceptable.

.3 Physical Construction Drawings, completely dimensioned, showing:

.1 Arrangement.

.2 Indication of top feeding.

.3 Plan, front view, and elevation views.

.4 Required clearances for opening doors and for removing breakers.

.5 Conduit or cable trays entrance locations and dimensions for both top and bottom entrance.

.6 Bus bar locations and configurations.

.7 Incoming and outgoing power cable terminator positions.

.8 Field wiring terminal block locations, and all other terminal block locations.

.9 Anchor bolt locations.

.10 Grounding connections.

.11 Weight of equipment.

.4 Three line diagrams, with ANSI device function numbers used throughout, to show all:

.1 Instrument transformers.

.2 Relays

.3 Meters and meter switches.

.4 Other pertinent devices.

.5 Elementary Diagrams

.1 Elementary (schematic) wiring diagrams to be furnished for the electrically-operated breaker control scheme.

.2 Each elementary diagram to show all control devices and device contact, each of which to be labelled with its proper ANSI device function number.

.3 Each elementary diagram to show device and terminal block numbers.

.6 Detailed Connection (Wiring) Diagrams showing:

.1 All wiring within each unit.

.2 All interconnecting wiring between units.

.3 Identification of all terminals, terminal blocks, and wires.

.4 Clear identification, by some distinguishing method, of all interface wiring to remote devices. This to include, but not be limited to, leads from external current transformers, trip circuits from remote devices, auxiliary contacts to remote devices, AC control power, and separate incoming AC power. This to also include spare auxiliary contacts and relay contacts which to be wired to terminal blocks for future use.

.7 Provide one additional set of drawings shipped with each switchgear assembly for maintenance use, installed in a suitable permanent drawing pocket inside one of the control cubicle doors.

.8 Provide nameplates in accordance with "Equipment Identification"; submit nameplate designations for approval.

.9 Submit circuit breaker time-current co-ordination curves (TCC) for review.

.10 Spare Parts List

.1 Complete spare parts list to be included with the Operation and Maintenance manuals.

.11 Material List

.1 A material list to be furnished listing the quantity, rating, type, and manufacturer's catalogue number of all equipment on each unit.

.12 Installation, Operating, and Maintenance Instructions

.13 Installation, operating, and maintenance instructions to cover all the equipment furnished including all protective relays, power fuses, auxiliary relays, etc., and to include characteristic curves of each different protective relay and power fuse.

1.4 Approvals and Information

.1 Manufacturer to not commence final fabrication or erection of equipment until receipt of:

.1 Reviewed or "Reviewed as Noted" shop drawings from Authority.

.2 Manufacturer to supply:

.1 information to install and test equipment for complete installation.

.2 shop drawings for review, as specified in "Design and Shop Drawings".

.3 information for Authority, as specified in "Instruction Manuals".

1.5 Provisions for Handling and Field Erection

.1 Each shipping split of stationary structures to be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

.2 Each shipping split to also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

1.6 Shipping

.1 If shipped separately, the power circuit breaker to be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.

.2 Relays to be shipped installed in the stationary structures and to be securely blocked and braced to prevent damage during shipment if required.

.3 Each "shipping section" of stationary structures to be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

1.7 Preparation for Shipment

.1 Preparation for Shipment to be in accordance with manufacturer's standards, unless otherwise noted. The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide materials and their destination in ex-works condition when handled by commercial carrier systems.

1.8 Work Included

.1 Work to be done under this Section to include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

1.9 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

1.10 Maintenance Materials

.1 Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements.

1.11 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions as specified in Section 26 05 01 Electrical General Requirements.

1.12 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 Materials

.1 Low voltage switchgear to be of type, rating and arrangement shown. Equipment to be constructed to fit space allocated and to be a free standing assembly mounted on a concrete pad.

.2 Provide fully prepared spaces where future breakers are indicated. Include racking mechanism, bus, stationary element, secondary contacts, control and metering wiring such that, at a future date, a circuit breaker of correct frame size can be installed with no modifications required to switchgear lineup.

.3 Switchgear to have provisions for future extension of additional vertical cells at each end. Main bus to be drilled and plated to facilitate extension.

Standard of Acceptance

- Schneider Square D Powerzone 4

2.2 Structure and Components

.1 Free standing, rigid, dead-front enclosure

.2 Indoor construction of non-walk-in type conforming to CSA Type-1 suitable for use in a sprinklered area, including additional drip hoods.

.3 Switchgear to consist of the required number of vertical sections bolted together to form a rigid and self-supporting assembly. Vertical sections to be designed for bolting together without misalignment or distortion.

.4 Each vertical section to be divided into three compartments from front to rear:

.1 Front compartment containing circuit breakers and/or auxiliary equipment

.2 Bus compartment in the middle

.3 Cable compartment at rear containing the bus extensions from breaker load terminals to cable terminals.

.5 Provide fire retardant and non-hygroscopic internal separation barriers:

.1 between vertical sections, full depth and from top to bottom, to isolate contiguous sections.

.2 between circuit breaker compartments and bus compartment.

.3 between circuit breaker compartments and instrument/control compartment.

.6 Each circuit breaker shall be mounted in an individual metal-enclosed compartment ventilated as necessary. Ventilation openings between compartments within the LV switchgear to be such that the gases produced by circuit breaker interruption do not impair the operation of adjacent compartments.

.7 Provide ventilation openings, with overhanging drip-proof louvers, to maintain internal air temperatures below limits required by CSA and ANSI C37.20.1

.8 Design to accommodate feeder circuit breakers to be stacked 4 high in a vertical section. Feeder circuit breakers up to 2000A to be capable of being mounted in the uppermost compartment without de-rating.

.9 Circuit breakers of like rating and secondary connections to be interchangeable. Circuit breaker compartments including prepared space compartments to have mechanical interlocks to allow only a breaker with the correct rating, frame size, secondary control voltage and connections to be inserted.

.10 Provide a hinged front door for each circuit breaker compartment or metering compartment. The door design for breaker compartments shall be such that the following functions can be performed with the door closed: manual or remote racking the circuit breaker between the connect, test and disconnect positions; manually operate the breaker spring-charging system; close and open circuit breaker; examine and adjust trip unit; and read circuit breaker rating nameplate. Meters and instruments to be mounted in the upper compartment on a suitably braced hinged door. Doors to be secured with ¼ turn latches. A door more than 1.22m (48 inches) high is to be fastened at minimum two latch points.

.11 Each vertical section to have a hinged full-height rear door to allow access into the cabling compartment. Rear doors to have minimum 3 captive bolts and be able to open 135°.

.12 Bolted connections, lugs for cable connections, terminations for power and control wiring and any other items requiring torquing, infra-red thermal scanning, maintenance, or replacement shall be visible and accessible from the front or rear when respective hinged door is opened.

.13 Vertical sections to be of sufficient depth to accommodate bending radii of mains and feeder cables shown. Section depth to also be adequate to accommodate the quantities of conduit terminations and bus-duct entrances as shown on the drawings.

.14 Vertical sections to be configured for top entry/exit of all cables and bus-duct ties. Provide removable top plates for ease of installation.

.15 Individual breaker compartments to be provided with primary and secondary contacts of silver plated copper. Also provide rails, stationary disconnecting mechanism parts and cell interlocks. The drawout mechanism to hold the circuit breaker rigidly in the fully connected, test, and fully disconnected positions. Interlocks to be provided which will prevent moving the circuit breaker from the fully connected, test, and fully disconnected positions, unless the breaker is open. Interlocks to prevent closing the breaker between any of these positions. Provisions to be made for padlocking the breaker open in any of the positions noted above. Mechanisms to be ruggedly constructed and close tolerances maintained to assure interlocks will not fail due to binding, misalignment or distortion of the enclosure.

.16 Each switchgear shipping section base to be of bolted or welded 76 mm (3") minimum channel iron or equivalent construction as certified by manufacturer, to provide a rugged assembly. Such construction to prevent distortion during shipment and installation, and maintain level and alignment throughout its life without additional support.

.17 Lifting angles, eyes or channels to be provided on top of each shipping section.

.18 Two channels across bottom of each section, to permit rolling or jacking of board.

.19 Provisions to accommodate seismic bracing on site.

.20 Shipping splits shall be as instructed by contractor.

2.3 Busses

.1 Busses to be 3 phase plated copper throughout.

.2 Buses and bus connections to be sized for a temperature rise of 65 deg C above 40 deg C ambient.

.3 Main bus to extend through all sections. Ampacity rating of main bus to equal the main breaker frame rating.

.4 Busing to be braced to withstand stresses resulting from fault current equal to the interrupting rating of the main breaker. Busing to be tested to withstand fault current equal to the interrupting rating of the main breaker for the short-time current duty cycle (2 periods of 30 cycle fault current flow separated by 10 seconds).

.5 Vertical section busses to be rated for the total maximum ampacity of the vertical section. Branch bus connections from the section bus to the breakers to be fully rated for the maximum frame size breaker which may be inserted.

.6 Provide plated bus extensions from the load side fixed terminals of each feeder breaker into the rear cable compartment for connection to load conductors.

.7 Compression type terminal lugs, cable supports, bus supports and necessary space to be provided in the rear section of the switchgear assembly for the proper termination of outgoing cable or bus. Lugs to be double indent long barrel, Burndy Catalogue No. YA-2N or Ilsco equal for outgoing copper cables and equivalent CU/AL lugs for outgoing aluminum cables.

.8 Continuous copper ground bus of adequate cross-sectional area to be provided, 6 mm x 50 mm (¼" x 2") minimum, extending the full length of the switchgear assembly and securely bolted to the structural members of the enclosure. Equipment requiring ground connections to be connected to this bus using approved pressure indent type solderless connectors. Ground bus to be readily accessible from the rear. Extend ground bus to connect to ground bus of bus-duct feeders. Ground bus to be continuous without joints except at shipping splits, where joint to be made with not less than two bolts. The frame of each housing to be grounded to this bus.

.9 Provide lugs for ground conductors run with outgoing feeders.

.10 Joints for busses, interconnections and disconnecting devices to have plating and contact arrangement as per manufacturer's standard unless otherwise noted. Bus connections to be bolted with at least two high strength bolts per lap properly torqued and locked into place.

.11 All busbar connections to be secured by the use of Grade 5 bolts and Belleville Grade 5 conical spring washers. All bolts to be tightened with a calibrated torque wrench to manufacturer’s standard.

.12 Where the busbars are drilled the cross section through the bars at the point of drilling the cross sectional area to be capable of taking the full rated current. Busbars to be de-burred and cleaned after drilling and plated before assembly.

.13 For switchgear lineups that are close-coupled to transformers, provide flexible braided connectors and interconnect the switchgear main bus to the transformer secondary terminals.

.14 Provision for bus extensions for future units to be drilled and plated.

.15 Bus supports of high strength, flame retardant, track resistant, inorganic, non-hygroscopic insulation material which to be standoff or fully compartmented type so as to eliminate flat horizontal surfaces and provide extra creepage such that contamination buildup does not compromise phase to phase and phase to ground insulation integrity.

.16 Busduct connections to be designed with the same integrity as the switchgear bus. Phase collection and provision of necessary bolts, nuts and washers for bus duct connection

.17 Coloured phase designations for all phases to suit CSA, NEMA and Hydro Quebec Standards..

2.4 Air Circuit Breakers

.1 Air circuit breakers to be designed, assembled, tested and to comply with the following standards complete with their latest revisions:

.1 Power circuit breakers in enclosures to comply with ANSI / IEEE C37.13

.2 Low-Voltage AC Power Circuit Breakers to be tested to ANSI / IEEE C37.50

.3 Trip devices to comply with ANSI C37.17

.4 Power circuit breakers to be UL 1066 listed

.2 Type tests of circuit breakers to have been conducted by the manufacturer as specified in the above standards. Proof of same with certification that the equipment meets or exceeds these standards to be supplied upon request.

.1 Short time current ratings of circuit breakers to be one half second at the current level equal to the interrupting rating.

.3 Air circuit breakers to include the following:

.1 Draw out construction

.2 Electric operation

.3 Isolation of adjacent breaker compartments by steel panels, top to bottom and front to rear

.4 Isolation of front breaker section and rear bus section by steel panels

.5 Solid-state trip unit with:

(a) True RMS sensing
(b) Adjustable long time pick-up and adjustable time delays including I^2t and I^4t
(c) Adjustable short time pick up and adjustable time delays including flat response and I^2t
(d) Adjustable ground fault pick up and adjustable time delays including flat response and I^2t
(e) Adjustable instantaneous pick up with “off” position
(f) Arc-flash reduction feature, for maintenance mode, wired to a manual switch and indicating light located on the corresponding breaker control compartment.
(g) Integral digital meter with local display of the following:
- Current: present and peak individual phase currents and ground current
- Voltage
- Power: present and peak values for kW, kVA and kvar
- Energy
- Power factor
- In addition to all of the above functions, main breaker trip units to display current and voltage total harmonic distortion, individual current and voltage harmonic components up to 31st harmonic, and be capable of waveform capture at a resolution of at least 58 points per cycle.

(h) Auxiliary modules, power supplies and wiring for the breaker to communicate the following information to an external networked SCADA system and to the building management system (BMS) via external Ethernet local area network.
- circuit-breaker identification and status (open/closed/tripped)
- present and peak values of current, voltage, power, energy, powerfactor and waveforms
- causes of tripping
- alarms
- historical files and maintenance records
- view and set protection function parameters remotely

(i) Auxiliary modules, power supplies and wiring to control (open/close) the breaker remotely from a networked SCADA system.

.6 Integral ground fault protection on all breakers. Adjustable up to breaker sensor rating or 1200A whichever is less.

.7 Six auxiliary contacts for remote annunciation, two for "open", two for "closed" and two for "tripped".

.8 Individual breakers to be equipped with a visual indication of ground fault indication. The integral ground fault protection specified for each breaker to include three coordinated time settings, with the minimum time setting to be 0.20 - 0.25 seconds. Two other, longer term, settings to be included, identified as intermediate and long term. The associated current and time ratings to be applied to the breakers as shown. Provide an auxiliary contact, with wiring to an accessible terminal block to indicate a "breaker tripped" condition, as initiated by the solid state relay.

.9 Ability to remain closed during power outage on supply.

.10 Breakers to be horizontal drawout type, equipped with a stored energy spring mechanism for quick make, quick break, trip free operation. The breaker stored-energy spring mechanism to be designed so that the closing speed is independent of both control voltage and the operator. Breakers to be 3 pole, single throw with a continuous current trip rating as specified and shown on drawings, complete with three independent arc quenchers, closing mechanism, mechanical push trip button, interpole barriers and positive position indicator, so that the position of the breaker is indicated at the front of the compartment. Breakers of like rating to be completely interchangeable. A mechanical interlock to allow only the correct rating breaker to be inserted into the cubicle.

.11 All breakers to have the spring charging device operating at 120 V AC unless noted otherwise. 120 VAC shunt trip from a power supply internal to the switchgear to be provided for remote tripping applications on all breakers unless noted otherwise.

.12 The breaker levering mechanism to be arranged to prevent racking the breaker between the Connected - Test - Disconnected positions unless the breaker is in the tripped position.

.13 Breakers to be dead front construction, which provides a steel barrier between the operator and live parts when racking the breaker - between the Connected - Test - Disconnected positions, and to be capable of being padlocked in any of these positions, such that it cannot be closed or moved to any other position.

.14 Breakers to be positively grounded to the enclosure prior to being inserted into the 'Test' and 'Connected' positions. In the 'Test' position the primary breaker disconnect contacts to be separated by a safe distance from the line and load contacts. The primary disconnect contacts to be self-aligning and to be positively and securely engaged in the 'connected' position. The contacts to be silver to silver and accessible for inspection.

.15 The secondary disconnecting contacts, as required, to consist of a rugged self-aligning constant pressure device, with smooth silver plated copper contacts, which supply control circuit connections to the moveable element. It to be fully engaged when the circuit breaker is in the 'connected' and 'test' positions. The contacts to be suitably protected from physical damage and designed so that positive contact pressure is assured during the life of the breaker. Control wiring

to be harnessed, protected and kept away from moving parts. Wiring to devices to be provided with sufficient slack to prevent breakage from movement or vibration.

.16 Each breaker to be provided with mounting brackets for installing an electrically operated remote-racking device.

.17 Key interlocks, in an arrangement as shown, complete with lamacoid nameplate at key block and on key with key designation inscribed with 12 mm (½") letters.

.18 Cable and/or bus duct terminations as required and as indicated on Drawings.

.19 Power supplies of suitable capacity for operation of such items as electrically operated breakers and meters, using HRC fuses for protection of small wiring

.20 Where switchgear lineups are connected in double-ended configuration, control power supplies in each lineup to be arranged to accept an external input and have control power transformers with suitable capacity to operate the entire double-ended lineup. This redundant arrangement of power supplies to be complete with transfer control relay to provide 120 VAC power to operate all breakers and meters in the double-ended lineup.

2.5 Equipment Identification

.1 Engraved, high quality plastic nameplates with black letters suitably inscribed on white background for cubicle and circuit identification to be provided on front and rear sections.

.2 Engraved letters to be 12 mm (½") minimum, except 6 mm (¼"} minimum height may be provided for meters, relays, switches, signal lights, keys and key blocks, and all other devices.

.3 Circuit identification inscription data will be furnished to the Manufacturer as required.

2.6 Phase Designation

.1 Coloured phase designations or numbering markings to be readily visible in each bus compartment, current transformer compartment, circuit breaker compartment and line and feeder cable compartment.

2.7 Mimic Bus

.1 A white mimic bus single line diagram to be rivetted on front of switchboard.

.2 Run bus through breaker handles and show every piece of equipment on board.

.3 Symbols used to be industry standards for each device.

2.8 Finish

.1 Finish equipment as follows:

.1 Basic rust-inhibiting metal process

.2 Interior in white

.2 Exterior to be finished with paint equal to Sherwin Williams, as follows:

.1 Normal power - [# F65L7, Pale Blue] [ASA# 61, Grey].

.2 Emergency power - F65E37 International Orange

.3 Manufacturer to provide quart of touch-up paint to touch-up small areas marred during installation.

2.9 Control and Secondary Wiring (Breaker Element and Cubicle)

.1 Control wiring to outgoing circuits, at shipping splits and devices mounted in hinged instrument panels, to terminate at terminal blocks.

.2 Terminal blocks to have numbered points for circuit identification. Terminal blocks to be General Electric Type EB or equal. Terminal blocks for current transformer circuits to be shorting block type.

.3 Wiring to be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG single conductor minimum, stranded, tinned copper, extra flexible type throughout. Wires to be tagged at both ends with permanent plastic sleeve type markers. Insulation to be 600V, working and 1500 V test.

.4 Cable openings between sections to be protected with bushings to prevent abrasion to cable jackets.

.5 Fuse and terminal blocks to be easily accessible. Fuses of the proper type and rating to be supplied by the switchgear manufacturer. Fuses to be Class J HRC in dead front enclosure.

.6 Provisions to be made for the installation of control wiring conduits to the switchgear and connections to be brought to terminal blocks furnished and installed by the switchgear manufacturer. Auxiliary wiring checks to be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.

.7 Final checkout of wiring to be made with the complete switchgear lineup assembly to assure wiring correctness and continuity. Polarity of current and potential transformers and devices to be checked to assure proper functioning of all protective devices and instrumentation.

2.10 Control Devices

.1 Switchgear to be configured for integration to the facility's Load Management System (LMS) system.

.2 The LMS vendor will free-issue Distributed I/O modules for installation in each switchgear lineup, and will deliver these to the switchgear manufacturer's factory. Install the Distributed I/O modules in each switchgear lineup complete with control wiring to main, tie and feeder breakers to achieve the following functions:

.1 Remote control (open/close) of each feeder breaker.

.2 Remote trip of main and/or tie breakers.

.3 Remote monitoring of the following status of each breaker:

(a) Breaker closed
(b) Breaker open
(c) Breaker tripped
(d) Breaker withdrawn
(e) Breaker 'ready to close', on main breakers, tie breakers, and feeder breakers associated with the Power Factor Correction system panel.

.4 Include auxiliary breaker-mounted devices and communication modules necessary to achieve the above functions.

.3 Control wiring for tripping, closing and breaker status points to be terminated on the distributed I/O modules. This wiring to be in accordance with the point-to-point wiring diagrams that will be furnished by the LMS vendor.

2.11 Instrument Transformers

.1 Potential transformers and current transformers required to operate relays, meters and other devices indicated in the drawings and specifications to be coordinated so that the ratio and accuracy are suitable for each individual application, taking into account the burdens imposed. Construction of transformers to conform to ANSI Standards. All terminals to have permanent polarity designations and to be wired accordingly. All applicable requirements of ANSI Standard C57.13 to apply.

.2 Primary potential bus or cable tap leads to be constructed with the same design integrity as the primary bus.

.3 Provide a current transformer (CT) on the main bus of each 600V switchgear lineup associated with a 12.47kV-600V step-down transformer, positioned downstream of the main and tie breakers and upstream of all feeder breakers such that the CT measures the load current of the main bus regardless of the main and tie breaker status. Provide CT wiring to shorting-type terminal blocks for extension to automatic Power Factor Correction (PFC) units connected to each lineup. Primary current rating of this CT to be equal to the main bus rating, secondary current rating to be 5 Amps.

2.12 Potential Transformers

.1 Potential transformers to be housed in a separate compartment in the circuit breaker cubicle or superstructure.

.2 Potential transformers to be of the 0.3 accuracy class, per ANSI Standards and of sufficient capacity to serve the maximum burden imposed.

.3 Each potential transformer to be protected with current limiting primary fuses, and to be designed to withstand the basic impulse level of the switchboard.

2.13 Current Transformers

.1 Current transformers to be easily removable and accessible and of the ring or bar-type.

.2 Ring-type current transformers to be used where burden and accuracy permit. Primary terminals on bar-type current transformers to be silver plated and rigidly (4 bolt minimum, 2 per end) connected to the bus structure.

.3 Secondary connections of all current transformers to have provisions for short circuiting when not connected to instruments and to be solidly grounded.

.4 Current transformers to be capable of carrying at least 125% of CT rating continuously and have a short time rating at least equivalent to that of the switchgear bus. Accuracy class: C100/ 0.6 B-1.

2.14 Operation of the Manual Transfer Scheme

.1 Each double ended switchboard is equipped with a manual transfer scheme utilizing kirk key interlocks.

.2 The incoming supply to enter the switchboard via two incoming line cells, separated through a normally open bus tie. Both of the incoming line breakers to be normally closed.

.3 Provide key interlock such that it to be possible to manually transfer the lines by first opening one breaker and then closing the tie breaker, or vice versa.

.4 Indicating lights to be provided to indicate the following conditions:

.1 Red Light: Breaker closed

.2 Green Light: Breaker open

.3 Blue Light: Potential available indication.

.5 All necessary relays, switches and wiring to be included to provide the manual transfer scheme as specified.

2.15 Grounding Resistors, Ground Fault Annunciation & Locating System

.1 Where switchgear is fed from 12.47-0.6kV transformers, the secondary wye-point of the source transformer shall be brought to the switchgear and grounded through a current limiting resistor which limits ground current to 5 amperes.

.2 Neutral grounding resistor, ground fault relay, ground-fault annunciation and locating system to be integrated into the switchgear.

.3 Neutral grounding resistors:

.1 designed and tested to IEEE-32 standards.

.2 outdoor type rated for continuous duty at 347 volts.

.3 consisting of helical stainless steel elements wound on a solid porcelain core, with welded terminals

.4 to be vibration resistant.

.4 Provide dual resistor elements for redundancy and protection in the event of an open circuit failure of one of the resistor elements.

.5 Provide a ground fault annunciation system that will:

.1 detect the presence of a phase-to-ground fault on any faulted feeder, create a System Alarm condition that will identify the faulted feeder, provide a locally audible alarm signal, and operate an alarm contact that will be interfaced to the Building Management System.

.2 not trip the first phase-to-ground faulted feeder

.3 monitor the integrity of grounding resistor elements and operate a local alarm and remote alarm contact if the value of the grounding resistor elements changes to a lower or higher limit that is set during commissioning.

.4 assist in locating the fault with a pulsing relay circuit that cyclically modulates the current in the fault circuit to 100% and 50% of the available ground fault current.

.6 Ground fault locating system:

.1 Implemented by means of a pulsing relay circuit. This circuit is to vary the magnitude of the ground fault current. The duration of pulsing to be field adjustable to suit the fault locating device sensitivity.

.2 Pulsing circuit to be activated by a selector switch located on the front panel. System to also have a test pushbutton.

.3 Provide a total of two (2) hand-held current sensors to assist in field location of the faulted circuit. Current sensor to be loop type with 48” diameter with dual banana jacks for connection to a hand-held digital multi-meter.

.7 Standard of Acceptance: i-Gard DSP Ohmini

2.16 Surge Protective Devices

.1 Where indicated on drawings, Surge Protective Devices (SPD) to be provided and mounted internal to the switchgear they are protecting.

.2 Surge Protective Devices to comply with ANSI/IEEE C62.41.2 and tested to ANSI/IEEE C62.45

.3 Units to be CSA approved as a Surge Protective Device and have the following markings, listings, and approvals:

- .1 UL 1449-2006, Type-2
- .2 UL 1283
- .3 CSA C22.2, Type 2

.4 Shop drawing submittals to state:

- .1 Peak single-impulse surge current rating, per phase and per mode
- .2 Voltage Protection Rating

.5 SPD's to be factory-installed as part of the switchgear assembly.

.6 SPD's to be equipped with a 30A, 3-pole current-limiting type moulded case circuit breaker on the line side.

.7 SPD's to be solid state, bipolar, bi-directional clamping devices based on non-linear voltage dependant metal oxide varistors. SPD's to be internally fused. Short circuit current rating of SPD to comply with UL 1449-2006 and not be less than the interrupting rating of the switchgear. .

.8 Minimum UL 1449 3rd edition withstand (In) rating to be 20kA per mode

.9 SPD's to be 3-phase, 3 wire delta connected with maximum continuous operating voltage (MCOV) rating not less than 750V for application on 3-phase 3-wire high-resistance grounded system.

.10 SPD's to provide suppression elements between each set of phase conductors (L-L), and between each phase conductor and ground (L-G) for all 3-wire resistance grounded switchgear assemblies.

.11 Suppressors to have a minimum surge current rating of 240kA per phase, 120kA L-L mode and 120kA L-G mode.

.12 UL 1449-2006 voltage protection rating (VPR) on individual units to not exceed 2500V L-L and 2000V L-G.

.13 Each SPD unit to include display unit, remote mounted on instrument compartment door, complete with:

- .1 indicating lights to display unit status,
- .2 audible alarm
- .3 transient disturbance counter,
- .4 NO/NC form C dry contacts indicating failure of the suppression network, wired to accessible terminals on the switchgear for extension to the Building Management System.

2.17 Miscellaneous

.1 Provide the following:

.1 Power supplies of suitable capacity for operation of such items as electrically operated breakers and meters, using HRC fuses for protection of small wiring

.2 Supply four counterbalanced hoists on wheels with swivel boom, heavy duty winch with positive locking safety latch and lockable wheels, one for each normal and emergency switchboard room.

.3 One set of spare fuses per switchboard of each type used in each switchboard.

.4 Redundant power supplies of suitable capacity complete with transfer control relay to provide 120 VAC power to shunt trip operators on feeder breakers.

.5 Provide one (1) electrically operated breaker remote racking device with minimum 7.6m {25'-0"} long umbilical cord and operator pendant. Remote racking device to be capable of being locked-on to the breaker without opening the cubicle door and allow the operator to remotely open/close and rack in/out the breaker. Remote racking device to operate on an external 120V AC power supply.

2.18 Metering System

.1 Provide a Schneider Powerlogic ION 7650 power and energy meter at the mains.

.2 Provide an integrated gateway-server, EGX-300 or equal, in each switchgear lineup to interface the metering information from all the breaker trip units to an external Ethernet local area network (LAN). On switchgear lineups shown interconnected in double-ended configuration provide a gateway-server for each side.

.3 The Ethernet-to-serial line gateway to also have an embedded webserver with embedded HTML pages such that all real-time circuit information and historical information from each breaker's trip unit can be viewed, in both numeric and graphical visual formats including waveforms, from multiple locations via a standard internet web browser without any additional software.

.4 Gateway-server in each switchgear lineup to have the following features:

(a) Power-over-Ethernet device
(b) serial support for Modbus RTU
(c) minimum one 10/100BaseTx Ethernet port
(d) minimum one serial port configurable for RS485 (2/4 wire) or RS232 (RJ45)

.5 Communication wiring between each breaker trip unit and the gateway-server device to be factory installed and made operational by the Switchgear manufacturer.

2.19 Co-ordination

.1 Manufacturer to review line and load side equipment connected to switchboard, as well as equipment enclosed and provide trip devices to co-ordinate with line side and load side equipment. Allowance will not be made, after Contract award, to change trip devices to provide satisfactory co-ordination.

2.20 Factory Test and Inspection

.1 Factory verification tests to be performed in the presence of the Design-Builder, Independent Testing Agent, and the Authority's representative, after completion of assembly in factory and following standard factory testing procedures, in accordance with NEMA and EEMAC Specifications, and as described herein.

.2 Certified copies of standard production tests to be submitted upon request.

.3 Tests to include hi-pot testing, operation of breakers, operation of relays, meters and switches.

.4 Completed switchboard to be connected to a power supply (or multiple power supplies as required) to permit operation of all electrically operated devices including but not limited to switches and

pushbuttons, indicating lights, meters, and automatic transfer and breaker interlock schemes to prove that they are wired correctly, that contacts make and break and that all devices and meters perform satisfactorily before shipment of switchboard.

.5 Test the overcurrent and other protective devices on each breaker to prove that trip unit and breaker function satisfactorily.

.6 Undertake primary current injection testing of each switchboard for verification of protective schemes. Double ended switchboards to be interconnected at factory to permit complete testing.

.7 Racking in and out of breakers and manual operation of equipment to be tested to prove that items work freely.

.8 Verification of key interlock schemes.

.9 Correct deficiencies noted during the factory test prior to shipment.

.10 Submit certified copies of successful completion of the above tests prior to shipment of the equipment.

2.21 Manufacturers

.1 Switchboard and Components

Standard of Acceptance
- Schneider Canada Ltd. – Square D Powerzone 4

3 EXECUTION

3.1 Installation

.1 Provide low voltage switchboards of type, rating and arrangement as shown.

.2 Provide a 100 mm (4") reinforced concrete pad with bevelled edges. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Pads to be provided under this division.

.3 Grout a minimum of two steel plates with anchor bolts into pad, for levelling purposes, for full length of switchboard.

.4 Assemble all shipping sections and level switchboard on pad.

.5 Provide interconnecting, incoming and outgoing cable, bus duct, and control wiring connections as shown and as required.

.6 Terminate all power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.7 Provide grounding of each switchboard to perimeter ground bus with two separate runs of a #4/O green insulated copper in conduit. Terminate with Burndy YA-2N lugs.

.8 Install 2- #10 AWG in {19 mm (¾”} conduit between normal and emergency switchboards for control power interconnection, for proper operation of centralized metering system devices.

.9 Touch up small areas marred in transit or during installation with touch up paint. Repaint entire switchboard using electrostatic process where large areas of significant damage to factory finish has occurred.

.10 Provide and install new rubber mats 3' wide 1/4" thick 17,000 volt rating, American Biltrite Canada Ltd., in front and rear of Switchboards for a continuous and neat appearance. Do not place mats until work is completed and room has been thoroughly cleaned. Clean or replace any existing mats dirtied or damaged during the installation.

3.2 On-site Testing

.1 Conduct an acceptance test in presence of and to satisfaction of Consultant, after completion of installation, but before switchboard is permanently put into service.

.2 Test to include operation of breakers manually and electrically, racking in and out, and checking that meters and relays function properly. Correct defects at no additional cost to Authority. Replace defective equipment immediately with new factory equipment.

.3 In addition to above, include work associated with field testing, cleaning and calibration of relays and trip devices in Bid cost.

END OF SECTION

POWER PANELS
26 27 15

1 GENERAL

1.1 References

.1 CSA C22.2 No. 29.

1.2 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.3 Work Included

.1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

1.4 Related Work

.1 Plywood Backboard: Section 06 10 00 - Rough Carpentry

1.5 Shop Drawings

.1 Submit shop drawings in accordance with Section 26 05 01 Electrical General Requirements.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.6 Plant Assembly

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

1.7 Identification

.1 Panels shall be identified with lamacoid plate with shall include panel designation 12 mm (½") lettering), voltage and phase 5 mm (¼") lettering and where panel is fed from 5 mm (¼") lettering).

1.8 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

1.9 Maintenance Materials

.1 Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements.

1.10 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions as specified in Section 26 05 01 Electrical General Requirements.

2 PRODUCTS

2.1 Power Panels

.1 Products of one manufacturer.

.2 Panelboards to be factory assembled type CDP, unless otherwise specified.

.3 All power panels 400A or larger to be in oversized tub with bus bar extensions drilled to accept a long barrel two hole compression connector on main incoming feeder.

.4 Copper bus with neutral of same ampere rating as mains.

.5 Panels to be freestanding surface mounted type, as shown.

.6 Panels to be dead front type in code gauge steel enclosure.

.7 Panels to have sub-feed lugs and additional tubs as required to accommodate the quantity of breakers and equipped spaces indicated.

.8 Each panel shall be complete with a typewritten directory which shall be mounted inside door with clear plastic cover.

Standard of Acceptance
- Square D

2.2 Construction Features

.1 Free-standing, rigid, dead front enclosure

.2 Hinged and formed front doors

.3 Completely front accessible with all bolted connections, lugs for cable connections, terminations for control wiring and any other items requiring torquing, infra-red scanning and maintenance and replacement all visible and accessible from the front, when front trim is removed.

.4 Indoor sprinkler proof construction of non walk-in type conforming to CSA Enclosure 2. Door(s) shall be gasketted, with overhanging drip shield, with T-handle 2 point locking system complete with lock and latch, protecting breakers and all other components.

.5 Two channels across bottom of each section to permit rolling, jacking and levelling.

.6 Finish basic rust inhibiting metal process

.7 Panels in kitchen, servery and dishwashing areas shall have stainless steel trim.

.8 Panels shall be finished with two coats of paint in accordance with Authority's colour coding standard.

.9 Panel locks shall be common to one key throughout project.

.10 Ground bus extending through all sections complete with copper lugs for number of incoming and outgoing feeders.

.11 Main incoming bus and main circuit breakers to be in a separate compartmentalized steel enclosure accessible from the front of the switchboard.

.12 All buses shall be copper and braced to match main breakers.

.13 All branch circuit breakers shall be molded case type suitable for interrupting capacity as indicated on single line diagram.

.14 Surge Protective Devices (SPD) to be provided and mounted internal to the distribution panels they are protecting where indicated, complete with 3P,30A circuit breaker.

.15 Kirk Key interlocks:

a) For Critical Distribution Panels serving Operating and Critical Care rooms, the two (2) main and one (1) tie breaker shall have a Kirk key interlock, arranged such that the key must be inserted in order to close the breaker. The interlock shall allow any two out of the three breakers to be closed at the same time.

.16 Breakers shall at a suitable height for operation without the use of step ladders or stools

.17 Equipment and total assembly shall be CSA approved.

.18 Warning labels indicating live components from 2 sources where required.

.19 UPS panels to have 200% neutral.

.20 Panels serving the Central Communications Hub, Telecommunication Rooms, Entrance Facility to have 200% neutral.

2.3 Breakers General

.1 Bolt-on or I-Line plug-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 5 - 10 times current rating.

.4 Circuit breakers with interchangeable trips over 150 A.

.5 Include:

.1 on-off locking device.

.2 handle mechanism.

.6 Symmetrical interrupting rating to be not less than the value recommended in the accepted Protective Device Coordination Study.

.7 not used.

.8 Series rated breakers are not permitted.

2.4 Thermal Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.5 Solid State Trip Breakers

.1 Moulded case circuit breaker to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for phase, ground fault and short circuit protection, with individually adjustable time and pick up settings.

2.6 Surge Protective Devices

.1 Surge Protective Devices (SPD) to be provided and mounted internal to the power panels they are protecting.

.2 Surge Protective Devices to comply with ANSI/IEEE C62.41.2 and tested to ANSI/IEEE C62.45

.3 Units to be CSA approved as a Surge Protective Device and have the following markings, listings, and approvals:

.1 UL 1449-2006, Type-2

.2 UL 1283

.3 CSA C22.2, Type 2

.4 Shop drawing submittals to state:

.1 Peak single-impulse surge current rating, per phase and per mode

.2 Voltage Protection Rating

.5 SPD's to be factory-installed as part of the power panel assembly.

.6 Wiring from the 30A, 3P breaker to the SPD to be kept as short and as straight as possible.

.7 SPD's to be solid state, bipolar, bi-directional clamping devices based on non-linear voltage dependant metal oxide varistors. SPD's to be internally fused. Short circuit current rating of SPD to comply with UL 1449-2006 and not be less than the required interrupting rating of the load centre or power panel circuit breakers.

.8 Nominal discharge current (In) rating to be not less than 20kA per mode.

.9 SPDs for 600V panels to be 3-phase, 3 wire delta connected with maximum continuous operating voltage (MCOV) rating not less than 750V for application on 3-phase 3-wire high-resistance grounded system.

a) SPD's to provide suppression elements between each set of phase conductors (L-L), and between each phase conductor and ground (L-G) for all 3-wire resistance grounded load center and power panel assemblies.

b) Suppressors to have a surge current rating of not less than 160kA per phase, 80kA L-L mode and 80kA L-G mode.

c) UL 1449-2006 voltage protection rating (VPR) on individual units to not exceed 2500V L-L and 2000V L-G.

.10 SPDs for 208V panels to be 3-phase, 4 wire wye connected with maximum continuous operating voltage (MCOV) rating not less than 150V (L-N & L-G) for application on 3-phase 4-wire solidly grounded system.

.1 SPD's to provide suppression elements between each set of phase conductors (L-L), between each phase conductor and neutral (L-N), between each phase conductor and ground (L-G), and between the neutral and ground (N-G) for all 4-wire solidly grounded load center and power panel assemblies.

.2 Suppressors to have a surge current rating of not less than 160kA per phase, 60kA L-L mode, 60kA L-N mode, 60kA L-G mode, and 60kA N-G mode.

.3 UL 1449-2006 voltage protection rating (VPR) on individual units to not exceed 1500V L-L and 700V L-G.

.11 Each SPD unit to include display unit complete with:

.1 indicating lights to display unit status,

.2 audible alarm

.3 transient disturbance counter,

.4 NO/NC form C dry contacts indicating failure of the suppression network, wired to accessible terminals for extension to the Building Management System.

2.7 Meters

.1 Provide metering on Panels as follows:

.1 On main incoming bus.

.2 HRC fuses on primary three potential transformers if required, secondary wiring and transfer switch.

.3 3 current transformers.

.4 A combined digital metering system, the power supplies to be protected with isolation transformers.

.5 Meters shall be as manufactured by: Square D Power Logic PM810

2.8 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Nameplate for each power panel size 4 engraved, Submit nameplate wording.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit. Cover directory with a 0.8 mm (1/32") thick clear plastic sheet.

.4 Nameplates for electrical panels shall indicate panel designation and mains voltage, i.e. 600V, 3 φ, 4 W and panel and circuit number from which this panel is fed.

3 EXECUTION

3.1 Installation

.1 Locate panel boards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

.3 Provide a 100 mm (4") reinforced concrete pad with bevelled edges for all floor mounted panelboards. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Pads to be provided under this division.

.4 Mount panelboards to height specified in Section 26 05 01 - Electrical General Requirements, or with top of trim at uniform height of 2000 mm (6' -6") or to match door heads or to suit tile layout, or as indicated.

.5 Co-ordinate panel finish with Room Finish Schedule.

.6 Deliver ten (10) duplicate keys for panel locks to Authority.

.7 Connect loads to circuits.

.8 Connect neutral conductors to common neutral bus with respective neutral identified.

.9 Provide minimum #6AWG green insulated copper bonding conductor in conduit to interconnect normal and emergency power panels serving common patient care areas.

.10 Connect ground conductors to common ground bus.

END OF SECTION

LIGHTING & RECEPTACLE PANELS
26 27 16

1 GENERAL

1.1 References

.1 CSA C22.2 No. 29.

1.2 Related Work

.1 Plywood Backboard: Section 06 10 00 - Rough Carpentry

1.3 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Section 26 05 01 Electrical General Requirements.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

.3 Nameplates shall be in accordance with Article "Equipment Identification”.

1.5 Work Included

.1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

1.6 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

1.7 Maintenance Materials

.1 Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements.

1.8 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions as specified in Section 26 05 01 Electrical General Requirements.

1.9 Plant Assembly

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

1.10 Identification

.1 Panels shall be identified with lamacoid plate with shall include panel designation 12 mm (½") lettering, voltage and phase 5 mm (¼") lettering and where panel is fed from 5 mm (¼") lettering.

2 PRODUCTS

2.1 Panelboards

.1 Product of one manufacturer.

.2 Panels shall have 208/120V, 3 phase, 4 wire and mains of 225A ampacity except where indicated otherwise.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase. When numbering breakers, number from top to bottom and from left to right.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with neutral of same ampere rating as mains except for panels on UPS power as well as panels serving the Campus Communication Hub, Entrance Facility or Telecommunication Rooms which shall have 200% capacity neutrals.

.7 Ground bus shall be copper with size and quantity of copper lugs to suit incoming feeder(s) and maximum complement of branch circuits.

.8 Panels shall be constructed and finished in accordance with details specified in Section 26 27 18 "Panel Trim".

.9 Panels shall be surface or flush mounted type, as shown.

.10 Panels shall be dead front type in code gauge steel enclosure.

.11 Each panel shall be complete with a typewritten directory which shall be mounted inside door with clear plastic cover.

.12 Surge Protective Devices (SPD) to be provided and mounted internal to the panels they are protecting where indicated, complete with 3P,30A circuit breaker. Surge protective devices to be identical to surge protective devices specified in Section 26 27 15.

.13 Panels shall have mains of voltage and capacity, and main and branch breakers and contactors, as shown on the "Lighting and Receptacle Panel Schedule". Panels shall be complete with branch circuit breakers not less than 85% of the total capacity of the panel. Spaces shall include the necessary bus work such that the Authority, at a later date, need buy only the breakers.

.14 Contactors in panel mains shall be electrically operated, mechanically held and shall be rated to control incandescent, fluorescent and other loads as shown. Contactors shall be mounted within panel and shall be open type. Contactors shall be complete with fuse and fuse adaptor mounted and connected to line side of contactor and shall be connected to supply power to operating coil. Coil clearing contacts shall be included in contactor where a contactor is controlled by a time switch.

.15 Breakers shall have bolted type connections.

.16 Panels for 120/208 volts, three phase, four wire systems shall be complete with full size breakers, having a symmetrical interrupting rating not less than the value recommended in the accepted Protective Device Coordination Study.

.17 Where indicated breakers shall have a ground fault interrupter.

Standard of Acceptance
- Square D

2.2 Breakers General

.1 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 5 - 10 times current rating.

.4 Circuit breakers with interchangeable trips over 150 A.

.5 Lock-on devices for clock outlet, fire alarm, security systems, battery chargers, door supervisory, intercom, stairway, exit and night light circuits.

2.3 Thermal Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.4 Trim

.1 Front panel trim shall be overall hinged type, door within door construction. Trim assembly shall provide hinged access to the internal tub and wiring channels for access to wiring and breaker terminals without removal of the trim assembly. With overall trim assembly closed and secured, a second integral hinged door forming part of the trim assembly shall provide access to the circuit breakers only for opening and closing purposes

.2 Panels shall be given a rust-resistant treatment to both tub and trim. Locks shall be chrome plated.

.3 Flush panels shall have concealed hinges and flush type combination lock latch. Doors shall open minimum 135 degrees. Trims shall have fasteners concealed and shall be prime coated to receive room finish paint.

.4 Surface mounted panels shall be constructed in accordance with CSA Type 2 enclosures with overall door assembly protecting all circuit breakers. Door(s) shall be gasketted, with overhanging drip shield, with T-handle 2 point locking system complete with lock and latch.

.5 Panels in kitchen, servery and dishwashing areas shall have stainless steel trim.

.6 Panels shall be finished with two coats of paint in accordance with Authority's color coding scheme.

.7 Panel locks shall be common to one key throughout project.

2.5 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Nameplate for each panelboard size 4 engraved, Submit nameplate wording.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit. Cover directory with a 0.8 mm (1/32") thick clear plastic sheet.

.4 Nameplates for electrical panels shall indicate panel designation and mains voltage, i.e. 120/208 V, 3 φ, 4 W and panel and circuit number from which this panel is fed

3 EXECUTION

3.1 Installation

.1 Locate panel boards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 01 - Electrical General Requirements, or with top of trim at uniform height of 2000 mm (6' -6") or to match door heads or to suit tile layout, or as indicated.

.4 Co-ordinate panel finish with Room Finish Schedule.

.5 Deliver ten (10) duplicate keys for panel locks to Authority.

.6 Connect loads to circuits.

.7 Connect neutral conductors to common neutral bus with respective neutral identified.

.8 Provide minimum #6 AWG green insulated copper bonding conductor in conduit to interconnect normal and emergency power panels serving common patient care areas.

END OF SECTION

FUSES - LOW VOLTAGE
26 28 13

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

1.2 Submittals

.1 Submit product data for each type of fuse used.

.2 Submit fuse performance data characteristics for each fuse type and size above 200 A. Performance data to include: average melting time-current characteristics on log log paper, I^2t (for fuse coordination), and peak let-through current.

1.3 Maintenance Materials

.1 Supply six spare fuses of each type and size installed up to and including 600 A.

1.4 Applicable Codes and Standards

.1 Latest version of CSA Standard C22.2 No.106 HRC – Miscellaneous Fuses

2 PRODUCTS

2.1 Fuses General

.1 Fuses: product of one manufacturer.

.2 Fuses rated to 600A: CSA certified HRCI-J.

.3 Fuses rated 601A and above: CSA certified HRCI-L.

2.2 Fuse Types

.1 HRCI-J fuses, current limiting, time delay, with blown fuse indication.

Standard of Acceptance
- Ferraz Shawmut: Amptrap 2000 AJT series
- Bussman: LPJ - SP series
- Littlefuse: JTD-ID series

.2 HRCI-L fuses, current limiting, time delay.

Standard of Acceptance
- Ferraz Shawmut: Amptrap 2000 A4BQ series
- Bussman: KRP-C - SP series
- Littlefuse: KLPC Power-Pro series

2.3 Fuse Storage Cabinet

.1 Manufactured from 2.0 mm thick aluminum.

.2 With provisions for wall mounting.

.3 750 mm high, 600 mm wide, 300 mm deep.

.4 Hinged, lockable front access door.

.5 Finished in accordance with Section 26 05 01 - Electrical-General Provisions.

3 EXECUTION

3.1 General

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in motor control centres, or disconnect switches.

.3 Spare fuses to be stored in original containers.

3.2 Installation

.1 Install fuses in fuseholders immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched fuseholders.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Mount fuse storage cabinet on wall in main electrical room.

.5 Provide a spare set of six fuses of each size and type installed on the project and locate in fuse storage cabinet.

PAD MOUNTED TRANSFORMERS
26 32 10

1 GENERAL

1.1 General Requirements

.1 General Conditions as applicable.

.2 Section 26 05 01, Electrical General Requirements.

1.2 Applicable Codes and Standards

.1 Latest edition of:

.1 CSA C2, Single-Phase and Three-Phase Distribution Transformers, Types ONAN and LNAN

.2 C227.4, Three-Phase, Dead-Front, Pad-Mounted Distribution Transformers

.3 CAN/CSA C802.1, Minimum Efficiency Values for Liquid-Filled Distribution Transformers

1.3 References

.1 Latest edition of:

.1 CEMA, IGL-1-Transformer and apparatus bushings

.2 ANSI, C.57.12.90-Test code for distribution, power and regulating transformers and shunt reactors

.3 NEMA, TR1-Transformers, regulators and reactors

1.4 Scope

.1 Provide labour, materials, equipment and services for the manufacture, factory witness testing and storage of complete transformers as shown as specified and as otherwise required.

.2 Shipping to site is not included in the scope of work.

1.5 Submittals

.1 Submit shop drawings and product data for each type and rating of transformer.

.2 Provide operation and maintenance data for incorporation into the Operating and Maintenance Manual.

1.6 Operating and Maintenance Instructions

.1 Provide operating and maintenance instructions.

1.7 Quality Control

.1 Type tests:

.1 to have been conducted in accordance with CSA C2 for the following:

(a) temperature rise,
(b) sound level.

.2 Production tests:

.1 conduct in accordance with CSA C2 the following:

(a) Voltage ratio, including all taps,
(b) polarity or angular displacement,
(c) dielectric, applied potential and induced potential,
(d) no load losses,
(e) exciting current,
(f) load losses,
(g) impedance,
(h) tank leakage.

.2 submit certified copies of reports of production tests.

.3 Energy efficiency:

.1 Submit the energy efficiency reports to show compliance with the specified efficiency values.

1.8 Warranty

.1 Provide a 2 year manufacturer's warranty for the equipment.

.2 Warranty period to commence following substantial performance of Project 2.

2 PRODUCTS

2.1 General:

.1 three phase pad-mounted distribution transformer,

.2 type KNAN,

.3 FR3 filled,

.4 continuous duty,

.5 with internal current limiting fuses,

.6 tamperproof,

.7 all current carrying parts including transformer windings to be minimum 98% pure copper,

.8 seismic certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the Building Code for the geographic location of the installation.

2.2 Ratings

.1 kVA as noted on drawings,

.2 12470 Volt delta connected primary,

.3 600 Volt wye connected secondary,

.4 three phase,

.5 60 Hz,

.6 65ºC temperature rise over 40ºC ambient,

.7 BIL: 125 kV primary, 10 kV secondary,

.8 efficiency: to CAN/CSA, C802.1,

.9 impedance: 4.5% ± 7.5%,

.10 sound level: not more than 56 dBA,

.11 Voltage regulation: not to exceed 3% at full load at 90% PF,

.12 12.47kV system symmetrical fault level: 250 MVA,

.13 Upstream system grounding:

.1 low resistance grounding when on emergency (generator) power

.2 solid grounding when on normal (utility) power.

2.3 Enclosure

.1 Outdoor, weatherproof, suitable for mounting on a concrete pad.

.2 Tamper-proof construction, “tamper resistant” in accordance with the requirements of CSA standard C227.5-08.

.3 All valves, fittings, connections, gauges, wiring, terminals, bushings etc to be housed within a lockable tamperproof cabinet.

.4 Provision for padlocking all doors, lids etc with a single padlock.

.5 A key interlock to prevent the doors from being opened unless the primary isolating switch is locked in the open position. Interlocks will be free issued by the manufacturer of the SF6 switchgear.

.6 Doors to be secured by a three point latching mechanism.

.7 Stainless steel hinges, concealed within the cabinet.

.8 Doors to be equipped with positive stops to prevent them from opening too far or from closing unintentionally, regardless of weather conditions.

.9 Doors to be bonded to the cabinet with flexible braided tinned copper straps.

.10 Grounded steel barrier between the high voltage and low voltage sections.

.11 Ground bus: copper, connected to the transformer tank at each end and bonded to the X0 terminal and to the cabinet.

.12 Drill ground buss to accept:

.1 cable shield connections,

.2 ground grid connections,

.3 neutral connection,

.4 feeder bonding conductors and

.5 test connections.

.13 Dome top of the enclosure to shed water.

.14 Coat the underside of the cabinet top, lids etc with an anti-condensation material.

.15 Hardware: stainless steel.

.16 Exposed hardware: pentahead bolts with the bolt heads located in a recess or in a steel cup welded to the enclosure to prevent gripping the bolt head with any tool other than the correct tamperproof socket.

.17 Provide means of support for the incoming and outgoing cables in a manner that will protect the bushings from any strain.

.18 Provide three intermediate class lightning arresters in the high voltage section of the cabinet wired to each phase and bonded to ground, with copper cables kept as short and as straight as possible.

.19 The low voltage side of the enclosure to house the control panel for the alarm terminals. Control panel to include provision to support the incoming waterproof flexible metallic conduit.

.20 Provision for bolting the transformer to the concrete pad in at least four locations. Securing bolts to be located within the cabinet.

2.4 High Voltage Windings and Bushings

.1 Off load tap changer with manual operating head mounted within the cabinet, with position indicator and provision for padlocking.

.2 Taps: 2-2½% FCAN & 2-2½% FCBN.

.3 HV bushings: side mounted in an air filled weatherproof enclosure.

.4 HV terminals to be live front design.

.5 Location of HV terminals to provide adequate space and proper orientation of terminals to:

.1 prevent cross phasing of unshielded conductors,

.2 provide full air clearance phase to phase and phase to ground of all unshielded phase conductors,

.3 provide adequate space for installation of terminators,

.4 provide adequate space to accept two hole long barrel compression connectors for terminating cables to bushings.

.5 Lugs: two hole long barrel compression type suitable for the connection of 250 MCM copper cables.

.6 Protect the HV windings with three internal (under oil) current limiting fuses. Size the fuses to operate only in the event of an internal transformer fault, and not to operate in the event of a fault external to the transformer. Provide time current characteristic curves of the fuses to the Independent Testing Organization for incorporation into the co-ordination study.

2.5 Low Voltage Windings and Bushings.

.1 Bring neutral point out to the low voltage compartment and bond to the ground bus, do not ground internally.

.2 Low voltage terminals: spade type sized and drilled to suit the outgoing cables.

.3 Lugs: two hole long barrel compression type.

.4 Space the low voltage bushings far enough apart to maintain clearances through air with cable lugs in place, allowing for lugs to be installed on both sides of the terminals.

2.6 Lightning Arrestors

.1 Three 8.4 kV MCOV Ohio Brass Dynavar intermediate class surge arrestors.

.2 Connect surge arrestors to the primary terminals with a 4 hole NEMA pad.

.3 Provide 4/0 AWG copper ground jumper to ground bus. Keep jumper length to a minimum.

2.7 Tank

.1 Sealed welded steel plate construction.

.2 Top of tank to be domed to shed water.

.3 Completely assembled tank to be capable of withstanding full vacuum during oil processing operations.

.4 Gaskets to be of cork-neoprene, nitrile rubber, or equivalent material, with gasket retainers provided on all oil tight gasketted joints.

.5 Main drain valve:

.1 located in low voltage compartment,

.2 not less than 1",

.3 located at lowest point of tank to permit complete drainage of tank,

.4 threaded outlet with pipe plug,

.5 ½" sampling needle valve to drain only when main drain valve is open.

.6 Filter press valve:

.1 not less than 1",

.2 threaded outlet with pipe plug and permanent labelling.

.7 Magnetic liquid level gauge:

.1 markings to show normal level range and alarm point,

.2 equipped with low level alarm contacts with leads extended to terminal blocks in the control panel.

Standard of Acceptance

° Qualitrol

.8 Pressure/vacuum gauge with markings to show normal range of operation.

Standard of Acceptance
° Qualitrol

.9 Top oil thermometer:

.1 located near top of transformer tank,

.2 readily removable for inspection without lowering of oil level,

.3 equipped with adjustable high temperature alarm contacts with leads extended to terminal blocks in the control panel.

.4 markings to show normal maximum operating temp, emergency maximum operating temp and set point of alarm contacts.

Standard of Acceptance
° Qualitrol

.10 Pressure relief device:

.1 automatic mechanical type,

.2 suitable for repetitive operation,

.3 positive resealing,

.4 visual indicator to identify that the device has operated,

.5 opening pressure value identified on nameplate.

Standard of Acceptance
° Qualitrol

.11 Lifting hooks for lifting the completely assembled transformer.

.12 Core assembly to include lifting lugs.

.13 Transformer base suitable for rolling, pulling or skidding in the direction of the center lines of the transformer without damage. All steel members forming the base to be level on the bottom to facilitate rolling.

.14 Two 4" square stainless steel pads with four (4) 1½" tapped holes spaced on 1-3/4" centres to be welded to tank wall near base; one on HV side and one on LV side, located as not to interfere with jacking facilities.

.15 Radiators:

.1 constructed of flat or round tube type elements,

.2 welded seams, headers and flanges,

.3 welded to the tank wall.

.16 Stainless steel or anodized aluminum nameplate, with detailed data and connection diagram located on the tank wall.

2.8 Control Panel

.1 Weatherproof grounded metal control panel provided within the low voltage section of the enclosure to terminate all leads for control and alarm circuits external to the transformer.

.2 Provide in the control panel Phoenix contact terminal blocks UK 2.5 with all accessories for termination of wiring from alarm leads (#12 AWG) including, low liquid level and high oil temperature.

.3 Control panel to accommodate connection of waterproof flexible metallic conduit for the external conductors.

.4 Leads from alarm devices to be wired in rigid steel or flexible watertight metallic conduit to control panel terminal blocks. Conduit fittings and connectors to be waterproof. Wiring to be 1000 V RW90 XLPE identified at both ends with permanent plastic sleeve type wire markers.

.5 Wiring and connections to be vibration proof.

2.9 Finish

.1 Clean metal surfaces with phosphoric acid,

.2 Provide iron phosphate coating,

.3 Provide zinc chromate and iron oxide primer,

.4 Finish with two coats of oil base alkyd in ASA 61 grey.

2.10 Factory Acceptance Testing (FAT)

.1 FAT:
(a) to be in addition to manufacturer's standard post-production tests,
(b) to be witnessed by the Independent Testing Organization,
(c) may be witnessed by the Consultant, provide the Consultant with at least one week's notice of the FAT schedule and accommodate the Consultant's presence at the factory throughout the FAT.

.2 As part of the FAT, perform the following inspections and tests:

(a) all required tests listed in section "Quality Control" above,
(b) heat run,
(c) BIL,
(d) applied potential,
(e) induced potential,
(f) ratio, polarity and phase angle,
(g) resistance,
(h) excitation losses,
(i) iron losses,
(j) impedance,
(k) review of efficiency curves from no load to full load, kW & kVAR,
(l) verification of tap voltage ratios including voltmeter recording at the various tap positions,
(m) verification of operation of all alarm and protective devices,
(n) oil sample analysis provided by an independent testing laboratory.

.3 Provide temporary power supplies as required to conduct the testing.

.4 Submit certified copies of the FAT reports.

.5 Correct deficiencies prior to shipment.

2.11 Accessories

.1 Provide the following accessories:

.1 two pentahead sockets for each size of pentahead bolt used,

.2 two aerosol cans of primer,

.3 two aerosol cans of touch up paint, colour to match enclosure.

.2 Provide the following spare parts:

.1 one HV bushing and one LV bushing of each type used on the transformers.

.2 one gasket in a sealed package of each type and sized used on the transformers.

2.12 Preparation for Storage and Shipping

.1 Prepare equipment and materials for storage and shipping by crating, mounting on a skid and wrapping and as otherwise required to protect the equipment and materials from damage due to weather, handling and shipping.

.2 Tag and mark material used to block equipment for shipping to ensure removal during installation.

2.13 Manufacturers' Service Representation on Site

.1 Refer to Part 3 Execution for requirements.

Standard of Acceptance
- Square D

3 EXECUTION

3.1 Storage

.1 Until delivered to the job site, the equipment to remain the manufacturer's responsibility.

.2 In the event of loss of, or damage to the equipment, the manufacturer to promptly repair or replace without cost to the Authority.

.3 Provide bonded storage for the equipment and materials until the Authority requests delivery to the site.

.4 Allow for not less than 12 months of storage.

.5 Provide sufficient insurance to cover against damage, loss or theft during storage.

.6 Provide a paid up certificate of insurance in the name of the Authority for the duration of the 12 month storage period.

.7 Material or equipment delivered in error will be returned at manufacturer's expense.

.8 The Authority retains the right to reject defective or otherwise non-complying equipment or materials, irrespective of acceptance of shipments by the future installing Sub-Contractor. Replace rejected equipment and materials to the Authority's satisfaction.

3.2 Manufacturers' Service Representation on Site

.1 Manufacturer to supply factory trained service representative to perform the following field services:

.1 check the installation of the equipment,

.2 conduct or supervise the future installation sub-contractor, in the start-up of the equipment,

.3 calibrate controls,

.4 conduct Site Acceptance Testing (SAT) as described herein, and

.5 participate in the commissioning program.

.2 Submit copies of completed manufacturer start-up and test records prior to hand-over of equipment.

3.3 Site Acceptance Testing (SAT)

.1 After completion of installation, but before equipment is permanently placed into service, conduct Site Acceptance Testing (SAT) in the presence of and to the satisfaction of the Consultant and the Independent Testing Organization.

.2 SAT to include:

(a) thorough physical inspection,
(b) ratio, polarity, and phase angle,
(c) insulation resistance,
(d) verification of the operation of monitoring and alarm devices,
(e) verification of the door interlock system,
(f) insulation resistance of auxiliary devices and wiring,
(g) measurement of secondary voltages,
(h) set taps to achieve rated voltage under typical loading,
(i) oil sample analysis after transformer energization, provided by an independent testing laboratory.

.2 Record the results of SAT and submit completed report.

.3 Correct defects at no additional cost.

.4 Replace defective equipment immediately with new factory built equipment.

3.4 Authority Training

.1 Provide the services of qualified factory trained technician to conduct training of the facility operating staff in the operation and maintenance of the transformers.

.2 Provide a 3 hour training session to instruct the Authority's staff. Repeat the session on different days as required to accommodate the Authority's different shifts. Provide a total of three 3 hour sessions.

END OF SECTION

POWER GENERATION DIESEL
26 32 13

1 GENERAL

1.1 Reference

.1 CSA Standard C282

.2 CSA Standard Z32

.3 ANSI/NEMA MG-1

1.2 General Requirements

.1 Conform to Sections of Division 1 as applicable.

.2 Conform to Section 26 05 01, Electrical General Requirements.

.3 Conform to Section 26 11 13, Switchboard -12470V

.4 Conform to Section 26 36 23, HV Transfer Switches.

1.3 Work Included

.1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for manufacture testing and putting into proper operation complete systems as shown as specified and as otherwise required. Installation will be by the electrical installation contractor.

.2 General Schedule of equipment to be provided:

.1 2 engine (future 4) 12.47kV, 3 phase, emergency diesel generator system meeting CSA C282-05 and CSA Z32-09 and additional requirements as noted herein. System shall comprise a fully automatic emergency generating plant of identically sized 2 paralleled (+ future 2) gen-sets capable of automatic starting, and producing rated power in the event of failure of normal supply. The intent is that generators will start independently and first to close on the bus to supply vital load within 10 seconds. After stable operation, units will parallel. In future, each pair of generators on a bus will start, the first to reach rated speed and voltage close on the affiliated bus and the second to synchronize with the first. After stable operation, units will parallel across the tie breaker.

.3 The services to be provided by the supplier under this section shall include but shall not be limited to the following for a complete and satisfactory operating system.

.1 Interface with 12.47kV switchgear, HV transfer switches, fire alarm system, Building management system. Review and comment on switchgear schematics, switchgear single line diagram for interfacing with generator control system.

.2 Interface control wiring diagrams, schedules and wire running lists between all components automatic transfer switches, generator switchgear, load management system, etc. Provide terminal numbers details of switchgear end wherever required.

.3 Delivery schedule and delivery F.O.B. Job site.

.4 Services of a technical representative as required by project to review production schedule, delivery dates, shop drawing changes, shop and field testing and training programs.

.5 Unloading, hoisting and setting into place, and work normal to the electrical, mechanical and millwright trades such as providing interface power and control wiring to terminals within the equipment components and installation of major components shall be done by the Installation Contractor.

.4 Work undertaken by the Contractor under Division 20, but included as part of the overall project requirements include the following:

.1 installation of the expansion joint and silencer.

.2 supply and installation of balance of exhaust system including support sleeves, rain caps and drains.

.3 insulating the entire exhaust system.

.4 supply and installation of the fuel system up to the engine fuel filter assembly.

.5 Work typically undertaken by the Concrete and Painting Contractors, but included as part of the Division 26 Bid Amount includes the following:

.1 Installation of concrete pad, coordination of anchor bolt installation. Pad to be sealed to prevent damage from oil spills.

.6 Complete systems shall be left ready for continuous and efficient satisfactory operation.

1.4 Warranty

.1 All equipment furnished under this contract shall be warranted by the Supplier for a period of 2 years following final site acceptance against:

.1 Faulty or inadequate design, manufacture or operation. improper assembly.

.2 Defective material or workmanship, or both.

.3 Leakage, breakage or other failure that might occur under normal and proper operation of the equipment.

.2 The manufacturer shall correct any deficiencies in his equipment which occur during the 2 year warranty period at no additional cost to the Authority. This shall include all costs for material and labour. The manufacturers technical representative shall be available on site on a priority basis i.e., within 24 hours of being notified of a deficiency to repair the system.

.3 Cost for service calls made necessary to maintain the total emergency power system in optimal operating conditions during the two year warranty period shall be included in the bid price.

1.5 Shop Drawings and Product Data

.1 Submit shop drawings and product data as per project requirements.

.2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:

.1 engine

.2 alternator

.3 voltage regulator

.4 governor

.5 battery charger

.6 battery

.7 cooling system

.8 cooling fan static pressure capability external to radiator

.9 engine and generator mounting, including vibration isolators

.10 silencer

.11 location of fuel and lube oil filters

.12 lube oil and coolant drain valves

.13 air cleaners

.14 engine instrument panel

.15 engine control panel

.16 master control panel

.17 starting motor

.18 power and control junction boxes

.19 engine and generator mounting feet

.20 weights of all components

.21 Dimensioned outline of unit

.22 Confirmation of Diesel exhaust pipe diameter

.23 Brake horsepower versus rated speed curves

.24 Diesel fuel consumption and cooling water data

.25 Performance curves for local conditions and multipliers for ambient temperatures

.26 Generator damage curves

.27 Generator decrement curves showing current delivered for specified faults

.28 Efficiency of generator

.29 List of components

.30 Confirmation of diesel exhaust back pressure.

.31 flow diagrams for fuel, lubricating oil, and cooling systems

.32 engine, generator and master control wiring diagrams

.3 Submit description of set operation including

.1 automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.

.2 manual starting

.3 manual emergency stop

.4 submit description of automatic shutdown and alarms on

.1 over cranking

.2 over speed

.3 high engine temperature

.4 low lube oil pressure

.5 short circuit

.6 alternator over voltage

.7 lube oil high temperature

.8 RTDs over temperature on alternator

.5 Physical Construction Drawings, completely dimensioned, showing:

.1 Arrangement.

.2 Plan, front view, and elevation views.

.3 Required clearances for opening doors and removal of major components such as turbo blowers, charge air coolers, cylinder heads and alternator.

.4 Conduit or cable trays entrance locations and dimensions for top entrance.

.5 Alternator terminal box locations and internal configurations.

.6 Incoming and outgoing power cable terminator positions.

.7 Field wiring terminal block locations, and all other terminal block locations.

.8 Anchor bolt locations.

.9 Grounding connections.

.10 Weight of equipment.

.6 Three line diagrams, with ANSI device function numbers used throughout, shall show all:

.1 Instrument transformers.

.2 Relays.

.3 Meters and meter switches.

.4 Other pertinent devices.

.7 Elementary Diagrams

.1 Elementary (schematic) wiring diagrams shall be furnished for the electrically-operated breaker control scheme.

.2 Each elementary diagram shall show all control devices and device contact, each of which shall be labelled with its proper ANSI device function number.

.3 Each elementary diagram shall show device and terminal block terminal numbers.

.8 Control Switches

.1 Provide control switch development tables.

.9 Detailed Connection (Wiring) Diagrams showing:

.1 Approximate physical location of all items in each unit.

.2 All wiring within each unit.

.3 All interconnecting wiring between units, between units and control panel, control panel and transfer switches and control panel and switchgear.

.4 Identification of all terminals, terminal blocks, and wires.

.5 Clear identification, by some distinguishing method, of all interface wiring to remote devices. This shall include, but not be limited to, leads from external instrument transformers, trip circuits from remote devices, auxiliary contacts to remote devices, AC/DC control power, and separate incoming AC power. This shall also include spare auxiliary contacts and relay contacts which shall be wired to terminal blocks for future use.

1.6 Operation and Maintenance Data

.1 Provide operation and maintenance data for diesel generator for incorporation into Operation and Maintenance Manual.

.2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier. Include all nameplate/sizing information.

.3 Three (3) complete sets of operation and maintenance manuals hard copy and one (1) electronic copy shall be provided for the system. Turn over one set to the engineer. These manuals shall be applicable to the engine, generator, battery and charger, control panel, controls instrumentation and all other components of the assembly. The manuals shall include circuit and wiring diagrams, safety precautions, operating and maintenance instructions, including drawings, illustrations and identification of wiring.

.4 PLC programs shall be printed and supplied on CD or DVD with the O&M manuals. These programs to be fully annotated to allow future troubleshooting

.5 Operation and maintenance instructions for engine and accessories, alternator and accessories, control panel, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.

.6 Illustrated parts lists with parts catalogue numbers.

.7 As Built schematic diagrams of electrical power, control, and logic circuits.

.8 Flow diagrams for:

- .1 Fuel system.
- .2 Lubricating oil.
- .3 Cooling system.
- .4 Certified copy of factory test results.
- .5 Maintenance and overhaul instructions and schedules.
- .6 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

.9 Operating manual shall include fully detailed software program, documentation including descriptive sequence of operations and referenced to accompanying ladder logic diagrams. This material shall be used in training Authority's staff in the system operation, maintenance and diagnostics. Include the cost of the services of a technical representative for instructing the commissioning team in the system operation.

1.7 Training program

.1 Include in the equipment supply tender price the services of a qualified technical representative at the site to conduct "hands-on" training programs for the Authority's staff.

.2 The amount of time to be included in the tender is three (3) days at the site for a total of 24 hours.

.3 The training shall include identification of components and diagnostic alarms as well as basic inspection, housekeeping and logging procedures.

.4 Submit an outline of the training program for review, adjustment and approval by the engineer. Training will occur in 3 separate 1 day sessions, at a time convenient to the Authority, over the construction and warranty period.

.5 Sessions may be videotaped by the Authority as an aid to ongoing training of Authority's staff.

1.8 Provisions For Handling And Field Erection

.1 Each shipping split of stationary structures shall be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

.2 Each shipping split shall also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

1.9 Preparation For Shipment

.1 Preparation for Shipment shall be in accordance with manufacturer's standards, unless otherwise noted.

.2 The manufacturer shall be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide materials and their destination in ex-works condition when handled by commercial carrier systems.

1.10 Shipping

.1 The engine generator set assembly shall be capable of withstanding normal shipping and handling shocks and vibration without damage or deterioration.

.2 If shipped separately, any components shall be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.

.3 Each "shipping section" shall be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

.4 Cost associated with transportation, insurance and road permits for delivery of equipment to job site shall be included in the bid price.

1.11 Installation

.1 Installation of the diesel generator equipment shall be in full accordance with, and under the technical supervision of the supplier. Provide drawings showing general arrangement of all components including batteries, interconnecting wiring drawings and schedules suitable for use by the successful contractor.

.2 Equipment shall be arranged or crated with features which make it easy for hoisting, rolling and jacking into place without damage to the equipment.

.3 Include in the bid, the cost of a factory engineer or technician to supervise the site assembly and to commission, test, and certify the installation on site.

1.12 Submittals with Bid

.1 The following drawings and information are to be submitted with the bidders tender:

.1 Location of nearest local office staffed with regularly employed engineers and/or technicians who have been factory trained in the installation and service of the proposed equipment.

.2 Name and location of factory trained engineers and technicians in regular employment with the system supplier qualified to service the proposed equipment.

.3 Typical response time for a qualified factory trained service engineer or technician to be on site following an "emergency" service call.

.4 A document of compliance indicating compliance with each article of the specification, where compliance is not possible the article shall be noted and an explanation given, the document of compliance shall be signed by an officer of the company supplying the system.

.5 Failure to provide the above information will result, at the discretion of the engineer, in the rejection of the tender.

.2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:

.1 engine

.2 alternator

.3 weights of all components

.4 Dimensioned outline of unit

.5 Cooling fan static pressure capability external to the radiator

.6 Brake horsepower versus rated speed curves

.7 Diesel fuel consumption and cooling ventilation data

.8 Performance curves for local conditions and multipliers for ambient temperatures

.9 List of components

.10 diesel exhaust back pressure.

.11 Transient frequency and voltage performance under specified step load conditions, including 0-100%, 0-50%, 25 - 75%, and 50-100% load steps.

.3 Preliminary Physical Construction Drawings, completely dimensioned, showing:

.1 Arrangement.

.2 Plan, front view, and elevation views.

1.13 Source Quality Control

.1 Factory test generator set including engine, alternator, control panels, and accessories in presence of PROJECT representative.

.2 Notify project representative 10 days in advance of date of factory test.

.3 Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:

.1 Date

.2 Generator set serial no.

.3 Engine, make, model, serial no.

.4 Alternator, make, model, serial no.

.5 Voltage regulator, make and model.

.6 Rating of generator set, kW, kVA, V, A, r/min, Hz.

.4 Mark check sheet and record data on forms in duplicate as test proceeds.

.5 Demonstration of automatic start system

.6 With 100% rated full load, with a resistive loadbank, operate set for 4 h, taking readings at 30 min intervals, and record following:

.1 Time of reading.

.2 Running time.

.3 Ambient temp in °C.

.4 Fuel consumption

.5 Lube oil pressure in kPa.

.6 Lube oil temp in °C.

.7 Engine coolant temp in °C.

.8 Exhaust stack temp in °C.

.9 Alternator voltage (all 3 phases):

.10 Alternator current (phase A,B,C):

.11 Power in kW.

.12 Frequency in Hz.

.13 Power Factor.

.14 Battery charger current in A.

.15 Alternator cooling air outlet temp.

.7 After completion of 4 hour run test, demonstrate following features, shut down devices and alarms: Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.

.1 Cycle crank test

.2 Over cranking.

.3 Over speed.

.4 High engine temp.

.5 Low lube oil pressure.

.6 Short circuit.

.7 Alternator over voltage.

.8 Low battery voltage, or no battery charge.

.9 Manual remote emergency stop.

.10 High alternator temperature.

.11 All other safety features

.8 Next install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:

.1 No load to full load to no load.

.2 No load to 75% load to no load.

.3 No load to 50% load to no load.

.4 25% load to 100% load to 25%.

.5 50% load to 100% load to 50%.

.6 100% load to no load

.9 Demonstrate

.1 Automatic starting of set and automatic transfer of load on failure of normal power.

.2 Operation of manual control switch.

.10 Synchronized Units

.1 Demonstrate manual and automatic paralleling and synchronizing of all units using an adjustable load bank of minimum 3000kW using Generator switchgear.

.2 For each unit demonstrate their synchronizing ability by acting as first lead set on (dead bus condition) and then as a following set (live bus condition).

.3 Demonstrate close transition including soft unloading of generator utilizing HV transfer switches.

.11 Load Management System

.1 Demonstrate automatic load management system using units operating paralleled at 4000kW load by dumping one unit and simulate operation of the ATS and/or breaker control system.

1.14 Seismic

.1 Equipment to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for nonstructural equipment as identified in the British Columbia Building Code for the geographic location of installation

.2 Equipment to be designed, certified and installed in accordance with the International Building Code (IBC) chapters 16 and 17 and tested in accordance with the shake table testing standard ICC-ES AC-156.

.3 Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification for “seismic withstand capability” and, to maintain the certification, anchor such equipment according to the manufacturer’s instructions.

1.15 Temporary and Trial Usage

.1 Temporary and trial usage by Design-Builder of equipment or any other work or materials supplied before final completion and written acceptance shall not be construed as evidence of acceptance by Engineer.

.2 Engineer shall have the privilege of such temporary and trial usage, as soon as supplier shall claim that said work is completed and in accordance with specifications, for such reasonable length of time as is deemed to be sufficient for making a complete and thorough test of same.

.3 Claims for damage shall not be made by supplier for the injury to or breaking of any parts of such work which may be used, whether caused by weakness or inaccuracy of structural parts or by defective materials or workmanship of any kind whatsoever.

1.16 Final Acceptance

.1 Request for acceptance shall be submitted in writing. Written request shall not be submitted until:

.1 Deficiencies noted during job inspections have been completed.

.2 Systems have been pre-commissioned and tested and are ready for on-line operation.

.3 Completed operation and maintenance manuals and software have been submitted and approved.

.4 Diagrams have been submitted and approved, and equipment identification is completed.

.5 The cleaning up is finished in every respect.

.6 Spare parts and replacement parts specified have been provided and receipt of same acknowledged.

.7 Record drawings are completed and approved.

.8 Authority's operating personnel have been instructed in operation of systems.

2 PRODUCTS

2.1 Nominal Size and Rating

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.1 The unit must be sufficiently rated, including future for phases (building areas will be provided), to handle all vital/delayed vital load with another generator unit out of service, plus all UPS load of the CCH at completion of Wellness phase, plus conditional/normal load of the largest supplied campus building [assumes a transformer failure in the affiliated building] plus minimum 'essential' chiller load on a design day to meet CSA Z317.2, all accommodated in the prime rating. Calculations estimate a minimum rating of 2975kW at 85% power factor to be confirmed by calculation. Rating shall be at 40^{o}C ambient and other local conditions for continuous operation as defined in latest CAN/CSA Standard C282-05 and Z32-09 for Hospitals. Calculations must be submitted to the compliance engineer to justify minimum generator sizing.

.2 The unit shall accommodate motor starting, 100% step loads while not exceeding voltage and frequency deviations specified, fault current duties, transformer inrush currents and exhaust stack back pressure limitations all within the CSA specified tolerances and the tolerances specified herein.

.3 The unit shall be sized and set to provide 100% load in a 40^{o}C ambient without overheating or exceeding the limits specified herein.

.4 The equipment comprising the system shall be of proven design and standard manufacture except where protective devices alarm and annunciation features, instrumentation, performance requirements and services are identified in detail.

.5 The equipment provided shall be designed for unattended operation. The equipment shall include hardware and software for Load management system, Generator switchgear and ATSs to receive remote permissives, remote commands and remote statuses. The system shall be designed for providing remote alarms and statuses, and Mechanical and electrical parameters for use by the Load Management system and building management system.

.6 Materials and parts comprising the system shall be new, of current manufacture, of a high grade and free from all defects and imperfections and shall not have been in prior service, except as required during factory testing.

.7 Active electronic devices shall be solid state. Semiconductor devices shall be hermetically sealed. Relays shall be dust tight.

.8 The engine provided shall have additional BHP capacity for power requirements to drive engine driven components and accessories such as: radiator fan, fuel pump, water pump, as well as additional BHP allowances for motor starting duties, step loading changes, stack back pressure levels at 40°C ambient, all within CSA specified tolerances for voltage, frequency and temperature, and the tolerances specified herein.

.9 The engine manufacturer's catalogued BHP curves for Standby Rating shall be based on continuous duty conforming to or exceeding the following standards:

.1 SAE J816b (US)

.2 BS5514 (British)

.3 DIN "B" 6270 (European)

.4 ISO 3046/1

2.2 Performance Characteristics

.1 The equipment shall be suitable for operation and providing full output power as per the manufacturers guaranteed performance profile under the following conditions:

.1 Altitude 100 meters above sea level

.2 Outside ambient -30°C. to 32°C. nominal

.3 Room ambient 10°C. to 40°C. nominal

.4 The engine and generator units shall be capable of being synchronized and operated in parallel under all load conditions within the total capacity of the units.

.2 Frequency Control - Governor control on each unit shall maintain output frequency within the following limits:

.1 Frequency drift - with any constant load between no load and rated load, the change in regulated frequency shall be plus or minus 0.25 Percent from rated.

.2 Steady-state - frequency control shall be within plus or minus 0.25 Percent from rated when the load is varied from no load to rated load and all transients have decayed.

.3 Frequency variations during steady-state conditions shall show a random nature (as opposed to cyclic variations).

.3 Voltage Regulation - voltage control of generator output shall be within the following limits:

.1 Voltage drift - with any constant load between no load and rated kVA, the change in regulated output voltage shall not exceed plus or minus 0.5 percent within one-half hour and a constant ambient temperature.

.2 Steady-state voltage regulation - voltage regulation shall be plus or minus one percent of rated voltage when the load is varied from no load to rated kVA and all transients have decayed.

.4 Transient voltage and frequency deviation and recovery time upon addition and deletion of a 100% step load shall not exceed

.1 20% voltage deviation

.2 engine does not stall

.3 5 second recovery time to reach normal stability requirements

2.3 Diesel Engine

.1 Engine shall be a four stroke, single acting, full compression ignition type with a maximum crankshaft speed of 1800 rpm.

.2 Engine shall be a Tier 2 low emissions type with NOx emissions not exceeding 6 grams/bhp-hr at full load.

.3 Engine shall operate on commercial grades of diesel oil readily available locally.

.4 A special operating condition is that the set be capable of operating at light loads (ie. less than 30%) for an extended period of time as normal power failure may occur when only part of the full output of the generator set is required.

.5 Engine shall incorporate dry vortex type air cleaners equipped with service indicators, of replaceable element type, with an efficiency of at least 99.8%. Service indicators are not to be mounted in rubber hose.

.6 Diesel engine shall be suitable for a stack back pressure of 6.00 kPa.

.7 Flex connection at engine exhaust complete with gaskets, nuts, bolts and miscellaneous hardware.

.8 All moving parts such as flywheels, pulleys, belts, etc., shall be enclosed with suitable guards to protect the engine operator from accidental injury. All guards shall be easily removable for servicing the equipment.

.9 Engine shall be complete with inter-changeable cylinder heads, exhaust valves constructed of special alloy steel, and stellite faced exhaust valve inserts.

.10 Provide with the engine a crankcase vent filter complete with flexible hose of proper diameter and sufficient length to reach from the engine crankcase vent filter to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere.

.11 Engine shall be equipped with minimum dual 24 volt D.C. electric starting motors, and the starting pinion shall be arranged to disengage automatically when the engine starts.

.12 Engine shall be equipped with individual safety devices to shut-down the engine and to sound an alarm in the event of conditions specified later in this section, and equipped with contacts to pre-alarm for conditions specified later in this section. All alarm signals to be available to building management system.

.13 Each engine flywheel housing shall be connected rigidly to the generator housing with an SAE adaptor. Each unit shall be mounted on a common, heavy duty, stress relieved, fabricated steel baseplate. Torsional approval of each entire assembly shall be obtained and submitted in duplicate to the Consultant for review. Each report shall also outline the critical speeds of the assembly.

.14 Removable guards or insulating blankets shall be provided around all moving parts and high temperature areas to protect operating personnel.

2.4 Governor

.1 Governor to be manufacturer's current OEM electronic high performance standard system for load sharing and speed control of the units. Governor package to be complete with magnetic pickup and synchronizing and load control modules.

.2 The governor shall be capable of the following performance:

.1 Operating the engine isochronously under steady state conditions from no load to full load.

.2 Transient regulation response as specified.

.3 Frequency drift as specified.

.4 Steady state speed regulation as specified.

.5 The governor control system shall include filtering of harmonics to provide true RMS electrical inputs to the speed control system.

.6 Parallel operation so the sets operate isochronously.

.7 Parallel operation with utility grid during close transition period. Loading and unloading the gen-sets when externally commanded by HV transfer switches during close transition period.

.8 Load sharing so that each engine generator set assumes an equal percentage of the total load while maintaining specified steady-state speed regulation.

.9 Parallel operation so that one gen-set operate in isochronous mode and other operate at base load.

2.5 Engine Cooling System

.1 Engine cooling system shall include built-in centrifugal type water circulating pump and thermostat to maintain proper jacket water temperature under each load condition.

.2 Cooling system components and seals with flexible braided steel water hose connections.

.3 Engine shall be cooled by an integral engine driven radiator and blower fan cooling system.

.4 Radiator shall have sufficient capacity for cooling the engine under full load conditions in an ambient temperature up to 40°C. Include for sizing to accommodate static pressure loss through louvres, silencers and dampers. Manufacturer shall verify this pressure drop and oversize as required to deliver full rated load under 40°C ambient temperature.

.5 Radiator to be equipped with a coolant liquid level indicator.

.6 Fan shall be pusher type, with ample means for adjustment to allow for belt stretching and shall be enclosed in an easily removable cage.

.7 Engine shall be complete with thermostatically controlled engine coolant pre-heater.

2.6 Engine Monitoring Panel

.1 The following gauges shall be supplied and shall be flexibly mounted on engine:

.1 Coolant in and out temperature gauges

.2 Lube oil pressure gauge

.3 Lube oil temperature

.4 Tachometer

.5 Run Hour meter

.6 Exhaust temperature thermometer

.7 Fuel Oil Water separator vacuum

.8 Dynamo charging ammeter

.2 Panel shall be equipped with an integral shrouded emergency stop pushbutton

2.7 Lube Oil System

.1 Engine shall be provided with full pressure lubrication with high capacity positive displacement type gear driven pumps, with adjustable pressure regulators, replaceable element filter with bypass valve, supplying filtered lubricating oil under pressure to main bearings, crank pin bearings, piston pins, timing gears, camshaft bearings, valve rocker mechanism, governor and turbocharger. Full pressure lubrication shall be provided to all main bearings, connecting rod bearings and camshaft bearings.

.2 Readily accessible ball valves with suitable piping shall be provided for convenient draining of complete lubricating oil system.

.3 A air-cooled lubricating oil cooler shall be included.

.4 Engine shall be complete with thermostatically controlled oil sump heater

2.8 Fuel System

.1 Engine mounted high performance fuel transfer pump with filter assembly.

.2 Fuel filter shall have replaceable elements that can be easily removed without disturbing other parts of engine. Equip engine with primary and secondary fuel filters.

.3 Equip engine with a fuel to air heat exchanger type fuel cooler located remotely in intake air plenum to dissipate waste heat transferred from engine to re-circulated fuel. Size fuel cooler to ensure fuel returned to the fuel storage tank from the engine is maintained at a temperature below 38 C with a room ambient air temperature of up to 40C.

.4 Equip engine with a Racor Fuel Filter/Water Separator suitable to engine fuel flow rate. .

.5 Provide braided stainless steel aircraft quality, 1000F, flexible fuel oil connections,

2.9 Generator

.1 Three phase brushless, self-ventilating, revolving field synchronous machine of salient pole construction with amortisseur windings with permanent magnet pilot exciter, connected to the engine through a flexible coupling with shear bolts.

.2 Diesel-driven alternator shall be complete with necessary controls and accessories, to comprise a fully automatic back-up generating plant capable of producing power in event of failure of normal supply. Generator shall be capable of operating on system voltage @ 80% power factor and 1800 rpm.

.3 Generator enclosure shall be CSA Type 2 Drip-proof as per CSA C22.2 No. 100-M 1982 modified with air inlet and outlet louvres arranged in such a way as to prevent the sprinkler liquid from entering the equipment

.4 Generator shall include fully connected damper windings and stator windings shall be 2/3 or 5/6 pitch to provide low reactance at the 5^{th} and 7^{th} harmonics for three phase non-linear loads. Total voltage harmonic distortion shall not exceed 6% for all types of loads. Telephone interference factor for harmonic content shall not exceed 50.

.5 Generator insulation shall be Class H. When operating continuously at full load the average winding temperature in °C measured by rise of resistance method shall not exceed 105°C at an ambient of 40°C.

.6 Generator shall be prime rated capable of maintaining at an ambient of 40°C the following: 100% of full load continuously; 150% of full load for 1 minute; and 300% of full load for 10 seconds, at terminals of generator, without damage to generator, for the following fault conditions:

.1 3 phase symmetrical fault,

.2 phase to phase fault,

.3 phase to ground fault.

.7 Generator shall be complete with automatic voltage regulators, 3 phase RMS voltage sensing acting on each phase and capable of controlling voltage within ±½% of rated voltage, no load to full load, during steady state conditions.

.8 Set shall be oversized as required, to accommodate motor in-rush duty and transfer inrush currents.

.9 Set shall be oversized as required, to limit the equivalent per unit sub-transient reactance to 12% at base rating.

.10 One CT on each of the windings located on the neutral side and located between the winding and the wye neutral connection for differential protection.

.11 12.47kV generator terminal box shall be sized to provide adequate space for terminating 15kV shielded cables with stress cones .

.12 Resistance temperature detectors (RTDs) shall be embedded in each phase of stator winding and connected to gen-set control panel for monitoring.

.13 RTDs shall be provided for bearing temperature monitoring.

.14 Surge capacitor shall be provided at generator terminals.

2.10 Generator Excitation System

.1 Exciter shall be a brushless type using a rotating 3 phase full wave rectifier bridge circuit and a 3 phase rotating armature type alternating current generator mounted on the rotor shaft rated to provide excitation current necessary to operate alternator at rated output continuously for all overload conditions and to maintain specified voltage regulation under transient conditions.

.2 Voltage regulator system to have frequency dependent circuitry with adjustable voltage roll-off feature to aid engine speed recovery for step loads. Include for fine tuning at the engine supplier's plant and at the site for optimization of the settings.

.3 Voltage regulator to be solid state silicon controlled rectifiers with three phase RMS sensing circuit, regulation ±½% no load to full load. Provide auto/manual control module, and individual hand trimmer adjustment located at control cubicle.

.4 The voltage regulator circuitry shall include:

.1 Control to adjust the stabilizing or anti-hunt circuit which controls overshoot or undershoot of the alternator voltage or load changes.

.2 Current forcing circuit to supply a minimum of 300% of nominal alternator output for at least 10 seconds to allow proper co-ordination of system protective devices.

.3 Manual control for adjustment of the automatically regulated generator voltage by ± 5%.

.5 Excitation system for each unit shall be complete with permanent magnet generator (PMG) pilot excitation system with a 3 phase RMS voltage sensing unit to provide +/- 0.5% voltage regulation. The AVR shall be immune to RIF and shall include built-in solid state overvoltage protection and adjustable short circuit current forcing controls and a separate trimmer unit mounted on the engine control panel.

.6 The voltage regulator shall have the following performance features:

.1 Regulating the output voltage of the generator when it is disconnected from the load, supplying load alone, supplying load in parallel with the other sets.

.2 Steady state voltage regulation as specified.

.3 Voltage drift as specified.

.4 Transient voltage regulation as specified hereinbefore.

2.11 Generator Grounding System

.1 Alternator shall be complete with a current limiting neutral grounding resistor designed to limit ground fault currents to 50A. Mount resistor at generator.

.2 Neutral grounding resistor, to be integrated in a suitably sized Type 2 solid-top drip-proof painted steel enclosure. Neutral grounding resistors shall be designed and tested to IEEE-32 standards and be CSA approved for 10 second duty operation.

.3 Neutral grounding resistors shall be outdoor type rated.

.4 Resistor shall consist helical stainless steel elements wound on a solid porcelain core, with welded terminals, and be vibration resistant.

.5 Resistor to be equipped with a neutral current transformer generator protection relay mounted in the switchboard.

2.12 Starting System

.1 Each engine shall be supplied with a complete and independent starting system.

.2 Electric starting system, minimum 24 volts, shall include dual starting motors, battery charger, cutout, regulator and lead acid batteries.

.3 Batteries shall be capable of providing six consecutive 30 second cranking attempts without recharging, with terminal voltage not to fall below 75% of nominal voltage. Provide cranking limiter for one or more cranking cycles.

Standard of Acceptance
- Rolls Surrette 5000 Series
- Deka East Penn DL Series
- GNB KDZ Series

.4 Provide a steel battery rack with a 3/4" plywood base both painted with acid resistant paint

.5 Provide a hydrometer with wall mounting bracket

.6 Batteries shall come complete with extra flexible 4/0AWG EPR insulated battery cables and compression connectors with battery rack with 3/4" painted plywood base.

.7 Fully automatic dual rate battery charger capable of recharging batteries in 30 minutes following one normal start shall be complete with battery rack, jumpers, cables and hydrometer.

.8 When battery voltage falls below a level suitable for starting, a contact on a secondary relay shall close to cause an alarm signal to be sounded at the Control Panel. All alarms to be sent to BMS.

.9 Battery charger shall be a dual rate silicon rectifier battery charger for automatic float charge operating from 120 volts, single phase, 60 Hz having the following accessories and capacities:

.1 Wall mounted sprinkler proof enclosure

.2 Silicon controlled rectifier assembly with DC protection, suitable for dual charging rates

.3 AC power on indication

.4 AC power failure indication

.5 Float voltage adjustment

.6 Equalize circuit and timer

.7 Overload protected input switch

.8 DC output breaker complete with normally closed auxiliary contacts

.9 DC ammeter

.10 DC voltmeter

.11 Short circuit current limit

.12 Low voltage alarm with 60 second time delay (relay contacts which open for alarm, close normally wired out to terminal strip with appropriate connection) for supervisory control.

.13 DC output breaker trip alarm (wire out auxiliary contacts on DC output breaker as for low voltage alarm).

.14 Minimum charge rate to be 30 amps for battery charging and maximum charging time for fully discharged battery to 90% full charge shall not exceed six (6) hours.

.15 Enclosure to be finished and painted to match generator set enclosure.

Standard of Acceptance
- Vulcan SCA
- La Marche A46F (c/w required accessory module)

2.13 Mounting Base

.1 Diesel-generator package shall be mounted on a structural steel base with suitable adjustable steel, restrained spring, seismic rated, vibration isolators with 50 mm static deflection leveling bolts, oil proof snubbers, and 6mm thick sound pads mounted between steel base and concrete floor. Isolation efficiency shall not be less than 95%.

Standard of Acceptance
- Mason Model SLR
- Vibro-Acoustics
- Korfund

.2 Vibration isolators to be anchored to the concrete floor with 5/8"anchors equal to Simpson Strong Tie Wedge All anchors with a minimum of 2-¾” concrete cover

.3 The alternator set shall be complete with hooks and hubs for the attachment of slings suitable for moving the unit.

.4 Baseplates shall be of sufficient rigidity to maintain alignment of engine generator shafts and frames under all conditions during shipping, installation and service and shall be of all welded construction without bolt-on components.

.5 Engine generator feet and baseplate sole plates shall be machined parallel and true. Shimming shall be of the steel type and shall only be permitted underneath the generator feet.

.6 Provide all necessary piping, couplings, fittings, wiring and connections between all components mounted commonly on the steel base.

.7 Provide full size galvanized steel drip pan under engine and a separate pan under the Racor fuel filter assembly.

2.14 Engine Alternator Finish

.1 Finish and paint the complete engine generator assembly, base, and all accessories with one coat of primer followed by two coats of high temperature machinery enamel.

2.15 Recirculator

.1 Provide a recirculator for removing the oil mist form the engine crankcase breather vent.

.2 Recirculator is to be mounted in a horizontal position and above the crackcase oil level. A connection using rigid piping to be made between the recirculator and the engine crackcase breather.

.3 The exhaust from the recirculator is to be piped so that the engine air flow provides a 0" to 0.3" positive pressure reading during normal engine operation. Provide a U-Tube manometer for measurement of pressure difference and a control valve to adjust the pressure difference.

.4 Oil collected by the recirculator is to be returned to the engine with a tube from the bottom of the recirculator to the engine oil sump. Position oil drain tube below the oil level line of the engine oil sump.

.5 Provide two (2) spare filters for each recirculator.

.6 If recirculator is integral to the engine and meets the requirements of this section an external recirculator is not required.

2.16 Diesel Exhaust Silencer

.1 Provide a high grade exhaust silencer to meet the requirements of local noise ordinances. Muffler to possess as high an insertion loss as possible consistent with maximum allowable pressure drop and exhaust pipe dimensions and configuration.

.2 Attenuation to be a minimum of 35 dB in the 125 to 4000 Hz frequency range and consistent with that below. The diesel exhaust muffler/silencer system shall provide the following minimum attenuation requirements:

Octave Band (Hz)	Muffler Attenuation Requirement (dB)

125	45
250	45
500	45
1000	40
2000	40
4000	45

.3 Provide flexible hose connections of stainless steel at diesel engines. Hoses shall have close pitch corrugations and flanged ends and be capable of taking up the movement of the diesel engines plus expansion of the exhaust mufflers and piping in the axial direction of the flexible hose.

.4 Supply nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust systems from the engines up to and including the flanged outlets of the silencers

.5 If engine has two outlet exhaust connections, provide two flexible hose connections and either a two inlet type muffler or an inverted “Y” type pipe fittings to transition from two to one exhaust connection.

.6 Exhaust silencer shall be seamless welded steel pipe to A-53-63T Grade “B” Specifications. Exhaust silencer, flanges and hardware shall be manufactured from Type 316 stainless steel.

Standard of Acceptance
- JP Environmental
- Silex
- York

2.17 Engine Control Panel Elements

.1 Each individual diesel generator set shall have a dedicated Engine Control Panel .It shall centralize the individual generator controls and interconnections to the Master Control Panel.

.2 Panel to include engine and generator monitoring, instrumentation, controls, and starting systems.

.3 Each engine control panel shall come with a 19” color touchscreen HMI display.

.4 All engine control panel elements are to be completely accessible with all terminations for power and control wiring and any other items requiring torqueing, infra-red thermal scanning, maintenance, or replacement all visible and accessible from the front, when respective hinged door is opened.

.5 Provide two (2) Form C dry contacts, for each generator set, wired to a separate terminal strip in the panel for connection to the Fire Alarm System for monitoring of the following conditions.

.1 Diesel Generator Set Summary Idle Trouble

.2 Diesel Generator Set Summary Running Trouble

.3 Diesel Generator Set Shutdown Alarm

.4 Diesel Generator Set Running Status

.6 Each engine control panel to include a programmable logic controller or a purpose built microprocessor based controller and is to include, but not be limited to, the following components:

.1 control system to initiate the diesel starting and stopping sequence, and annunciate any fault condition (local or remote indication);

.2 all required secondary and control wiring, type 'TEW' 105'C rated, extra flexible wire with thermoplastic insulation and an overall flame retarding cotton braid, neatly harnessed, suitably secured and identified with slip-on identification markers; Wiring shall be colour coded to suit application and standards.

.3 Each cell to be complete with all required control wiring and terminal blocks. Control wiring to be neatly harnessed and suitably secured. Wiring to outgoing circuits and to door mounted equipment shall terminate on terminal blocks.

.4 Control panel shall be provided with a redundant power supplies fed from redundant 125 VDC control power from 125V DC system included with 12,470V Switchboard. Blocking diodes shall be included in the control panel to ensure availability of control power to each power supply for the control panel. The control supply shall be backed up from engine battery.

.7 The designer/manufacturers of the entire control system will be required to:

.1 supply complete design, erection and layout drawings for the system, clearly indicating to all wiring requirements, interfacing or interconnection provisions required to completely integrate the controls with all remote apparatus;

.2 assemble, wire and pretest the system components in their factory prior to shipment to the engine supplier for factory testing.

.3 assist in the installation and oversee the work to ensure that it meets with the generator supplier's requirements;

.4 carry out a site test of the system in conjunction with the other components in the standby power system and demonstrate its proper operation to the satisfaction of the Authority and Consultant.

.8 Selector and Control Switches per Engine

.1 Provide the following devices on the front panel of the engine control panel external to the HMI display panel:

(a) Engine Mode Operation Selector Switch with Manual, Off, Auto and Reset options.
- Switch in 'OFF' position shall cause an alarm to occur.

(b) Generator Start/Stop Momentary Contact Selector Switch with middle rest position
(c) Generator Breaker Open/Close Momentary Contact Selector Switch with middle rest position (with interlock to synchronization check protection scheme)
(d) Synchronization Auto/Manual Selector Switch
(e) Engine Speed Control
(f) Generator Voltage Adjust
(g) Alarm and Trouble audible notification
(h) Red Alarm Lamp
(i) Yellow Idle Trouble Lamp
(j) Yellow Running Trouble Lamp
(k) Illuminated White Alarm Silence Pushbutton
(l) Lamp Test Pushbutton
(m) Blue Engine Emergency Stop Shrouded mushroom type Pushbutton
(n) Synchroscope

.9 Metering and Instrumentation per engine

.1 automatic voltage regulator with provision for automatic voltage adjustment as specified

.2 radio suppression module (unless suppression with alternator meets Commercial Standards);

.3 digital governor and speed control system

.4 Provide the capabilities to monitor the following parameters through the engine HMI display:

(a) Generator Phase Currents
(b) Generator Voltage (L-L, L-N) at line side of generator breaker

(c) Bus Voltage (L-L, L-N) at load side of generator breaker
(d) Line-to-Load Voltage Difference between line and load side of generator breaker for all three (3) phases
(e) Power Factor (Average, Phase)
(f) kW, kVAR, kVA (Average, Phase, %)
(g) kW-hr, kVAR-hr (Total)
(h) Frequency
(i) Engine Speed
(j) Generator Elapsed Time
(k) Oil temperature
(l) Oil pressure
(m) Oil level
(n) Engine Coolant In Temperature
(o) Engine Coolant Out Temperature
(p) Fuel Pressure
(q) Fuel In Temperature
(r) Fuel Out Temperature
(s) Fuel Oil/Water separator vacuum pressure
(t) Excitation Voltage and Current
(u) Generator Stator and bearing temperature

.5 Individual engine information shall be accessible on the engine control panel HMI displays. Information shall be provided to the main control panel via network communication.

.10 Synchronization (including “Dead Bus” Operation)

.1 A synchronization monitor, one per diesel generator set, shall sense voltage, frequency and phase angle of the unit to be paralleled. The monitor shall:
(a) Compare the voltage of an oncoming diesel generator set with the load voltage and initiate a correction signal to cause any voltage difference to be reduced to within that specified.
(b) Compare the frequency of an oncoming diesel generator set with the bus frequency and initiate a correction signal to the governor of the oncoming diesel generator set until the frequency difference is within that specified.
(c) Cause the phase angle of an oncoming diesel generator set with respect to the load voltage to be within that specified.

.2 The monitor shall permit a diesel generator set to be held in synchronization when both sources are available.

.3 When the above conditions have been satisfied, the monitor shall initiate a signal to close the circuit breaker of the incoming diesel generator set to the bus.

.4 The synchroscope shall be complete with an auto/manual selector switch.

.5 In the "auto" position the DG sets shall be automatically synchronized and paralleled to the bus. In the "manual" position the synchroscope shall allow the closing of the respective circuit breaker from the individual diesel generator control panel.

.11 The system shall be designed to start and parallel diesel generator sets G1/G2 (Future), G3/G4 (Future) and between each bus. During first phase G1 synchronies with G3 with tie breakers normally closed.

.12 The first diesel generator set to achieve 90% of nominal voltage and frequency shall be connected to the emergency bus. Monitor the switchgear for dead bus, lock-out other generator set (to avoid a race condition) and provide an instant connection.

.13 As additional diesel generator sets reach nominal output they shall be automatically synchronized, paralleled and connected to the bus in the sequence in which they achieve synchronization.

.14 Prior to being paralleled to the bus, the oncoming unit shall be compared to the bus in frequency, voltage and phase angle. The set shall not be connected to the bus unless and until the following conditions have been satisfied:

.1 Frequency difference less than 0.3 Hz

.2 Voltage difference less than 5%

.3 Phase angle less than 5^{o} (electrical) with respect to the bus

.15 The paralleling of a diesel generator set shall not cause a voltage fluctuation exceeding 8% or a frequency fluctuation exceeding +/- 0.3%.

.16 Manual Control

.1 Controls shall allow manual start and paralleling from respective control panel. Controls shall include:
(a) A positive means of inhibiting out-of-phase paralleling.
(b) Means to operate diesel generator sets without connecting them to the main bus (Generator Start/Stop Selector Switch)
(c) Means to operate (trip/close) generator breakers that allow connection and disconnection of generators on the Generator Switchgear main bus (Generator Breaker Open/Close Selector Switch).

.17 Automatic synchronizers shall be of unit chassis construction, utilizing solid state circuitry for all sensing and control functions.

.18 Each synchronizer shall include a "check" selector switch to permit each diesel generator set to be held in synchronization when both normal and emergency sources are available.

.19 Automatic synchronizers shall be part of the Engine Control Panel section.

.20 Provide Remote monitoring software complete with all necessary licenses.

.21 Event logging with time and date stamps.

.22 Provision for exporting event logs/storing event logs on a personal computer. Include all necessary allowances for onsite set-up for remote storing of events.

.23 Provide annunciation of the following Status, Alarm and Trip conditions for each engine through the associated engine HMI display (trouble idle = function included in summary trouble idle output contacts and annunciation lamps; trouble running = function included in summary trouble running output contacts and annunciation lamps; alarm = function to be included in summary alarm output contacts)

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Emergency Stop Activated (Local and Remote)	Shutdown			X
Overcrank	Shutdown			X
High Engine Temperature Pre-alarm	Warning		X	
High Engine Temperature Alarm	Shutdown			X

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Low Lube Oil Pressure Pre-alarm	Warning		X	
Low Lube Oil Pressure Alarm	Shutdown			X
High Lube Oil Temperature	Warning		X	
Low Lube Oil Level	Warming	X		
Over Frequency	Shutdown			X
Under Frequency	Shutdown			X
Low Coolant Level	Warning	X		
Low Coolant Temperature	Warning	X		
Under Voltage	Shutdown			X
Over Voltage	Shutdown			X
Damper Breaker Open	Warning	X		
Alternator Over Temperature	Warning		X	
Exciter Diode Failure	Warning		X	
Engine Control Switch Not in Auto	Warning	X		
Low DC Voltage (Starting Batteries)	Warning	X		
Battery Charger Failure	Warning	X		
Fuel System Trouble	Warning	X		
Fuel Leakage Detection	Warning	X		
Breaker Fail to Close	Warning		X	
Cool Down Cycle				
Fuel oil filter clogged	Warning		X	
Ground Fault Alarm	Shutdown			X
Reverse Power Relay	Shutdown			X
Generator Fault	Shutdown			X
Low DC Voltage (Control Power)	Warning	X		

.24 Instrument Transformers are to be provided by the switchgear supplier. A number of current transformers and potential transformers are to be located in the Generator Switchgear. Provide additional current transformers or potential transformers, if required, per engine, for:

.1 Voltage regulation

.2 Exciter power

.3 Governor circuits

.4 Generator VAR/Pf control or cross current compensation control circuitry

.5 Current transformers for differential protection are to be provided by the switchgear supplier and installed by the generator supplier.

.25 All instrumentation transformers shall have final ratios, burden and other characteristics selected by the Independent Testing Agent preparing the protection and coordination study. Coordinate final selections with Independent Testing Agent.

.26 Current transformers to have positive action automatic short circuiting devices in secondary terminals.

.27 Color coding wiring (D.C. - Blue, A.C. - Black, Dry Contact - Yellow), and necessary instrument transformers, nameplates, bus and terminal blocks.

.28 Two (2) remote Emergency Stop mushroom head pushbutton stations per engine with lift type guard, with size 6 label, wired to shut down the associated engine immediately..

2.18 Master Control Panel

.1 Two (2) fully redundant master control touchscreen HMI display panels shall be provided, each arranged to control four(4) engine generator units (two (2) present, two (2) future).If one HMI is out of service or fails, the other HMI shall provide immediate control of the associated system. HMIs shall be 21” in size and mounted in the main control panel.

.2 The master control system shall include two fully redundant PLC controllers for parallel and load management controls etc. that operate via a hot/standby type of arrangement. If either controller fails, the surviving controller shall assume immediate control of the system. Each PLC controller shall be provided with a separate power supplies fed from redundant 125 VDC control power from 125V DC system included with 12,470V Switchboard. Blocking diodes shall be included in the control panel to ensure availability of control power to each controller and HMI. The control system shall be such that addition of the future generator will not require the replacement, upgrade or retrofit of the control panel. The master control system shall not have any single points of failure.

.3 General Operation

.1 The generators will normally operate in parallel with each other as one system of two (2) units, with provisions for two future generators.

.2 The synchronization system shall be capable of paralleling with BC Hydro’s distribution system through the HV ATSs.

.3 Obtain City’s/BC Hydro’s approval for closed-transition operation (parallel operation not exceeding 20 seconds), the transfer controller/synchronization system shall be programmed to operate in closed-transition operation during weekly tests and on re-transfer to utility following a utility outage. Include all necessary allowances.

.4 Main Control Panel Components

.1 Programmable Logic Controllers

.2 Paralleling control components

.3 Load management control components

.5 Provide two (2) Form C dry contacts wired to a separate terminal strip in the panel for connection to the Fire Alarm System by Division 26 for monitoring of the following conditions.

.1 Emergency System Summary Idle Trouble

.2 Emergency System Summary Running Trouble

.3 Emergency System Shutdown Alarm

.6 Provide the capabilities to monitor the following system parameters through the master control panel HMI displays:

.1 kW/kWHr

.2 kVAR

.3 Power Factor

.4 Phase Current (for all three (3) Phases)

.5 Voltmeter for 3 phases (L-L, L-N),

.6 Frequency

.

.7 Provide the following devices on the front panel of the engine control section external to the main control panel HMI displays:

.1 Alarm and Trouble audible notification

.2 Red System Alarm Lamp

.3 Yellow System Idle Trouble Lamp

.4 Yellow System Running Trouble Lamp

.5 Illuminated White Alarm Silence Pushbutton

.6 Blue Control Panel Priority Lamp

.7 Lamp Test Pushbutton

.8 Red System Emergency Stop Shrouded mushroom type Pushbutton

.9 No Load Test Selector Switch (Enable/Disable)

.10 Generator load testing.

.11 Generator Ecomode Selector Switch (Enable/Disable)

.8 Operation of each vacuum breaker on the 12,470V Generator Switchboard, HV switchgear 1A and HV switchgear 1B, and operation of each circuit breaker on the conditional side of the main 600V switchgear in the MHSU, EC, HCC and CT buildings shall be possible through the Main Control Panel HMI display. Electrical and mechanical Interlocks shall not be able to be defeated through the operation of the breakers via the HMI display. Breaker operation feature shall be password protected.

.9 Provide annunciation on the main control panel HMI display for six (6) separate (four (4) current and two (2) future) downstream transfer switchgear Status conditions:

.1 Transfer Switchgear in Normal Position

.2 Transfer Switchgear in Emergency Position

.3 Transfer Switchgear Not in Auto (System Idle Trouble)

.10 Provide annunciation of the following system Status, Alarm and Trip conditions through the Main control panel HMI displays:

.1 Controls Not in Auto (System Idle Trouble)

.2 Control Voltage Alarm (System Idle Trouble)

.3 Ground Fault alarm (System Running Trouble)

.4 PLC failure (System Idle Trouble)

.5 System Overvoltage (System Alarm)

.6 System Undervoltage (System Alarm)

.7 Running, On Line, Lock Out indication for each engine

.8 Bus over/under frequency (System Alarm)

.9 Fuel System Trouble (System Idle Trouble)

.11 Paralleling controls and Load Management Control assembly and shall utilize sync check relays installed in the switchgear.

.12 Provide No Load Test feature such that on activation of associated selector switch all diesel generator sets will start and parallel onto the Synchronizing Switchboard through their normal synchronization and paralleling sequences. This feature shall not cause any of the downstream transfer switchgear to transfer to emergency power. Diesel generators shall remain on the main bus until the No Load Test Selector Switch is turned to the Disable position.

.13 Provide generator load testing feature such that enabling allows start of selected pair of diesel generator sets to start and parallel onto the Synchronizing Switchboard through their normal synchronization and paralleling sequence followed by close transition sequence. Close transition initiation shall close transition the building load from utility through selected HVATS to generator by soft loading of the generator. The generator selected for the annual load testing is run as base load generator while other parallel generator takes all the building load variation. Disabling the test mode shall cause the HVATS to close transition the building from generator to utility by soft unloading of the generator.

.14 Provide Ecomode feature such that on enabling of the Ecomode feature, the emergency power system shall calculate the available load and determine how many of the diesel generators are required on the bus to provide an N+1 installation. Should more than the required diesel generators to achieve an N+1 emergency system exist, the programmable logic shall remove the unnecessary number of diesel generators from the main bus and put them into their cooldown cycle. Any failure of the existing units or increase in the emergency load put the system out of the N+1 configuration, the required number of stand-by generators will be brought on line to maintain the emergency system in an N+1 configuration. Ecomode logic shall be such that the diesel generators are cycled as the standby generator by retaining in memory the last diesel generator that was put into standby.

.15 The generator supplier shall provide all software necessary for the Authority to perform diagnostics and maintenance on the generator set controls, paralleling controls and load management controls. Include all licensing costs and make all necessary allowances in the bid price.

2.19 Load Management

.1 Load management controls shall allow dynamic loading and monitoring of the loads and generators connected to the emergency bus. The load management system shall dynamically monitor the connected load and compare it to the available on line generator capacity, and initiate load dumping at the HV switchboard 1B (2B for future) feeder breaker level and generator start/stop control as required, and on the conditional loads at the main 600V switchgear in the MHSU, EC, HCC and CT buildings when applicable (EG: when a tie is closed on this switchgear).

.2 If any diesel generator set fails, while operating in parallel, due to actuation of a prime mover safety device or due to the actuation of a reverse power monitor, the affected diesel generator set shall be immediately disconnected from the bus. Simultaneously, a quick dump signal shall be given to the pre-determined loads as required to reduce the connected load to be within the capacity of the remaining connected diesel generator sets.

.3 A priority load dumping feature shall ensure that pre-determined priority loads are always supplied while other loads are dumped, as necessary, to keep the load within available capacity, irrespective of whether one or more diesel generator sets are operating.

.4 Load management of the HV switchboard 1B feeder breakers shall be achieved using a block priority loading module.

.5 The load dumping circuitry shall operate to:

.1 Ensure that all "Load Group 1 – Life Safety/Vital" loads are supplied at all times.

.2 Supply "Load Group 2" and lower priorities after the demands of "Load Group 1 – Life Safety/Vital" have been satisfied.

.3 Add or dump loads to meet the requirements of the above.

.4 Each bus has Vital and non-vital feeders. Provide separate priority settings for each non-vital feeder breaker.

.5 Immediately and automatically dump and reload to the capacity of the remaining diesel generator sets.

.6 Interface with BAS to control available running chillers to move load to balance electrical load across the various busses at each project phase.

.6 The load management system shall function as follows:

.1 The master control panel shall contain Load Group and Priority selector screens.

.2 Each feeder breaker under load management control to have a unique priority designation except for feeders supplying life safety and vital loads.

.3 After the transfer switches return to the preferred (utility power) position, loads that have been automatically dumped shall:

(a) be automatically supplied with utility power,
(b) have their breakers reclosed in a timed sequence starting with the highest priority load.

.4 The load management system to be able to address at least the following operational scenarios:

(a) Loss of utility power to both HV ATS' (i.e. a utility power failure), with tie breaker open between HV Switchgear 1A and 1B, and tie breakers open in 600V main switchgear in MHSU, EC, HCC, and CT.
(b) Loss of utility power to both HV ATS' (i.e. a utility power failure), with tie breaker closed between HV Switchgear 1A and 1B, and tie breakers open in 600V main switchgear in MHSU, EC, HCC, and CT.
(c) Loss of utility power to both HV ATS' (i.e. a utility power failure), with tie breaker open between HV Switchgear 1A and 1B, and one tie breaker closed in 600V main switchgear in either of MHSU, EC, HCC, or CT.
(d) Loss of utility power at either HV ATS (i.e. a failure in the HV feeder to the ATS) (both cases), with tie breaker open between HV Switchgear 1A and 1B, and tie breakers open in 600V main switchgear in MHSU, EC, HCC, and CT.
(e) Loss of utility power at either HV ATS (i.e. a failure in the HV feeder to the ATS) (both cases), with tie breaker closed between HV Switchgear 1A and 1B, and tie breakers open in 600V main switchgear in MHSU, EC, HCC, and CT.
(f) Loss of utility power at either HV ATS (i.e. a failure in the HV feeder to the ATS) (both cases), with tie breaker open between HV Switchgear 1A and 1B, and one tie breaker closed in 600V main switchgear in either of MHSU, EC, HCC, or CT.
(g) The above scenarios (a thru f) with either Generator Bus 1 or Generator Bus 2 (both cases) out of service (i.e. tie breaker between Generator Bus 1 and Generator Bus 2 is open)
(h) The above scenarios (a thru f) with one generator, two generators (phase 2), and three generators (phase 2) out of service.

.7 In case of loss of power to HVATS-1A, all the generator are started. When the first generator breaker closes onto the emergency bus, all loads on HV Switchgear 1A, except for chillers, are supplied through HVATS-1A. Loss of power to HVATS-1A starts all the generators and all feeder breakers on HV Switchgear 1B are opened. Feeder breaker from the generator switchgear to HVATS-1B, which is normally open, is permitted to close after the second generator on the adjacent bus synchronizes. Feeder breakers on the HV Switchgear 1B are time closed sequentially to manage transformer inrush current and voltage transients while loads are fed from Switchgear 1A.

.8 When load on any DG set reaches 95% full load for not more than 5 seconds, loads are to be dumped, starting with the lowest priority load and moving up in load priority until capacity vs load is stabilized. Loads are to be only manually added following overload conditions unless additional capacity is successfully brought on line following the overload condition.

2.20 Equipment Identification

.1 Provide equipment identification on generator, control panel, and all indication and control devices consisting of engraved, high quality plastic nameplates with white letters suitably inscribed on red background.

.2 Engraved letters shall be 12mm minimum, except 6mm minimum height may be provided for meters, relays, switches, signal lights, keys and key blocks, and all other devices.

.3 All terminal blocks to have permanent labels

.4 All control cables shall be clearly identified, at both ends, with permanent PVC wire markers, indicating Cable Number and wire numbers.

2.21 Phase Designation

.1 Coloured phase designations or numbering markings shall be readily visible in each bus compartment, current transformer compartment, circuit breaker compartment and line and feeder cable compartment.

2.22 Finish

.1 Finish control panel as follows:

.1 basic rust-inhibiting metal process

.2 2 coats of powder coat finishing paint EEMAC 2Y-1.

.2 Manufacturer to provide quart of touch-up paint or 10 pressurized spray cans to touch-up small areas marred during installation.

2.23 Control and Secondary Wiring

.1 Control and secondary wiring shall be enclosed in metallic raceways. Wiring to outgoing circuits, at shipping splits and devices mounted in hinged instrument panels, shall terminate at terminal blocks.

.2 Terminal blocks shall have numbered points for circuit identification. Terminal blocks to be General Electric Type EB or equal. Terminal blocks for current circuits to be shorting block type.

.3 Wiring shall be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG size single conductor minimum, stranded, tinned copper, extra flexible type throughout. Wires shall be tagged at both ends with permanent plastic sleeve type markers. Insulation shall be 600 V, working and 1500 V test.

.4 Secondary and control wiring within the rear bus compartment shall be completely shielded in a protective metal covering.

.5 Wiring from bus differential and transformer differential CT's shall be minimum #10 AWG.

.6 Fuse and terminal blocks shall be easily accessible. Fuses of the proper type and rating shall be provided. Provisions shall be made for the installation of control conduits to the switchboard and connections shall be brought to a terminal board. Fuses shall be Class J HRC. DC fuses (one per pole) shall be in dead front enclosure.

.7 Auxiliary wiring checks shall be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.

.8 Switchgear will be shipped to manufacture's test facility. Final checkout of wiring at factory and at site shall be made with the complete switchgear lineup assembly to assure wiring correctness and continuity in both factory (FAT) and site. Infrastructure electrical contractor is responsible to complete site wiring and generator supplier's technician to verify. Polarity of current and potential transformers and devices shall be checked to assure proper functioning of all protective devices and instrumentation.

2.24 Instrument Transformers

.1 Potential transformers and current transformers required to operate relays, meters and other devices indicated in the drawings and specifications shall be coordinated so that the ratio and accuracy are suitable for each individual application, taking into account the burdens imposed. Construction of transformers shall conform to ANSI Standards. All terminals shall have permanent polarity designations and shall be wired accordingly. All applicable requirements of ANSI Standard C57.13 shall apply.

.2 Primary potential bus or cable tap leads shall be designed with the same design integrity as the primary bus.

.3 Both current and potential transformers shall be wired through test switches to provide quick and easy multi-circuit testing of switchboard relays, meters and instruments.

2.25 Potential Transformers

.1 Potential transformers shall be of the 0.3 accuracy class, per ANSI Standards and of sufficient capacity to serve the maximum burden imposed.

.2 Each potential transformer shall be protected with current limiting primary fuses, and shall be designed to withstand the basic impulse level of the switchboard.

2.26 Current Transformers

.1 Current transformers shall be easily removable and accessible and of the ring or bar-type.

.2 Ring-type current transformers shall be used where burden and accuracy permit. Primary terminals on bar-type current transformers shall be silver plated and rigidly (2 bolt minimum) connected to the bus structure.

.3 Secondary connections of all current transformers shall have short circuiting device for use when not connected to instruments and shall be solidly grounded.

.4 Current transformers shall be capable of carrying at least 125% of CT rating continuously and have a short time rating at least equivalent to that of the switchgear bus. Accuracy class: C100/ 0.6 B-1.

2.27 Factory Test Procedure

.1 Supplier shall conduct performance and full load tests in his factory, in accordance with the article "Source Quality Control" at the beginning of this specification.

.2 Dismantling and shipment from factory test bay shall not occur until deficiencies have been corrected and the system retested to the satisfaction of the Owner/ or designated representative and certified as being acceptable for shipment.

.3 Provide a photograph of an oscilloscope trace of the sine wave generator output 60 cycle.

2.28 Acceptance Test (Final On-site Testing)

.1 A competent Diesel-generator expert shall be supplied for as long as is necessary for commissioning and witness testing and in addition shall be present during on-site commissioning and acceptance test.

.2 Engine manufacturer shall provide an electric resistor load bank of approximately 120% of full rated load of one generator set for use during on-site test of generators.

2.29 Site Tests

.1 General

.1 Upon completion of the installation of the emergency power supply system, the installation shall be tested to ensure conformity to the requirements of CSA Standard C282. Provide PROJECT representative with a minimum of 10 days written notification of the proposed test date

.2 All construction within the diesel generator room is to be completed and the room is to be thoroughly cleaned prior to starting the engine for the first time.

.2 Operational Test

.1 With the engine in a "cold start" condition and the emergency load at normal operating level, a power failure shall be simulated by opening all switches or breakers supplying the normal power to the building or facility. The test load is to be that load which is normally served by the emergency power system.

.2 The operational test shall be continued for one hour after which normal power shall be restored to the building or facility and satisfactory transfer of the load and shutdown of the emergency generating set shall be demonstrated.

.3 The following data shall be observed and recorded:

(a) time delay on start
(b) cranking time until the engine starts and runs
(c) time required to come up to operating speed
(d) time required to achieve steady-state condition with all switches transferred to the emergency position
(e) time required to synchronize generators
(f) voltage, frequency, and amperes at start-up and at any observed change in load
(g) Engine oil pressure, water temperature where applicable, and battery charge rate at 5 min intervals for the first 15 minutes, and at 15 minute intervals thereafter
(h) time delay on retransfer for each transfer switch

(i) time delay on engine cooldown and shutdown.

.4 Following the test prescribed above each emergency generator set shall be subjected to a 4 h 100% load test, using a test load bank to be provided by the engine generator supplier and connected by the Division 26 contractor.

.5 The building load shall not be used as part of the test load. Full load shall equal the nameplate kW rating of the emergency generator set less applicable derating factors for site conditions. Unity power factor is acceptable for on-site testing, provided that rated load tests at rated power factor have been performed by the manufacturer of the emergency generator set prior to shipment.

.6 Synchronization and Load Management Tests

(a) Demonstrate the emergency start and synchronizing features of all generators as a system, for each system.
(b) Demonstrate the automatic operation and control of each HVATS on the project
(c) Demonstrate the functioning of all load management control and safety devices by creating the actual conditions or simulating these conditions if the actual conditions cause deterioration or damage the emergency system.
(d) Demonstrate load management system using permanently wired automatic transfer switches and building loads. The various failure and/or overload scenarios shall be simulated and system responses observed.
(e) Demonstrate generator load testing system.

3 EXECUTION

3.1 Installation General

.1 Take delivery of the diesel generators and related equipment. Provide necessary cranes and hoisting equipment and labour to unload equipment from transport and place in designated location.

.2 Prior to project completion, revise all wiring diagrams submitted as Shop Drawings to "As-Built" condition, prepare photo reductions of same and include them in the Operation and Maintenance Manual.

.3 Touch up small areas marred in transit or during installation with touch up paint.

3.2 Installation of Engine Generator Set

.1 Mount Diesel-generator package on structural steel base with suitable adjustable steel spring vibration isolators with sound pads mounted between steel base and concrete base pad.

.2 Touch-up areas marred in transit or installation.

.3 Install complete starting system including batteries, jumpers and cables and battery charger. Provide 2#4/0 EPR extra flex copper cable connections from starting battery to each starter.

.4 Free issue flexible fuel connections for fuel system to connect to isolating valves provided by division 20, complete with all necessary flexible fuel connections between various filter components and engine.

.5 Mount and assemble water separator and provide flexible fuel connection to engine.

.6 Provide full size galvanized steel drip pan under engine and a separate pan under the fuel filter assembly.

.7 Ground generator frame to building ground and/or perimeter ground system.

.8 Install the flexible hose supplied by the engine manufacturer between the engine crankcase vent connection over to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere. Provide necessary cutting and patching, and sleeve through plenum, with final connections of hose.

.9 Free issue the engine exhaust silencer, flexible connection at engine, and miscellaneous nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust system from the engine up to and including the flanged outlets of the silencers to the Division 20 contractor for installation.

3.3 Installation of Control Panel

.1 Assemble all shipping sections and level control panel in accordance with manufacturer's recommendations.

.2 Provide incoming and outgoing cable connections.

.3 Provide interconnecting power and control wiring between Diesel-generator and control panel.

.4 Terminate all power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.5 Provide interconnecting control wiring connections as shown and as required.

.6 Provide grounding of each control panel to building ground bus with two separate runs of a #4/O green insulated copper in PVC conduit. Terminate with Burndy YA-2N lugs.

.7 Install complete DC control power system including batteries, jumpers and cables and battery charger and connect to control panel with 2#8 + ground in conduit.

.8 Extend DC control wiring 2#8+ ground in conduit to engine starting battery for control power

.9 Touch up small areas marred in transit or during installation with touch up paint. Repaint entire panel using electrostatic process where large areas of significant damage to factory finish has occurred.

3.4 Installation of Miscellaneous Components

.1 Provide power and control wiring between engine control panel and diesel combustion air dampers and ventilation dampers. Provide 120 V secondary power source from local120V emergency panel to the control panel switching relay to permit dampers to close when engine shuts down.

.2 Provide 8 conductor #12 MICC cable from each High voltage Automatic Transfer Switch to the diesel generator control panel for engine start contact, ATS in normal position status, ATS in emergency position status, and ATS in bypass position status.

.3 Provide 4 conductor #12 MICC cable from each Fire Pump ATS/Control Panel, and each Sprinkler Pump ATS/Control panel to the engine generator control panel for engine start contact and ATS in emergency position status.

.4 Supply Remote Emergency Stop mushroom head pushbutton station with lift type guard, with size 6 label, wired to shut down the engines in room immediately. Contractor to mount outside of room, and wire to control panel.

.5 Provide connection from control panel to fire alarm panel to indicate engine running and trouble condition on fire alarm annunciator.

.6 Provide power and control wiring between engine control panel and the diesel fuel tank level controller to obtain “Fuel Low Level” alarm contact.

.7 Provide control wiring connection between engine control panel and fuel leakage detection system panel.

.8 Provide control wiring to battery charger and automatic transfer switches for remote monitoring indication on the centralized electrical monitoring system.

.9 Install 2- #10 AWG in 19 mm conduit interconnection from control power batteries and engine start batteries to generator control panels and generator switchboards for redundant control power.

3.5 Testing

.1 Unload, handle, install and provide temporary cables from generator control panel to temporary load bank for on-site testing.

.2 Remove the load bank and temporary connections after on-site witness tests have been completed successfully.

.3 Provide pre-service inspection, testing and calibration of control panel for switchboards, panelboards, and protective schemes prior to energization.

.4 Conduct an acceptance test of the complete emergency power system and the generator system after preliminary runs and test have been made. This acceptance test shall be as described under the article Site Testing in Section 2 above. In the event of equipment or component failures interrupting completion of test, correct the deficiency and repeat test until satisfactorily completed without failure.

.5 Demonstrate functioning of safety devices, pilot lights, controls, remote monitoring on the Building Management System and Fire Alarm system, operation of any remote controls and indicators on the remote annunciator, and operation of all interconnections and alarms to battery charger, fuel system, leak detection panel, dampers, Automatic Transfer switches, Load Management System, etc.

END OF SECTION

STATIC UPS
26 33 53

1 GENERAL

1.1 General Requirements

.1 Conform to General Conditions as applicable.

.2 Conform to Section, 26 01 01 Electrical General Requirements.

.3 UPS to be UL listed per UL Standard 1778.

.4 UPS to be CSA certified.

1.2 Applicable Standards

.1 The UPS systems are to be in accordance with the applicable sections of the current revision of the following documents. Where a conflict arises between these documents and statements made herein, the statements in this specification to govern.

.1 ANSI C62.41 (IEEE 587)

.2 NEMA PE-1

.3 CSA 22.2, No. 107.1

.4 FCC Part 15, Class A

.5 UL Standard 1778

.6 IEC 62040-1, 62040-2 and 62040-3

1.3 References

.1 NETA, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

.2 ITIC (Information Technology Industrial Council): Voltage tolerance curve.

.3 Section 26 05 48 Vibration Isolation and Seismic Restraint

.4 Section 26 05 53 Equipment Identification

1.4 Work Included

.1 Provide two independent UPS systems, each system to be an N configuration. The two systems to be used in an overall 2N arrangement.

.2 Work to be done under this Section to include furnishing of labour, materials, and equipment required for manufacture, testing and putting into proper operation complete systems as shown as specified and as otherwise required. Installation will be by the electrical contractor. Additional services as described herein are to be undertaken by the supplier or their field service representatives and all costs for this work is to be included in the Bid Amount.

.3 The services to be provided by the supplier under this section to include but not limited to the following, for a complete and satisfactory operating system.

.1 Shop drawings.

.2 Fabrication and assembly as per shop drawings.

.3 Interface control wiring diagrams, schedules and wire running lists between all components supplied.

.4 Factory testing and supplementary acceptance testing. Acceptance testing procedure to be submitted as a shop drawing.

.5 Delivery schedule and delivery F.O.B. job site in a manner suitable to the installation contractor.

.6 Information as appropriate to install and test the equipment.

.7 Technical supervision of: unloading, site assembly, installation of power and control cable connections, and all other work normal to the electrical trade.

.8 Commissioning, site testing including acceptance testing.

.9 Providing technical staff and manuals for factory and field training of Authority's staff in the complete operation of the system.

.10 Warranty service on a priority basis (within 2 hours).

.11 Data book including schematic diagrams of circuit boards.

.12 Check out of system one month prior to expiry of warranty period.

.13 Services of a technical representative to review production schedules, delivery dates, shop drawing changes, shipping details, shop and field testing and training programs.

.4 Complete systems to be left ready for continuous and efficient satisfactory operation.

1.5 Work by Electrical Installation Contractor

.1 Installation, including: unloading at the site, moving to final location, hoisting and setting into place will be done by the Installation Contractor.

.2 Electrical installation contractor will assemble shipping splits and will install major withdrawable components into the equipment where such components have been shipped individually.

.3 Electrical installation contractor will install battery units into the battery cabinets or onto racks.

.4 Electrical installation contractor will install incoming and outgoing field wiring such as providing inter-face power and control wiring to terminals within the equipment and will connect wiring between shipping splits.

1.6 Submittals

.1 Shop Drawings

.1 Include;

(a) technical information as specified in section 26 01 01,
(b) system configuration with single-line diagrams,
(c) functional relationship of equipment including weights,
(d) dimensions, and heat dissipation,
(e) detailed layouts of customer power and control connections,
(f) detailed installation drawings including terminal locations,
(g) size and weight of shipping units to be handled by installation contractor.

.2 Provide one additional set of drawings shipped with the equipment for start up and maintenance use.

.2 Spare Parts List

.1 Complete spare parts list, including parts location diagrams or drawings to be included with the manufacturer's quotation.

.2 Supply a list of priced spare parts which manufacturer recommends to be on-hand during start-up and the first two year's operation.

.3 Material List

.1 A material list to be furnished listing the quantity, rating, type, and manufacturer's catalog number of all equipment on each unit.

.4 Installation, Operating, and Maintenance Instructions

.1 Provide installation, operating, and maintenance instructions to cover the equipment furnished.

1.7 Warranty:

.1 Submit to the end user:

.1 60 month extended warranty on the UPS systems, the warranty to include annual full maintenance of the UPS in accordance with the manufacturer's recommendations.

.2 120 month warranty on the battery consisting of 60 months full replacement warranty (materials and labour), followed by 60 months prorated warranty on materials only. Battery manufacturer's standard warranty is not acceptable.

.2 Warranties to take effect after acceptance of the equipment.

1.8 Quality Control

.1 Manufacturer Production Test and Records:

.1 Submit certified copies of reports of manufacturer's production testing for each UPS system.

.2 Perform factory tests in advance of the formal factory acceptance testing (FAT) to ensure that the system will function acceptably during the formal FAT testing.

.3 Refer to Part 2 Product for FAT requirements.

.2 Site Acceptance Testing

.1 Manufacturer to provide services of manufacturer's authorized service personnel in accordance with the requirements of Part 3 of this specification.

1.9 Provisions for Handling and Field Erection

.1 Each shipping split of to be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

.2 Each shipping split to also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the equipment.

1.10 Preparation for Shipment

.1 Preparation for Shipment to be in accordance with manufacturer's standards, unless otherwise noted. The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide the equipment at the site in ex-works condition when handled by commercial carrier systems.

1.11 Shipping

.1 Arrange shipping details of the equipment with the electrical installation subcontractor.

.2 If shipped separately, any components to be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.

.3 Each "shipping section" to be provided with a permanently-attached, readily-visible identification tag bearing Submittals to be included with UPS delivery:

.4 Submittals to be included with UPS delivery:

.1 a complete set of submittal drawings,

.2 one (1) instruction manual that includes a functional description of the equipment with block diagrams, safety precautions, instructions, step-by-step operating procedures and routine maintenance guidelines, including illustrations.

1.12 Operation and Maintenance Data and Training

.1 Provide operation and maintenance data manual for equipment supplied.

.2 Include detailed instructions to permit effective operation, maintenance and repair of the equipment.

.3 Technical data to be included:

.1 Schematic diagrams of components, controls and relays.

.2 Illustrated parts lists with parts catalogue numbers.
.3 Certified copy of factory test results.

.4 Provide the services of qualified factory trained technicians and service representatives to conduct training of the facility operating staff in the operation and maintenance of the UPS systems including their interactions with the power sources, monitoring, metering and control systems. Include for a total of four separate full day training sessions. Should equipment fail during a training session, conduct a repeat session.

2 PRODUCTS

2.1 General

.1 Uninterruptible Power Supply systems: continuous duty, three phase, solid state including static bypass.

.2 Each N system to consist of:

.1 an input transformer,

.2 two UPS modules each consisting of:

(a) a rectifier/battery charger,
(b) a DC bus,
(c) an inverter,

.3 a bypass transformer,

.4 a static bypass,

.5 a battery,

.6 an output transformer.

.3 The UPS to be constructed of replaceable subassemblies. Printed circuit assemblies to be plug-in. Like assemblies and like components to be interchangeable.

.4 Labels to be visible.

.5 Materials

.1 All materials to be new, of current manufacture, high grade and free from all defects and not been in prior service except as required during factory testing.

.2 The maximum working voltage, current, and di/dt of solid-state power components and electronic devices not to exceed 75% of the ratings established by their manufacturer. The operating temperature of solid-state component sub-assemblies not to be greater than 75% of their ratings. Electrolytic capacitors to be computer grade and operated at no more than 95% of their voltage rating at the maximum rectifier charging voltage.

.6 Equipment Enclosures

.1 Front accessible, not requiring rear or side access to install, maintain or test the system. Components replaceable from the front of the enclosures.

.2 Enclosure doors/covers to require a tool for gaining access.

.3 Casters and leveling feet to be provided.

.4 Structurally adequate with provisions for hoisting, jacking, and forklift handling.

.5 Cleaned, primed, and painted with the manufacturer's standard colour.

.6 Supply one liter of paint for touch-up purposes. Colour to match the enclosures.

.7 Nameplates

.1 Provide a nameplate on each system, module, battery and bypass cabinet.

.2 Nameplates to be laminated plastic, 3 mm (1/8") thick, white lettering on a blue background, with beveled edges.

.3 Lettering to be engraved and to be 5 mm (¼") high, except where indicated otherwise.

.4 Wording on nameplates to be approved prior to manufacture.

.5 Nameplates to indicate:

(a) Name of the unit eg: UPS 1A (8 mm (5/16") high lettering)
(b) System voltage, eg: 600V, 3Ø, 3W
(c) System rating, eg: 550 kVA/500 kW
(d) Power source, eg: FED FROM SWGR-MH-05A
(e) Load supplied, eg: SUPPLYING: SYSTEM BYPASS CABINET

.6 Mechanically attach nameplates with stainless steel screws.

.8 Cooling:

.1 forced-air,

.2 redundant fans,

.3 low velocity to minimize audible noise output,

.4 fans powered by the UPS output.

.5 The thermal design, along with thermal and ambient sensors, coordinated with the protective devices to shut the module down before allowable component or internal cabinet temperatures are exceeded.

.9 Grounding

.1 The AC output neutral to be electrically isolated from the UPS chassis. The UPS chassis to have an equipment ground terminal. Provide provisions for local bonding.

2.2 System Description

.1 Modes of Operation

.1 Each UPS system to operate as an on-line double conversion reverse transfer system in the following modes:

(a) Normal: The system load is continuously supplied by the UPS inverters. The rectifier/charger derives power from a utility AC source and supplies DC power to the inverter while simultaneously charging a power reserve battery.
(b) Emergency: Upon failure of utility AC power, the system load is supplied by the inverter, which without any switching, obtains power from the battery. No interruption in power to the system load upon failure or restoration of the utility AC source.
(c) Recharge: Upon restoration of utility AC power, after a utility AC power outage, the rectifier/charger to automatically restart, walk-in, and gradually assume the inverter and battery recharge loads.
(d) Module failure: Should one module of the system fail, the other module is to assume the full system load with no interruption of power to the load, provided that the load is less than the rating of one module. Where the load exceeds the rating of one module the system is to transfer to bypass with no interruption of power to the load.
(e) Bypass: If the UPS must be taken out of service for maintenance or repair, or should the inverter overload capacity be exceeded, the static transfer switch to perform a reverse transfer of the system load from the inverter to the bypass source with no interruption in power to the critical AC load.
(f) On Generator: If the UPS is signaled that it is being supplied from the on-site generators it is to continue to operate as per the Normal condition, except that two auxiliary current limits are

to become operational, one to limit the total input current to the module to not more than is required for 100% output, the other to limit the battery charging current to 10%.

(g) Energy Saving Mode (ESS): Adjustable user enabled operating mode in which most of the load is supported via the bypass circuit operating in parallel with the UPS modules. In the event of the bypass power falling outside of the acceptable limits the UPS system automatically reverts to the normal mode of operation with no power interruption to the load. System efficiency while operating in the ESS mode to be not less than 99%. System to be able to identify when out of tolerance conditions are created by a load fault in which case the system will operate to provide maximum fault clearing current.

(h) Variable Module Management mode (VMMS): When system load is sufficiently low the VMMS is to automatically cause one module to assume all of the load while the second module operates in a “ready-state”. The “ready-state” module is to be immediately available to assume load if the load increases above the rating of one module or if the loaded module fails. With the VMMS in operation the UPS system efficiency is to increase at least 1% compared to operation with the load shared between the modules.

.2 Performance Requirements

.1 System Voltages

(a) Input: 600 Volts, three-phase, 3-wire-plus-ground, high resistance grounded system.
(b) Output: 600 Volts, three-phase, 3-wire-plus-ground, high resistance grounded system.

.2 System Capacities:

(a) System rating (for each N system): 550 kVA/500 kW.
(b) Module rating: 275 kVA/250 kW

.3 System Fault Levels:

(a) System components exposed to the 600V input to be rated to withstand the available fault level of 50,000 A RMS symmetrical @ 600V.
(b) System circuit breakers exposed to the 600V input to be rated to interrupt fault levels not less than 65,000 Amperes RMS Symmetrical at 600V.

.4 AC Input, UPS Modules

(a) Voltage range: + 10%, -15% of nominal.
(b) Frequency range: 45 to 65 Hz.
(c) Power factor: nominally 0.99 lagging at nominal input voltage and full rated UPS output load.
(d) Input transformer inrush current: not more than 800% of full load current.
(e) Current limit: adjustable from 100% to 115% of nominal AC input current.
(f) Auxiliary Current Limit 1: adjustable from100% to 115% (set at 100%) of nominal input as required for 100% output, when on generator power.
(g) Auxiliary Battery Current Limit: adjustable from 10% to 15% (set at 10%) of nominal, when on generator power.
(h) Input Current Walk-in:

- upon transfer to normal power, adjustable from 3 to 60 seconds to full rated input current.
- upon transfer to generator power, zero input current for an adjustable time, 0 to 5 minutes, set at 3 minutes, followed by adjustable ramp up, from 3 to 60 seconds, to Auxiliary Current Limit value.

(i) Current Distortion: 3.5% THD maximum at full load.
(j) Surge Protection: to sustain input surges without damage per criteria listed in ANSI C62.41.

.5 UPS Battery

(a) Reserve Time: 10 minutes with UPS at full load, 0.9 power factor, with ambient temperature of 20°C to an end voltage of not less than 1.67 Volts/cell.
(b) Recharge Time: to 90% capacity within ten (10) times discharge time.
(c) Operational life expectancy 10 years @ 20°C.

.6 AC Output, UPS Modules

(a) Voltage Configuration: three-phase, 4-wire plus ground with isolated neutral (neutral to be high resistance grounded at the output transformer).
(b) Voltage Regulation:

- +/- 1% three-phase RMS average for a balanced three-phase load for the combined variation effects of input voltage, connected load, battery voltage, ambient temperature, and load power factor.
- +/- 2% three-phase RMS average for a 50% unbalanced load for the combined variation effects of input voltage, connected load, battery voltage, ambient temperature, and load power factor.

(c) Frequency Regulation: nominal frequency +/- 0.1 Hz.
(d) Frequency Slew Rate: adjustable up to 0.7 Hertz per second maximum.
(e) Phase Displacement:

- +/- 1 degree for balanced load,
- +/- 3 degrees for 100% unbalanced load.

(f) Phase Voltage Variation:

- +/- 1% for balanced linear load,
- +/- 5% for 100% unbalanced linear load

(g) Bypass Line Sync Range: +/- 3 Hertz, adjustable to +/- 0.5 Hertz.
(h) Voltage Distortion:

- not more than 5% total harmonic distortion (THD) with 100% non-linear load (as described in IEC 62040-3),
- 3% maximum for any single harmonic.

(i) Load Power Factor Range: 0.9 leading to 0.7 lagging.
(j) Overload Capability (without bypass source):

- 110% for 10 minutes,
- 125% for 2 minutes,
- 150% for 15 seconds.

(k) Inverter Output Voltage Adjustment: +/- 3% manual adjustment.
(l) Voltage Transient Response:

- 50% load step: not to exceed +/- 5%,
- Loss or return of AC input power: not to exceed +/- 1%,
- Manual transfer of 100% load: not to exceed +/- 4%.

(m) Transient Recovery Time: to within 1% of output voltage within 50 milliseconds.
(n) Fault Clearing:

- sub-cycle current of at least 300%,
- 660A RMS per module for 10 cycles.

.7 Bypass

(a) Voltage: 480 VAC
(b) Ampacity: not less than 663 A continuous duty.
(c) Surge Protection: to attenuate input surges per criteria listed in ANSI C62.41 to within IEC and ITIC limits without damage.
(d) Bypass transformer inrush current: not more than 800% of full load current.

2.3 Environmental Conditions:

.1 Operating Ambient Temperature: 0°C to 40°C.

.2 Storage/Transport Ambient Temperature: -25°C to 60°C (-13°F to 140°F).

.3 Relative Humidity: 5% to 95%, non-condensing.

.4 Altitude:

.1 Operating: no derating from sea level to 2,000 meters (6,560 ft.) above Mean Sea Level. Derated for higher altitude applications.

.2 Transport: capable of air transport.

.5 Audible Noise: not greater than 76 dBA measured 1 meter from surface of the UPS under any condition of normal operation.

.6 Vibration Isolation and Seismic Restraint: UPS systems to comply with the requirements of specification section 26 05 48 Vibration Isolation and Seismic Restraint. Provide isolation and bracing as required.

2.4 Equipment

.1 Input transformer:

.1 Provide a 600V-480V input transformer with each UPS N system.

.2 Input transformer: Two winding isolation type with copper windings in compliance with the requirements of Section 26 22 13 Dry Type Transformers up to 600V Primary factory installed inside UPS systems cabinet; or Auto Transformer with copper windings, factory installed inside the UPS systems cabinet.

.3 The input transformer will be able to continuously work on a high resistance grounded system without operational issues. The maximum leakage current of the input transformer will be 100mA.

.4 Size transformer for continuous operation at the full rated load of the UPS system including maximum battery charging current.

.5 Oversize the transformer or provide a suitable K rating as required to accommodate the harmonic currents produced by the UPS modules.

.2 Fuse Failure Protection

(a) Power semiconductors to be fused with fast-acting fuses, so that loss of any one power semiconductor will not cause cascading failures.

.3 Rectifier/Chargers:

.1 DC Filter

(a) Filter to minimize ripple voltage into the battery to not more than 0.5% peak to peak.
(b) Filter sized such that the DC output will meet the input requirements of the inverter with the battery disconnected.

.2 Automatic Restart

(a) Upon restoration of utility AC power, after a utility AC power outage and prior to a UPS automatic end-of-discharge shutdown, the rectifier/charger to automatically restart, walk-in, and gradually assume the inverter and battery recharge loads.
(b) Upon restoration of utility AC power, after a utility AC power outage and after a full UPS automatic end-of-discharge shutdown, the UPS to automatically restart, performing the normal UPS start up walk-in.

.3 Battery Recharge

(a) In addition to supplying power for the inverter load, the rectifier/charger to produce battery charging current sufficient to replace 90% of the battery discharge power within ten (10) times the discharge time.
(b) After the battery is recharged, the rectifier/charger to maintain the battery at full charge until the next emergency operation.
(c) Provide the following charging modes:

- float voltage charging,
- automatic equalize charging,
- manual equalize charging,
- programmed cyclic charging to reduce plate corrosion, increasing battery life.

(d) If an over-temperature condition in the battery cabinet is detected the rectifier/charger to automatically reduce the charging voltage.

.4 Overvoltage Protection

(a) DC over-voltage protection so that if the DC voltage rises to the pre-set limit, the UPS is to shut down automatically and initiate an uninterrupted load transfer to the static bypass line.

.4 Inverters

.1 Overload Capability

(a) Status indicator to indicate overload operation.
(b) Automatic transfer of the load to bypass when overload capacity is exceeded.

.2 Fault Clearing and Current Limit

(a) For currents or duration that exceed the ratings, the inverter to current-limit to protect components from damage.
(b) The inverter to be self-protecting against any magnitude of connected output overload.

.3 Inverter control logic to sense excessive overloads and to disconnect the inverter from the critical AC load without the requirement to clear protective fuses.

.4 Inverter Shutdown

(a) For rapid removal of the inverter from the critical load, the inverter to instantaneously turn off the inverter transistors. Simultaneously, the static transfer switch to be turned on to maintain continuous power to the critical load.

.5 Inverter DC Protection

(a) The inverter to be protected by the following disconnect levels:

- DC Overvoltage Shutdown
- DC Undervoltage Warning (Low Battery Reserve), user adjustable from 1 to 99 minutes
- DC Undervoltage Shutdown (End of Discharge)

(b) Over discharge protection:

- To prevent battery damage due to over discharging, the inverter to automatically raise the shutdown voltage set point as discharge time increases beyond ten (10) minutes.

.5 Output Power Transformer

.1 Provide a 480V-600V step-up output transformer as part of each UPS N system.

.2 Output transformer: Two winding isolation type with copper windings in compliance with the requirements of Section 26 22 13 Dry Type Transformers up to 600V Primary; or Auto Transformer with copper windings.

.3 Factory installed output transformer inside UPS systems cabinet.

.4 Size transformer for continuous operation at the full rated load of the UPS system.

.5 When two winding isolation transformer is provided, High resistance ground the neutral point of the secondary (600V) winding.

.6 Display and Controls

.1 Monitoring and Control

(a) Each UPS N system to be provided with a microprocessor based unit status display and control section. A system power flow diagram to be provided as part of the monitoring and controls section which depicts a single-line diagram of the UPS. The monitoring functions

such as metering, status and alarms to be displayed on an alphanumeric LCD display. Additional features of the monitoring system to include:

- Menu-driven display with text format selectable in at least three (3) languages (French, English, Spanish)
- Real time clock (time and date)
- Alarm history with time and date stamp
- Battery back-up memory

.2 Metering

(a) The following parameters to be displayed:

- System input AC voltage line-to-line for each phase with nominal indication at 600V
- System input AC current for each phase
- Module input AC current for each phase
- System input frequency
- Battery voltage
- Battery charge/discharge current
- Battery cabinet temperature
- Module charge/discharge current
- System output AC voltage line-to-line for each phase with nominal indication at 600V
- System output AC current for each phase
- Module output AC current for each phase
- Output frequency
- Percent of rated load being supplied by the UPS
- Battery time left during battery operation

.3 Alarm Messages

(a) The following alarm messages to be displayed:

- Input power out of tolerance
- Incorrect input frequency
- Module charger in reduced current mode
- Battery charger problem
- Battery failed test
- Low battery warning (adjustable 1 to 99 minutes)
- Low battery shutdown
- Battery over-temperature
- DC bus overvoltage
- Bypass frequency out of range
- Load transferred to bypass
- Excessive retransfers attempted
- Static switch failure
- Module inverter leg over current in X-phase
- Output undervoltage
- Output overvoltage
- Output overcurrent
- Module overcurrent
- System output overloaded
- Load transferred to bypass due to overload
- Overload shutdown
- Control Error
- Control power supply failure
- Load transferred due to internal protection
- External shutdown (remote EPO activated)

- Fan failure
- Over-temperature shutdown impending
- Over-temperature shutdown
- UPS output ground fault
- Grounding system resistor failure

.4 Status Messages

(a) The following UPS status messages to be displayed:

- Normal operation
- Load on UPS
- Load on static bypass
- UPS operating in redundant mode
- System shutdown
- UPS on battery

.5 On-Line Battery Test

(a) The UPS to have an automatic On-Line Battery Test feature to confirm the capability of the battery to supply 80% of it's rated capacity. Conducting the test is not to jeopardize the supply of power to the critical load. If the battery fails the test, the system to automatically initiate an alarm.

(b) The battery test feature to have the following user selectable options:

- DC bus voltage threshold (pass/fail value)
- Interval between tests
- Date and time of initial test
- Enable/disable test

.6 Remote Communications

(a) Each UPS system to include a ModBus Ethernet communications package to communicate to the building management system all of the metering, alarm and status indications for the overall system, each module, each battery, the bypass cabinet and the grounding system.

(b) Each UPS system to include a Simple Network Management Protocol (SNMP) interface to provide unidirectional (read only) monitoring of all metered values, alarms and status indications for the overall system, each module, each battery, the bypass cabinet and the grounding system, by Health Shared Services BC.

.7 Bypass Module

.1 Input transformer:

(a) Provide a 600V-480V input transformer for the bypass circuit on each UPS N system.

(b) Input transformer: in compliance with the requirements of Section 26 22 13 Dry Type Transformers up to 600V Primary.

(c) Two winding isolation type with copper windings, factory installed inside the UPS system cabinet.

(d) Size transformer for continuous operation at the full rated load of the UPS system.

.2 Static Transfer Switch

(a) General

- Provide a static transfer switch and bypass circuit as an integral part of the UPS system.
- Static switch to be a naturally commutated high-speed static (SCR-type) device rated to conduct full load current continuously.
- Static switch to have an overload rating of 125%.
- Include an automatic transfer control circuit that senses the status of the inverter logic signals, and operating and alarm conditions. This control circuit to provide an uninterrupted transfer of the load to an alternate bypass source, without exceeding the

transient limits specified herein, when an overload or malfunction occurs within the UPS, or for bypassing the UPS for maintenance.

(b) Uninterrupted Transfer

- The transfer control logic to automatically turn on the static transfer switch, transferring the UPS system load to the bypass source, after the transfer logic senses any of the following conditions:
  - Inverter overload capacity exceeded
  - UPS load overvoltage
  - UPS load undervoltage
  - Battery protection period expired
  - UPS fault condition
- The transfer control logic to inhibit an automatic transfer of the UPS system load to the bypass source if any of the following conditions are present:
  - Inverter/bypass voltage difference exceeding preset limits
  - Bypass frequency out of limits
  - Bypass out-of-synchronization range with inverter output

(c) Uninterrupted Retransfer

- Retransfer of the UPS system load from the bypass source to the inverter output to be automatically initiated unless inhibited by manual control. The transfer control logic to inhibit an automatic retransfer of the critical load to the inverter if one of the following conditions exists:
  - Bypass out of synchronization range with inverter output
  - Inverter/bypass voltage difference exceeding preset limits
  - Critical load exceeds UPS system full load rating
  - UPS fault condition present

(d) Maintenance Capability

- With the critical load powered from the bypass circuit, it is to be possible and safe to inspect, test and repair the UPS modules and batteries.
- With the critical load powered from the UPS modules, it is to be possible and safe to inspect, test and repair the static transfer switch.

.3 Remote EPO System

(a) Provide an emergency power off system that will, upon closure of a remote contact, remove all output power of the system to the critical load and will initiate an alarm message.
(b) Operation of the remote EPO does not require the shutdown of the UPS system, only the removal of all output power to the critical load.

.4 Provision for System Testing

(a) System to include a self-test feature that places full load on the system without the need for a load bank.
(b) In addition:

- provide bus work and cable lugs suitable for the connection of a portable load bank rated at 125% of the UPS module rating.
- provide a suitable means for cable exit, consisting of a bushed opening with a removable cover or equivalent means to allow the cables to exit without risk of damage to the cables. Leaving a cabinet door open is not an acceptable provision.

.5 Grounding System

(a) Provide a high resistance grounding system on the 600V output of each UPS N system to limit the ground fault current to not more than 5 Amperes in the event of a single line to ground fault.
(b) Neutral grounding resistor, ground fault relay and ground-fault annunciation system to be integrated in a suitably sized Type 1 enclosure that can be wall-mounted.
(c) Neutral grounding resistors to be designed and tested to IEEE-32 standards.
(d) Neutral grounding resistors to be rated for continuous duty at 347 volts.
(e) Resistor to consist of helical stainless steel elements wound on a solid porcelain core, with welded terminals, and be vibration resistant.
(f) Provide dual resistor elements for redundancy and protection in the event of an open circuit failure of one of the resistor elements.
(g) Provide a ground fault annunciation system that will:

- continuously display the system leakage current,
- detect the presence of a phase-to-ground fault on the system and create a System Alarm condition with visual indication, and operate an alarm contact that is interfaced with the UPS system alarms,
- identify the phase on which the ground fault exists,
- monitor the integrity of the grounding resistor elements and operate a local alarm and operate an alarm contact if the value of the grounding resistor elements changes to a lower or higher limit that is set during commissioning, the alarm contact to be interfaced with the UPS system alarms,
- assist in locating the fault with a pulsing relay circuit that cyclically modulates the current in the fault circuit to 100% and 50% of the available ground fault current.

(h) Ground fault locating system:

- Implemented by means of a pulsing relay circuit. This circuit is to vary the magnitude of the ground fault current. The duration of pulsing to be field adjustable to suit the fault locating device sensitivity.
- Pulsing circuit to be manually activated by a selector switch located on the front panel. System to also have a test pushbutton.
- Provide a total of two (2) hand-held current sensors to assist in field location of the faulted circuit. Current sensors to be loop type, one 12” diameter and one 24” diameter, with dual banana jacks for connection to a hand-held digital multi-meter.

(i) Manufacturer to test and verify proper operation after installation.
(j) Overall integrated system to be equal to I-Gard, model “Gemini”

.8 Battery

.1 Provide a dedicated battery for each UPS system.

.2 Provide a dedicated disconnecting and isolation switch for each battery string.

.3 The battery to include sealed, lead-acid valve regulated battery cells housed in separate cabinets. Battery cells to be front connected (i.e. all connections facing out of the cabinet and accessible without reaching over other items). Batteries not to be mounted on slide out trays.

.4 Battery capacity to be based on an end voltage of not less than 1.67 Volts/cell, 80% of initial capacity (i.e. end of life) and at a room ambient temperature of not more than 21^{o}C .

.5 Battery to have a design life of not less than ten years at the room ambient design temperature.

.6 Battery cabinet temperature to be monitored and relayed to the UPS system controls.

.7 Cabinets to include side panels as the batteries will be located separately from the modules.

.8 Provide levelling feet on the battery cabinets.

2.5 Manufacturer Factory Acceptance Testing and Inspection (FAT):

.1 FAT to be performed in the presence of the Authority’s representative(s) for each tested equipment or system.

.2 FAT is in addition to manufacturer's standard production tests.

.3 Deficiencies discovered during FAT to be corrected prior to shipping of product.

.4 Conduct FAT for each UPS system including the following tests:

(a) Per NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.22.2 Emergency Systems, Uninterruptible Power Supplies, specifically tests #1.1, 1.2, 1.4, 1.6, 1.8 and 2.2 thru 2.6 inclusive.
(b) Demonstration of all functions of the UPS system while connected to a load bank.
(c) Simulate failure modes while monitoring the output voltage for disturbances. Include the following failure modes:
- Loss/return of input power to bypass
- Loss/return of input power to each module
- Loss/return of input power to the system
- One module failure
- Two module failure

(d) Operation under 100% load for not less than 2 hours. This test may be performed individually on each module.
(e) Operational discharge tests at full load with a battery plant of at least five minute capacity.
(f) Operational recharge tests with a battery plant of at least five minute capacity.

.5 Submit copies of completed FAT test result documentation.

Standard of Acceptance
- Eaton Power Xpert 9395

3 EXECUTION

3.1 Installation

.1 Provide UPS systems and batteries, located and sized as indicated.

.2 For each line up of equipment, provide a 4" reinforced concrete pad with beveled edges. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Pads to be provided under this division.

.3 Anchor the concrete pads to the building structure in accordance with Section 26 05 48, Vibration Isolation and Seismic Restraints.

.4 Arrange shipping details of equipment with UPS supplier.

.5 Receive equipment at site and inspect for damage.

.6 Provide necessary cranes and miscellaneous equipment to unload and transfer equipment into its final location.

.7 Secure equipment cabinets to the concrete pad.

.8 Should the batteries be received on site early, or should the energization of the UPS modules be delayed, make arrangements and place the batteries under charge. Do not allow the batteries to remain stored without charging. Obtain and follow the battery manufacturers' recommendations regarding storage.

.9 Provide interconnecting, incoming and outgoing cable and control wiring connections as shown, as required by the UPS manufacturer and as required for a complete operating system.

.10 Terminate power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.11 Bond each enclosure to perimeter ground bus with a #4/O green insulated copper in PVC conduit. Terminate with Burndy YA-2N lugs.

.12 Connect UPS input transformer secondary wye point to the perimeter ground bus with minimum #6 AWG green insulated copper installed in PVC conduit.

.13 Connect UPS bypass transformer secondary wye point to the perimeter ground bus with minimum #6 AWG green insulated copper installed in PVC conduit.

.14 Connect the UPS output transformer secondary wye point and the high resistance grounding system to perimeter ground bus with minimum #6 AWG green insulated copper installed in PVC conduit.

.15 Touch up small areas marred in transit or during installation with touch up paint.

.16 Install a system compatible Ethernet cable in conduit from the ModBus communications module in each UPS system to the Ethernet switch located in each main electrical room. Program the communications module as required to provide the operation specified.

.17 Facilitate the connection of the IT system cabling to the SNMP interface, and include the performance of the interface and the IT connection in the testing of the system.

.18 Provide wiring in conduit from the Ground Fault Annunciation system panel alarm contacts to UPS system.

.19 Provide 2 #12AWG in conduit, from each UPS system to the automatic transfer switch that feeds the system and connect to the auxiliary contacts in the transfer switch, such that the UPS system will operate at the lower load limit control and with the battery charging current limit, when the transfer switch is connected to the alternate source.

.20 4 #12AWG in conduit will be provided to each UPS system from the transfer switch that feeds the UPS. Connect these wires to inhibit the transfer switch from transferring in the event that the UPS system is on bypass.

.21 Complete the installation and correct all deficiencies.

3.2 Manufacturers' Service Representation on Site

.1 Manufacturer to supply factory trained service representative to perform the following field services:

.1 Conduct or supervise the installation contractor in the start-up of the equipment
.2 Perform a visual Inspection:

(a) Inspect equipment for signs of damage
(b) Verify installation per drawings
(c) Inspect cabinets for foreign objects
(d) Verify neutral and ground conductors are properly sized and configured
(e) Inspect battery cases
(f) Inspect battery for proper polarity
(g) Verify printed circuit boards are configured properly

.3 Perform a mechanical Inspection:

(a) Check all control wiring connections for tightness

(b) Check all power wiring connections for tightness
(c) Check all terminal screws, nuts, and/or spade lugs for tightness

.4 Perform an electrical Inspection:

(a) Check all fuses for continuity
(b) Confirm input voltage and phase rotation is correct
(c) Verify control transformer connections are correct for voltages being used

.5 Calibrate controls.

.6 Start-up system and complete testing as necessary to ensure that the system is ready for use.

.7 Start up the system and complete testing.

.8 Conduct site acceptance testing as described herein.

.9 Participate in the commissioning program described herein.

.10 Demonstrate to the Authority's representative(s) the following:

(a) operation of safety controls,
(b) operation of the equipment over its entire performance range,

.11 Provide training of the Authority's operations staff as described herein.

.2 Note that multiple visits will be required due to the phased construction. Provide all necessary visits.

.3 Submit copies of completed manufacturer start-up and test records.

3.3 Site Acceptance Testing (SAT)

.1 Conduct Site Acceptance Testing (SAT) on each UPS system in accordance with the reviewed test program and in the presence of and to the satisfaction of the Authority's representative(s).

.2 Perform SAT after completion of installation, but before equipment is permanently placed into service.

.3 Include:
.1 a thorough physical inspection and verification of the installation including wiring and interconnections,

.2 calibration of devices, relays, instrumentation and record "as tested" condition,

.3 a complete functional test of the UPS system and the associated accessories supplied by the manufacturer,

.4 a full load power test including a partial battery discharge test; (do not disturb user wiring connections).

.4 Perform the SAT in accordance with the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems:
.1 Section 7, #7.18.1.3 Direct-Current Systems, Batteries, Valve-Regulated Lead-Acid

.2 Section 7, #7.22.2 Emergency Systems, Uninterruptible Power Systems

.5 Provide a portable load bank for the duration of the testing. The load bank to be rated at not less than 125% of the output rating of the UPS system and to be adjustable with at least 15 steps including 10 steps at 5kW each, or equivalent, to allow adjustment of the load to match the rating of the UPS system. Include temporary cables to connect the load bank to the UPS system. Locate the load bank where adequate cooling can be provided for the duration of the testing.

.6 Verify operation of the transfer inhibit signals to the automatic transfer switches.

.7 Verify operation of the Load Limit Control from the automatic transfer switches.

.8 Verify operation of the Battery Charging Limit Control from the automatic transfer switches.

.9 Dynamically verify all signals through to the building management system.

.10 Dynamically verify all signals through to Health Shared Services BC.

.11 Record the results of the performance testing and submit completed report.

3.4 Commissioning Program

.1 In addition to the manufacturer Site Acceptance Testing, installation contractor and manufacturer to provide field service personnel to participate in the system integration commissioning of the equipment and/or system including:

.1 review of equipment and system commissioning procedures in addition to the manufacturers own testing procedures,
.2 control of and operation of equipment during testing,
.3 adjusting of equipment controls as required to simulate load or fault conditions, and
.4 assist with record keeping of test results as directed by the commissioning agent.

3.5 Demonstration and Training

.1 Provide training to the Authority's operations staff, in conjunction with the manufacturer's service representative, in accordance with the reviewed procedures.

END OF SECTION

HARMONIC CANCELLATION TRANSFORMERS
26 35 26

1 GENERAL

1.1 General Requirements

.1 General Conditions as applicable.

.2 Section 26 05 01, Electrical General Requirements.

.3 Applicable Codes and Standards

.4 Latest edition of:

.1 CSA C22.2 No. 47 Air-Cooled Transformers (dry type),

.2 CSA C9 Dry-Type Transformers,

.3 CAN/CSA C802.2 Minimum Efficiency Values for Dry-Type Transformers.

1.2 Scope

.1 Provide labour, materials, and equipment for the installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

1.3 Submittals

.1 Submit shop drawings and product data for each type and rating of transformer.

.2 Provide operation and maintenance data for incorporation into the Operating and Maintenance Manual.

.3 Nameplates shall be in accordance with Article "Equipment Identification".

1.4 Quality Control

.1 Type tests:

.1 to have been conducted in accordance with CSA C9 for the following:

(a) temperature rise,
(b) sound level.

.2 submit certified copies of reports of type tests.

.2 Production tests:

.1 conduct in accordance with CSA C9 for the following:

(a) Voltage ratio, including all taps,
(b) polarity or angular displacement,
(c) dielectric, applied potential and induced potential,
(d) partial discharge (cast-coil transformers only).

.2 submit certified copies of reports of production tests.

.3 Energy efficiency:

.1 Submit the energy efficiency reports to show compliance with the specified efficiency values.

1.5 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 Transformers

.1 Transformers shall be constructed in accordance with the referenced standards except where indicated otherwise.

.2 Transformers to be self-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.

.3 Single Output Units

.1 Three phase harmonic cancellation type transformers, 600 volt delta connected primary and 120/208 volt WYE secondary, with an integral zero sequence zig zag winding configuration designed to cancel secondary winding zero sequence harmonic fluxes and eliminate primary winding circulating current.

.4 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.

.5 Transformers to have voltage and kVA rating indicated

.6 Vacuum impregnated polyester resin construction.

.7 kVA capacity indicated to be based on Class 220 degree C insulation, 150 degree C rise.

.8 Transformers to be ANN.

.9 Transformer to be suitable for loads with a crest factor up to 4.5, and capable to deliver full nameplate kVA for loads of up to a K-factor of 13, without exceeding 150 degree C temperature rise.

.10 All current carrying parts to be copper.

.11 Primary to secondary phase shift for 5^{th} and 7^{th} harmonics to be zero degrees or thirty degrees for single secondary output units, as indicated on the drawings.

.12 Shielded isolation transformer

.1 Each winding to be independently shielded with full length copper electrostatic shield, providing a minimum of 60 dB common mode attenuation; 30 dB transverse mode at 10kHz

.13 Positive and negative sequence impedance of transformers at 60 Hz not to exceed:

.1 3%: up to 150 kVA

.2 3.75%: 225 - 300 kVA

.3 4%: 500kVA.

.14 Zero sequence reactance not to exceed:

.1 0.3%; up to 150 kVA

.2 0.5%: 225 - 300 kVA

.3 1.0%: 500kVA.

.15 Zero sequence impedance not to exceed:

.1 0.9%; up to 150 kVA

.2 1.0%: 225 - 300 kVA

.3 1.5%: 500kVA.

.16 Regulation 3% no load to full load at 80% power factor.

.17 Harmonic distortion: 1% maximum under linear load.

.18 Three heavy duty bonding straps to bond electrostatic shield, transformer core and transformer neutral to a single point ground bus. Ground bus connection to be a bus bar connection, suitable to accept a ground conductor terminated with a NEMA two hole compression connector.

.19 Neutral connection to be rated at twice the ampacity of the secondary phase current.

.20 The 200% neutral ampacity to be established at the star point of the transformer coils and extended through to the neutral connection to the contractor's field wiring.

.21 Transformer noise level to CSA C9.

.22 Magnetic field to be a maximum of 0.1 Gauss at 1.5 feet.

.23 Transformer enclosure to be CSA type 2 self-contained, free standing unit suitable for floor mounting. Include drip shield and angled sprinkler resistant louvers at ventilation openings. Where shown or required to be wall mounted, necessary mounting hardware to be included.

.24 Transformers to have 4-2½% full capacity primary taps, two above and two below nominal voltage.

.25 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.

.26 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of powder coat finishing paint.

.27 Finish equipment as follows:

.1 basic rust-inhibiting metal process

.2 Interior in white

.28 Exterior to be finished with paint to meet Authority's color coding scheme

Standard of Acceptance

- Square D

2.2 Support and Isolation

.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection underweight and weight distribution of supported equipment. Pads to provide a minimum of 6mm static deflection.

.2 In addition, each transformer is to be set on 9mm ribbed or waffle pattern neoprene pads of not more than 50 durometer. Pads to be similar to Peabody Noise Control Model "NP". Installed mountings to provide a uniform deflection underweight and weight distribution of supported equipment.

.3 Include vibration isolation pads (to give minimum 6 mm static deflection) for each unit.

2.3 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Label size: 7. Submit nameplate wording.

3 EXECUTION

3.1 Installation

.1 Mount dry type transformers up to 75 kVA suspended or on floor as indicated.

.2 Mount dry type transformers above 75 kVA on floor.

.3 Provide a 4" reinforced concrete pad with bevelled edges for all floor mounted transformers. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Concrete pads to be provided under this division.

.4 Provide suitable mounting hardware complete with external vibration isolation pads for both floor mounted (between enclosure and pad) and suspended (between enclosure and support frame) transformers.

.5 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 6mm static deflection.

.6 Each transformer is to be set on 2 layers of 9mm ribbed or waffle pattern neoprene pads of not more than 50 durometer. Pads to be similar to Peabody Noise Control Model "NP". Installed mountings shall provide a uniform deflection under weight and weight distribution of supported equipment.

.7 Install transformers in level upright position.

.8 Ensure adequate clearance around transformer for ventilation.

.9 Remove shipping supports only after transformer is installed and just before putting into service.

.10 Loosen isolation pad bolts until no compression is visible.

.11 Make final primary and secondary connections using flexible steel conduits.

.12 Make primary and secondary connections in accordance with wiring diagram.

.13 Provide green insulated copper ground conductor in conduit, sized as follows, from transformer ground bus to the building grounding system, in accordance with Table 17 of the Electrical Code: Below 30 kVA transformer: #8AWG in 13mm conduit; 30 kVA transformer: #6AWG in 13 mm conduit; Up to 45 kVA transformer:#4 AWG in 19mm conduit; Up to 75 kVA: #2 AWG in 19mm conduit: up to 112.5 kVA: #2/0 AWG in 25mm conduit; over 112.5 kVA: 3/0 AWG in 25mm conduit.

.14 Energize transformers after installation is complete.

.15 Adjust transformer taps as required to achieve suitable secondary voltage at loads

END OF SECTION

POWER FACTOR CORRECTION UNITS
26 35 33

1 GENERAL

1.1 General Requirements

.1 Conform to Sections of General Conditions as applicable.

.2 Conform to Section 26 05 01 Electrical General Requirements.

1.2 Standards

.1 CSA C22.2 No. 190, Capacitors for Power Factor Correction

.2 EEMAC 6G-1, Shunt Capacitors

.3 CSA CAN3 – C155, Shunt Capacitors for AC Power Systems

.4 ANSI/NETA ATS-2009 Acceptance Testing Specifications

.5 Power factor corrections units to be seismic certified to withstand the ground acceleration criteria and seismic demand requirements for nonstructural equipment as identified in the British Columbia Building Code for the geographic location of installation.

1.3 Work Included

.1 Work to be done under this Section to include furnishing of labour, materials, and equipment required for manufacture, testing and putting into proper operation complete systems as shown as specified and as otherwise required. Installation will be by the electrical contractor. Additional services as described herein are to be undertaken by the supplier or their field service representatives and all costs for this work is to be included in the Bid Amount.

.2 The services to be provided by the supplier under this section to include but not limited to the following, for a complete and satisfactory operating system:

.1 Shop drawings.

.2 Fabrication and assembly as per shop drawings.

.3 Interface control wiring diagrams, schedules and wire running lists between all components supplied.

.4 Factory testing and supplementary acceptance testing. Acceptance testing procedure to be submitted as a shop drawing.

.5 Delivery schedule and delivery F.O.B. job site in a manner suitable to Fraser Health.

.6 Information as appropriate to install and test the equipment.

.7 Calibration and testing of all instruments and meters, and verification of harmonic performance of the entire system.

.8 Commissioning, site testing including acceptance testing.

.9 Providing technical staff and manuals for factory and field training of Fraser Health's staff in the complete operation of the system.

.10 Warranty service.

.11 Data book including schematic diagrams.

.12 Check out of system one month prior to expiry of warranty period.

.13 Services of a technical representative as required by Electrical Contractor to review production schedules, delivery dates, shop drawing changes, shipping details, shop and field testing

.14 Services of a technical representative as required by Fraser Health to for training programs.

.3 Complete systems to be left ready for continuous and efficient satisfactory operation.

1.4 Work By Electrical Installation Contractor

.1 Installation, including: unloading at the site, moving to final location, hoisting and setting into place will be done by the Installation Contractor.

.2 Electrical installation contractor will assemble shipping splits and will install modules into the enclosures where such components have been shipped individually.

.3 Electrical installation contractor will install incoming and outgoing field wiring to terminals within the equipment and will connect wiring to modules if shipped separately and between shipping splits if applicable.

1.5 Provisions for Handling and Field Erection

.1 Each shipping split to be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

.2 Each shipping split to also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the equipment.

1.6 Preparation for Shipment

.1 Preparation for Shipment to be in accordance with manufacturer's standards, unless otherwise noted. The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide the equipment at the site in ex-works condition when handled by commercial carrier systems.

1.7 Shipping

.1 Arrange shipping details of the equipment with electrical contractor.

.2 If shipped separately, any components to be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.

.3 Each "shipping section" to be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

1.8 Warranty

.1 For all equipment under this section, the supplier shall provide a warranty, covering a period of 2 years following final site acceptance, against:

.1 Faulty or inadequate design, manufacture or operation.

.2 Improper assembly.

.3 Defective material or workmanship or both.

.4 Leakage, breakage or other failure that might occur under normal and proper operation of the equipment.

.2 The manufacturer to correct any deficiencies in his equipment which occur during the 2 year warranty period at no additional cost to Fraser Health. This to include all costs for material and labour. The manufacturer's technical representative to be available on site on a priority basis within 24 hours of being notified of a deficiency and the need to repair the system.

1.9 Shop Drawings and Product Data

.1 Submit shop drawings and product data in accordance with Section 26 05 01 Electrical General Requirements.

.2 Spare Parts List

.1 Complete spare parts list, including parts location diagrams or drawings to be included with the manufacturer's quotation.

.2 List of priced spare parts which manufacturer recommends shall be on hand during start-up and the first two year's operation.

.3 Material List

(a) A material list to be furnished listing the quantity, rating, type, and manufacturer's catalog number of all equipment on each unit.

.3 Nameplates shall be in accordance with Article "Equipment Identification".

1.10 Quality Control

.1 Manufacturer Production Test and Records:

.1 Submit certified copies of reports of manufacturer's production testing for each power factor correction unit.

.2 Site Acceptance Testing

.1 Manufacturer to provide services of manufacturer's authorized service personnel in accordance with the requirements of Part 3 of this specification.

1.11 Operation and Maintenance Data

.1 Provide installation, operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements.

.2 Include detailed instructions to permit effective operation, maintenance and repair of the equipment.

.3 Technical data to be included:

.1 Schematic diagrams of components, controls and relays.

.2 Illustrated parts lists with parts catalogue numbers.

.3 Certified copy of factory test results.

.4 Provide the services of qualified factory trained technicians and service representatives to conduct training of the facility operating staff in the operation and maintenance of the power factor correction units. Include for a total of four training sessions, each to be four hours in duration and to be provided on separate nonconsecutive days at times acceptable to Fraser Health. Should equipment fail during a training session, conduct a repeat session.

2 PRODUCTS

2.1 General

.1 Power factor correction units are required to provide power factor correction only. Reduction of harmonic distortion is not a requirement.

.2 Power factor correction units are required to operate in an environment containing harmonic currents. Each unit shall include protection to minimize the amount of harmonic current that can flow into the unit for all possible combinations of steps, i.e. the units are to be detuned capacitor banks. Units shall be inductive at frequencies above 282 Hertz. Also the design shall take into account the profile of the building distribution system so that a resonant condition will not be created with any combination of modules energized (including the future modules), submit calculations as a shop drawing to verify that a resonant condition will not be encountered.

.3 Power factor correction units to be suitable for use with 600V 3 phase 3 wire high resistance grounded systems. The units shall not require a neutral conductor, shall not introduce neutral current into the bonding conductor and shall not include any connection from a neutral point to the bonding conductor.

.4 Power factor correction units to be rated per the schedule of ratings for:

- .1 Maximum unit kVAR
- .2 Total installed kVAR
- .3 Module (step) size
- .4 Number of modules installed
- .5 Number of future modules
- .6 System available fault level

.5 Each power factor correction unit to include space for future modules of the same design and kVAR rating as the installed modules. Number of spaces for future modules to be as listed elsewhere in this specification.

.6 Each power factor correction unit to include the flowing features:

- .1 Main fused switch with HRC fuses (Fuses to Section 26 28 13 - Fuses - Low Voltage)
- .2 CSA Type 1 enclosure with drip hood, gaskets, sealed control devices, etc as required for use in a sprinklered area (type 3R enclosure is an acceptable alternative)
- .3 1000 V insulation class.
- .4 Copper wiring sized for not less than 150% of the module rating.
- .5 Electronic controller to monitor the power factor of the system and to automatically add or remove stages so as to keep the system power factor between the required values.
- .6 Terminals for incoming power feeders suitable for aluminum conductors of the sizes shown.
- .7 Modular design with rack mounting of components complete with bus, connectors, enclosing plates, screens.
- .8 Potential transformers with primary HRC fuses in dead front holders.
- .9 Control power transformer with primary HRC fuses in dead front holders.
- .10 Oil tight “Manual-Auto” selector switch for each stage including the future stages.
- .11 Oil tight “On-Off” selector switch for each stage including the future stages.

.12 Two oil tight LED pilot lights for each stage, including the future stages, to indicate the “On” and “Off” status of each stage.

.13 An oil tight LED pilot light to indicate power on at the unit.

.14 An oil tight LED pilot light to indicate a blown fuse condition.

.15 An oil tight push-to-test switch to test all pilot lights.

.16 Form “C” contacts wired out to a terminal strip for remote indication on the Building Management System of:

(a) a blown fuse,
(b) over temperature,
(c) unable to meet required power factor.

.7 At the terminal strip, interconnect the three alarm contacts to function as one common summary alarm.

2.2 Capacitor Modules

.1 Capacitor/reactor assembly for power factor correction: to CAN3-C155, EEMAC 6G-1.

.2 Each capacitor module shall consist of a three phase capacitor bank connected in delta, a three phase reactor bank, a three pole contactor, three fuses, blown fuse indicators and contacts for remote annunciation. It shall be possible to add or remove a module without disturbing other modules within the unit. Modules may be plug in or bolt on design.

.3 Capacitors:

.1 Rated not less than 690V nominal

.2 Rated for not less than 180% of nominal current

.3 Low dissipation factor

.4 Dry type or non propagating liquid insulated, free of PCB’s

.5 Internal discharge device: to 50 V within 1 min.

.6 Internal pressure sensitive interrupter device to disconnect capacitor when excessive pressure is detected

.4 Reactors:

.1 Copper windings

.2 220^{o}C insulation system

.3 Embedded over temperature sensors connected to shut down the module in the event of an over temperature condition

.4 Individually tuned to limit the flow of harmonic currents so that the capacitors will not overheat or be overloaded.

.5 Sized to limit the initial inrush current to no more than 10% of nominal, alternatively separate pre-charge contacts and current limiting devices may be used to limit the inrush current to no more than 10% of nominal

.5 Contactors:

.1 Rated for not less than 150% of rated capacitor current

.2 Electrically held

.6 Fuses:

.1 HRC type with 200,000 A interrupting capacity to Section 26 28 13 - Fuses - Low Voltage

.2 Installed in each phase of each capacitor

.7 Blown fuse indicating devices:

.1 Each fuse equipped with indicating device to indicate blown fuse condition, alternatively individual enclosure mounted LED indicating lights may be used in lieu of the indicating devices plus the one common indicating light.

2.3 Electronic Controller

.1 The electronic controller shall provide automatic control of the capacitor stages so as to keep the power factor of the associated substation bus within a range of 0.96 lagging to 1.0.

.2 The controller shall have at least 10 steps to individually control each capacitor module. Power factor information shall be obtained from potential transformers included within the unit and from CT's provided as part of the low voltage substations. CT's will have 5 Amp secondaries.

.3 The controller shall provide:

.1 manual control allowing each module to be turned on, off or set to automatic,

.2 metering functions with accuracy of not less than 2% of full scale

.3 alarm functions

.4 communications.

.4 The controller shall be field programmable for:

.1 Target power factor

.2 Response limits

.3 Stepping program

.4 Reconnection delay

.5 Step configuration (fixed, auto, disconnected)

.6 Temperature setting

.5 The controller shall have a display visible from the exterior of the enclosure.

.1 The language of the display shall be English.

.2 The display shall show the following parameters:

(a) Voltage,
(b) Current,
(c) kW,
(d) kVAR,
(e) kVA,
(f) PF,
(g) Number of stages on
(h) Alarm – blown fuse
(i) Alarm – unable to meet required power factor
(j) Alarm – over temperature

2.4 Enclosure

.1 Enclosures to be of sufficient size to meet or exceed wire bending space requirements for field wire terminals as outlined in CSA C22.2 No. 14-M1987 Clause 4.6.3 and 4.6.5.

.2 Enclosures to be dead front code gauge steel CSA Type 1 construction complete with overhanging dripshield, gaskets and sealed controls and pilot lights, suitable for use in a sprinklered room. (Type 3R enclosure is an acceptable alternative)

.3 Prior to finishing, enclosures shall be cleaned of oils and rust and primed inside and outside with a rust resistant primer.

.4 Shop finish metal enclosures with at least two coats of finish enamel, colour per EEMAC 2Y-1 (light grey).

.5 Supply 5 pressurized spray cans of paint for touch-up purposes. Colour to match the enclosures.

.6 Provide a nameplate on each unit as follows:

.1 3 mm thick, black letters inscribed on white background, with bevelled edges.

.2 Engraved lettering, 5 mm (¼") high, except where indicated otherwise.

.3 Wording on nameplates to be approved by Fraser Health prior to manufacture.

.4 Nameplates shall indicate:

(a) Name of the unit, (8 mm high lettering), eg: PFC-6NA
(b) System voltage, eg: 600V, 3Ø, 3W
(c) Unit installed kVAR rating, eg: 600 kVAR INSTALLED
(d) Unit ultimate kVAR rating, eg: 800 KVAR MAXIMUM

.5 Mechanically attach nameplates with stainless steel screws.

2.5 Ratings

.1 Schedule of ratings to be completed by Design-Builder:

PFC Unit Name	Maximum kVAR Rating	Installed kVAR Rating	Module (Step) Size (kVAR)	Number of Modules Installed	Number of Spaces for Future Modules	Available Fault Current, RMS Symmetrical @ 600V)
MH A						
MH B						
EC A						
EC B						
HCC A						
HCC B						
CT A						

CT B						

3 EXECUTION

3.1 Installation

.1 Provide complete power factor correction units at each main 600 V substation as shown and as specified. Install on concrete pads.

.2 Arrange shipping details of equipment with supplier. Accept equipment at site and provide necessary cranes and miscellaneous equipment to unload and transfer equipment into its final location.

.3 Provide interconnecting, incoming and control wiring connections as shown as specified and as required.

.4 Terminate all power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.5 Provide grounding of each unit to perimeter ground bus with a #4/O green insulated copper in PVC conduit. Terminate with Burndy YA-2N lugs.

.6 Touch up small areas marred in transit or during installation with touch up paint.

.7 Provide interconnecting wiring between each unit and the CT in the respective switchboard, for runs up to 15m use #10 wiring, for runs in excess of 15m use #8 wiring. Install wiring in conduit.

.8 Provide 2#12 in conduit from the summary alarm terminals of each unit to the remote I/O module in the communications equipment rack located in the substation room. The communications rack and the I/O module are not part of the Power Factor Correction Units scope of work. Make connections and demonstrate correct operation of the summary alarm.

.9 Complete the installation and correct all deficiencies.

3.2 Arc Flash Labelling

.1 Equipment shall be labelled with the arc flash potential in accordance with the requirements of the Canadian Electrical Code. Co-ordinate with the system coordination and arc flash study supplier who will provide and install the arc flash labels.

3.3 Manufacturers' Service Representation on Site

.1 Manufacturer to supply factory trained service representatives to perform the following field services:

.1 Check the installation of the equipment;

.2 Conduct or supervise the installation contractor in the start-up of the equipment;'

.3 Calibrate controls;

.4 Conduct site acceptance testing;

.5 Participate in the commissioning program described herein;

.6 During commissioning and within one month of building normal occupancy, test final installation to verify harmonic profile. Retune if necessary at no additional cost to Fraser Health;

.7 Demonstrate the operation of safety controls to the facility operations staff and Fraser Health representative(s);

.8 Demonstrate the operation of the equipment over its entire performance range and provide training to Fraser Health Facilities maintenance staff.

.2 Note that multiple visits will be required due to the phased construction. Provide all necessary visits in accordance with Fraser Health's procedures.

.3 Submit copies of completed manufacturer start-up and test records to Fraser Health prior to hand-over of equipment.

3.4 Site Acceptance Testing

.1 Conduct Site Acceptance Testing (SAT) in presence of and to the satisfaction of the Fraser Health representative(s) after completion of installation, but before equipment is permanently placed into service.

.2 Conduct acceptance tests on each unit to the satisfaction of Fraser Health's representative.

.3 On site acceptance testing shall be performed in accordance with the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.20.1 Capacitors and Reactors, Capacitors and Section 7, #7.20.3.1 Capacitors and Reactors, Reactors.

.4 Verify the operation of the electronic power factor controller, manual switches and pilot lights.

.5 Dynamically verify all signals through to the building management system and document test results.

.6 Record the results of the performance testing and submit completed report to the Engineer.

3.5 Commissioning Program

.1 In addition to the manufacturer's Site Acceptance Testing, installation contractor and manufacturer to provide field service personnel to participate in the system integration commissioning of the equipment and/or system including:

.1 Review of equipment and system commissioning procedures provided by Fraser Health in addition to the manufacturers own testing procedures.

.2 Control of and operation of equipment during testing;

.3 Adjusting of equipment controls as required to simulate load or fault conditions; and

.4 Assist with record keeping of test results as directed by Fraser Health.

3.6 Demonstration and Training

.1 Provide training to Fraser Health operations staff, in conjunction with the manufacturer's service representative, in accordance with Fraser Health's procedures.

LOW VOLTAGE LOW VOLTAGE TRANSFER SWITCHES
26 36 23

1 GENERAL

1.1 General Requirements

.1 General Conditions as applicable.

.2 Section 26 05 01, Electrical General Requirements.

1.2 Applicable Codes and Standards

.1 Latest edition of:

.1 CSA C22 No. 178.1 Transfer Switch Equipment,

.2 CSA C282 Emergency Electrical Power Supply for Buildings,

.3 CSA Z32 Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.3 References

.1 Section 26 32 13 - Power Generation Diesel.

.2 NEMA ICS 10 AC Automatic Transfer Switches.

.3 NETA, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.4 Scope

.1 Provide labour, materials, and equipment required for manufacture, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

.2 Additional services are to be provided by the equipment supplier or their field service representatives and costs for this work are to be included in the Bid Amount.

.3 Services to be provided by the equipment manufacturer, supplier or their field service representatives to include:

.1 shop drawing preparation,

.2 fabrication and assembly as per "reviewed" shop drawings,

.3 interface control wiring diagrams, schedules and wire running lists between all components,

.4 factory testing and supplementary acceptance testing,

.5 provision of information as appropriate to install and test the equipment,

.6 technical supervision of equipment unloading, equipment site assembly, installation of power and control cables, cable connections, and all other work normal to the electrical trade,

.7 on site setup of timers and controls,

.8 on site programming of controls and communications equipment,

.9 on site testing,

.10 technical assistance during acceptance testing,

.11 technical assistance during commissioning,

.12 factory and field training of the Authority’s staff in the complete operation of the system,

.13 warranty service on a priority basis,

.14 data book including schematic diagrams,

.15 check out of system one month prior to expiry of warranty period,

.16 services of a technical representative as required by the Authority to review production schedules, delivery dates, shop drawing changes, shipping details, shop and field testing and training programs.

.4 Manufacturer to correct deficiencies which occur during the 2 year warranty period at no additional cost to the Authority. Include all costs for material, labour, travel and accommodation. The manufacturer's technical representative to call back within 1 hour and be available on site on a priority basis i.e. within 2 hours of being notified of a deficiency requiring repair.

1.5 Submittals

.1 Shop drawings in accordance with Section 26 05 01 Electrical General Requirements.

.2 Provide one additional set of drawings shipped with the equipment for start up use.

.3 Spare Parts List

.1 a complete spare parts list, including parts location diagrams or drawings (to be included with the manufacturer's quotation),

.2 a list of spare parts which the manufacturer recommends to be on site during start-up and the first two year's of operation,

.3 a material list, listing the quantity, rating, type, and manufacturer's catalog number of all equipment on each unit.

.4 Installation, operating, and maintenance instructions to cover the equipment furnished.

1.6 Quality Control

.1 Factory Acceptance Testing (FAT):

.1 Refer to Part 2 Product for requirements.

.2 Site Acceptance Testing:

.1 Refer to Part 3 Execution for requirements.

1.7 Preparation for Shipment

.1 The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide equipment at the site in ex-works condition when handled by commercial carrier systems.

1.8 Shipping

.1 Any component shipped separately to be individually crated and tagged with unit number and the equipment number of the assembly to which it belongs.

.2 Provide each "shipping section" with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

1.9 Provisions for Handling and Field Erection

.1 Provide removable side panels, lifting angles or lifting plates to accommodate the use of slings or crane hooks for each shipping section.

.2 For floor mounted transfer switches, provide on each shipping section, removable steel channel base plates to permit use of pipe rollers or dollies without damaging the equipment.

1.10 Operation and Maintenance Data

.1 Provide operation and maintenance data for transfer switch equipment for incorporation into manual specified in Section 26 05 01 - Electrical General Requirements.

.2 Detailed instructions to permit effective operation, maintenance and repair.

.3 Technical data:

.1 schematic diagram of components, controls and relays,

.2 illustrated parts lists with parts catalogue numbers,

.3 certified copy of factory test results.

1.11 Warranty

.1 Supplier to provide a warranty for the equipment supplied under this Section, for a period of 2 years following final site acceptance, against:

.1 faulty or inadequate design, manufacture or operation,

.2 defective material or workmanship, or both,

.3 breakage or other failure that occurs under normal and proper operation of the equipment.

1.12 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 Contactor Type Automatic Transfer Switches

.1 Type A without any internal trip devices.

.2 Suitable for use as part of a code required emergency power system.

.3 Electrically operated, mechanically held contacts.

.4 Designed for unattended operation.

.5 Double throw type:

.1 3 pole for 600V switches,

.6 Rated for operation on the system shown:

.1 600V 3 phase, 3 wire high resistance grounded,

.7 Suitable for operation on a high resistance grounded system without requiring a neutral connection and without introducing any load current into the ground connection.

.8 Main contacts:

.1 protected by separate arcing contacts and arc chutes,

.2 interlocked mechanically and electrically.

.9 Sensing and control relays:

.1 continuous duty,

.2 industrial control quality.

.10 Pilot lights:

.1 LED type,

.2 with “Push to Test” feature.

.11 Cable lugs:

.1 suitable for copper conductors,

.2 suitable for the cable sizes shown,

.3 oversized where required to suit feeders that have been oversized (eg: to meet voltage drop criteria),

.4 reduced sizes where required to suit feeders that are substantially smaller than the transfer switch rating (eg: due to switch oversizing to meet the specified withstand ratings).

.12 Switch lifting yoke.

.13 Seismically certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the Building Code for the geographic location of the installation.

2.2 Power Circuit Breaker Type Automatic Transfer Switches

.1 Type A

.2 Electrically interlocked electrically operated draw-out type power circuit breaker switching units.

.3 Designed for unattended operation.

.4 3 Pole, rated for operation on the 600V, 3 phase, 3 wire, high resistance grounded system

.5 Suitable for operation on a high resistance grounded system without requiring a neutral connection and without introducing any load current into the ground connection.

.6 Provided with control package that has been previously engineered and has a proven history of successful operation in critical applications. Custom designed control systems are not acceptable.

.7 Sensing and control relays:

.1 continuous duty,

.2 industrial control quality.

.8 Pilot lights:

.1 LED type,

.2 with “Push to Test” feature.

.9 Cable lugs:

.1 suitable for copper conductors,

.2 suitable for the cable sizes shown,

.3 oversized where required to suit feeders that have been oversized (eg: to meet voltage drop criteria),

.4 reduced sizes where required to suit feeders that are substantially smaller than the transfer switch rating (eg: due to switch oversizing to meet the specified withstand ratings).

.10 Seismically certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the Building Code for the geographic location of the installation.

2.3 Automatic Transfer Switches (ATS)

.1 Basic operation of each ATS:

.1 when any phase of the preferred source power at the transfer switch drops below 90% of preferred source voltage for the selected time, a relay on that transfer switch to operate to cause the Diesel engine to be started,

.2 when Diesel-alternator reaches rated voltage and frequency, the transfer switch to operate to transfer load to Diesel-alternator,

.3 when preferred source power supply is restored and voltage on all phases is 90% or more for the selected time, switch to transfer load back to preferred source power supply,

.4 after a preselected time delay the engine start signal is removed.

.2 Automatic transfer switches shown connected to continuously energized preferred and alternative sources:

.1 controls to prevent transfer to the alternative source unless:

(a) the normal source fails or,
(b) the test switch on the respective unit has been operated.

.2 Selector switch to allow selection of the preferred source.

.3 Engine start contacts not required.

.3 Provide in each automatic transfer switch the following features:

.1 a microprocessor-based control panel with field accessible adjustments to such items as voltage pick-up and drop-out and timing controls,

.2 three phase true RMS over and under voltage sensing of both the preferred and alternative sources with programmable set points,

.3 over and under frequency sensing of both the preferred and alternative sources with programmable set points,

.4 engine start contacts,

.5 duplicate engine start contacts,

.6 time delays:

(a) on engine start after preferred source fails, adjustable from .5 to 6 seconds, set at 2 seconds,
(b) on transfer to alternative source, adjustable 0-300 seconds, set as indicated,

(c) on alternative source failure, adjustable from .5 to 6 seconds, set at 6 seconds,
(d) on transfer to preferred source after restoration of preferred source, adjustable 0-30 minutes, set as indicated,
(e) on transfer to preferred source following a test of the alternative source, adjustable 0-30 minutes, set at 30 seconds,
(f) on unloaded engine cool down, adjustable 0-60 minutes, set at 0 minutes,

.7 selector switches, mounted on outside of door with a guard to prevent accidental actuation:

(a) four position selector switch for engine control. Auto / Off / Engine Test / System Test,
- Auto: Normal operation of ATS.
- Off Position: ATS signal to start engine is inhibited.
- Engine Test: Engine starts but ATS remains in normal position unless normal power fails.
- System Test: Engine starts and ATS transfers to alternate source.

(b) reset switch for manual retransfer to preferred source with bypass of time delay,
(c) switch and circuitry to enable selection of the alternative source as the preferred source with override in event of failure of the alternative source.

.8 pilot lights:

(a) to indicate transfer switch is in preferred source position,
(b) to indicate transfer switch is in alternative source position,
(c) to indicate preferred source power is available,
(d) to indicate alternative source is available,

.9 auxiliary contacts:

(a) contact to close when preferred source fails,
(b) four on main shaft, closed when on preferred source,
(c) four on main shaft, closed when on alternative source,

.10 remote test circuitry,

.11 load management controls:

(a) to cause immediate transfer to the selected source or to the neutral position upon closure of a remote contact as follows:
- Contact #1: transfer to or remain on the preferred source
- Contact #2: transfer to or remain on the alternative source
- Contact #3: transfer to the neutral position (delayed transition switches only)

(b) to be implemented immediately, bypassing all timers except for the neutral position (delayed transition) timer which is to remain active,
(c) transfer switch operation to return to non-load management operation upon opening of the remote Load Management System contacts.

.12 terminal provisions for a remote customer contact to inhibit transfer to the preferred source,

.13 terminal provisions for a remote customer contact to inhibit transfer to the alternative source,

.14 externally-mounted quick-make quick-break operating handle on switches ≥ 600Ampere rating,

.15 ModBus Ethernet communications system to provide the following:

(a) transmission of status conditions to the building management system and to the generator control switchboard, including:
- Loss of preferred source
- Preferred source available
- Alternative source available
- TS connected to preferred source
- TS connected to alternative source
- TS parked in neutral position (where applicable)
- TS in bypass (where applicable)

- TS under load management control (where applicable)
- TS transfer inhibit by SUPS (where applicable)

2.4 Additional Features for Selected Automatic Transfer Switches

.1 For switches with bypass/isolation feature:

.1 built-in two way manual bypass/isolation system,

.2 to allow the active switch element to be removed from the system while the load remains energized from either the preferred source or the alternative source,

.3 bypass/isolation switch ratings: same as the active switch,

.4 load break and load make contacts,

.5 externally-mounted quick-make quick-break operating handle,

.6 safe operation as a manual transfer switch,

.7 auxiliary contacts to indicate when the transfer switch is in bypass mode,

.8 automatic shutters which close when the active element is withdrawn, to provide isolation from live bus.

.2 For switches that supply elevator equipment:

.1 two selective load disconnect control contacts,

.2 contacts to operate prior to and/or after load transfer and retransfer (elevator pretransfer signal),

.3 contacts adjustable from 0 to 300 seconds, set at 20 seconds,

.4 engine start contacts not required.

.5 rear access not required.

.3 Provide the additional features as indicated by a **√** mark in the following table:

Transfer Switch Name	Bypass/Isolation Feature	Switch Supplies Elevator Equipment
ATS-EC-LL-V	**√**	
ATS-EC-LL-DV	**√**	
ATS-MH-05-V	**√**	
ATS-MH-05-DV	**√**	
ATS-HCC-V	**√**	
ATS-HCC-DV	**√**	
ATS-CT-V	**√**	
ATS-CT-DV	**√**	
ATS-MH-ELEV		**√**

2.5 Delayed Transition Transfer Switches

.1 To provide a break before make switching operation in each direction.

.2 Preferred source and alternative source contacts mounted on separate shafts.

.3 Two operators, one to operate the preferred source contacts, one to operate the alternative source contacts.

.4 A controlled time delay between the opening of one set of contacts and the closing of the other set of contacts, adjustable from 0 to 30 seconds. Set as indicated.

.5 Auxiliary contact to close when the switch is parked in the neutral position (not to operate during normal delayed transfer delay).

2.6 Closed Transition Transfer Switches

.1 To provide a make before break switching operation in each direction.

.2 Preferred source and alternative source contacts mounted on separate shafts.

.3 Two operators, one to operate the preferred source contacts, one to operate the alternative source contacts.

.4 Controls to ensure that both sources are available and within limits when transferring between live sources.

.5 Overlap time during the switching operation not to exceed 6 cycles (100ms).

.6 When transferring from a dead source to a live source the switching is to automatically change to a break before make operation as specified for the delayed transition transfer switches.

.7 Relay to monitor if the overlap of the normal and emergency contacts exceeds the allowable limit. In the event that the contact overlap time has been exceeded:

.1 circuitry to automatically and immediately open the switch power contacts for the source, to which the switch is attempting to transfer,

.2 switch power contacts, for the source from which the switch is being fed, to remain closed and maintain power to the load,

.3 pilot light to indicate the failure,

.4 alarm contact to operate for remote signalling of the failure.

2.7 Automatic Transfer Switch Table

.1 Provide automatic transfer switches of the type indicated by the **√** mark in the following table:

Transfer Switch Name	Delayed Transition	Closed Transition
ATS-EC-LL-V		**√**

ATS-EC-LL-DV		√
ATS-MH-05-V		√
ATS-MH-05-DV		√
ATS-HCC-V		√
ATS-HCC-DV		√
ATS-CT-V		√
ATS-CT-DV		√
ATS-MH-ELEV	√	

2.8 Ratings

.1 Continuous duty at capacity specified without derating.

.2 Capable of withstanding fault currents of magnitudes ≥ than the values shown, for the durations shown.

.3 Capable of functioning in the normal manner:

.1 following a fault, up to the maximum level and duration specified for the withstand rating of the switch,

.2 after closing into a fault of a magnitude not less than that specified for the withstand rating of the switch.

.4 The specified withstand ratings to be achieved without requiring the operation of a breaker or a fuse to protect the switch.

.5 Schedule of ratings to be completed by Design-Builder:

Transfer Switch Name	Continuous Current Rating (Amperes)	18 Cycle Withstand and Closing Rating (Amperes, RMS Symmetrical @ 600V)	3 Cycle Withstand and Closing Rating (Amperes, RMS Symmetrical @ 600V)
ATS-EC-LL-V			
ATS-EC-LL-DV			
ATS-MH-05-V			
ATS-MH-05-DV			
ATS-HCC-V			

ATS-HCC-DV			
ATS-CT-V			
ATS-CT-DV			
ATS-MH-ELEV			

2.9 Settings

.1 Factory set the TS's in accordance with the settings listed in the following table. Confirm settings prior to manufacture and reprogram on site as directed.

Transfer Switch Name	Time Delay on Transfer to the Alternative Source (seconds)	Time Delay in the Neutral Position (seconds)	Time Delay on Transfer to the Preferred Source (Seconds)
ATS-EC-LL-V	0	N/A	310
ATS-EC-LL-DV	10	N/A	360
ATS-MH-05-V	0	N/A	300
ATS-MH-05-DV	20	N/A	370
ATS-HCC-V	0	N/A	320
ATS-HCC-DV	30	N/A	380
ATS-CT-V	0	N/A	330
ATS-CT-DV	40	N/A	390
ATS-MH-ELEV	2	0.5	400

2.10 Enclosure

.1 Enclosure:

.1 Type 1 with drip shield or Type 3R

.2 suitable for installation in a sprinklered room,

.3 sized to accommodate the cable/bus duct feeders shown,

.4 doors:

(a) to be hinged,
(b) to open not less than 135°,
(c) equipped with a T-Handle 3 point locking system complete with lock and latch,

.5 instrumentation and status lights to be visible without opening doors,

.6 for transfer switches requiring rear access, provide three infra-red viewing ports supplied loose for field installation.

.2 Finish:

.1 rust-inhibiting metal treatment process,

.2 powder coat finish to UL50 3R,

.3 colour: ANSI #61 grey

.3 Provide a liter of matching paint to touch-up small areas marred during installation.

2.11 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

.2 Provide a nameplate on each TS. Nameplates to be 3 mm (c") thick, with white lettering on a red background, with bevelled edges.

.3 Lettering to be engraved and to be 5 mm (¼") high, except where indicated otherwise.

.4 Confirm wording on nameplates prior to manufacture.

.5 Nameplates to indicate:

.1 Name of the switch, eg: ATS-7 (8 mm (d") high lettering)

.2 System voltage, eg: 600V, 3Ø, 3W

.3 Switch current rating, eg: 800 A

.4 Preferred source, eg: PREFERRED SOURCE: SWBD-7N

.5 Alternative source, eg: ALTERNATIVE SOURCE: SWBD-4G

.6 Load supplied, eg: SUPPLYING: SWBD-4E

.6 Mechanically attach nameplates with stainless steel screws.

2.12 Factory Acceptance Testing (FAT)

.1 Provide FAT on transfer switches rated ≥ 600 Amperes.

.2 FAT:

(a) to be in addition to manufacturer's standard post-production tests,
(b) to be witnessed by the Independent Testing Organization,
(c) may be witnessed by the Consultant, provide the Consultant with at least one week's notice of the FAT schedule and accommodate the Consultant's presence at the factory throughout the FAT.

.3 As part of the FAT, perform the following inspections and tests on each switch:

(a) physical inspection,
(b) compliance with specifications,
(c) proper operation of all control and interlocking systems,
(d) dynamic transfer between two sources,
(e) per the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.22.3 Emergency Systems, Automatic Transfer Switches: however, testing of "field" connections is not required,
(f) for closed transition transfer switches include:

- waveform capture to demonstrate seamless transfer of load within 100ms,
- demonstration of protection circuitry to prevent paralleling of sources beyond 100ms, testing of the switch in delayed transition mode,

.4 Submit certified copies of the FAT reports.

.5 Correct deficiencies prior to shipment.

2.13 Manufacturers' Service Representation on Site

.1 Refer to Part 3 Execution for requirements.

Standard of Acceptance

- ASCO Power Technologies 7000 series
- Thompson Technology
- Accepted Alternate

3 EXECUTION

3.1 Installation

.1 Install switches in accordance with the manufacturer's instructions.

.2 Provide, under this division, a 100mm (4") reinforced concrete pad with beveled edges for each floor mounted transfer switch. Seal with paint or concrete sealer to prevent concrete dust from entering equipment.

.3 Anchor the concrete pad to the building structure in accordance with Section 26 05 48, Vibration Isolation and Seismic Restraints.

.4 Receive equipment at site and inspect for damage.

.5 Provide necessary cranes and miscellaneous equipment to unload and transfer equipment into its final location.

.6 Position transfer switches to provide:

.1 adequate clearance at the front, with draw-out elements in the drawn-out position,

.2 adequate clearance at the rear for switches requiring rear access.

.7 Secure transfer switches to the concrete pad and/or the building structure.

.8 Provide interconnecting, incoming and outgoing cable, bus duct, and control wiring connections as shown and as required.

.9 Terminate power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.10 Provide bonding of each transfer switch to perimeter ground bus with a #4/O green insulated copper conductor in PVC conduit. Terminate with Burndy YA-2N lugs.

.11 For each transfer switch requiring rear access, install the three infra-red viewing ports supplied loose, and locate to allow for unobstructed scanning of the power connections.

.12 For switches equipped with a quick make quick break operator attach a lamicoid warning label adjacent to the operator, with white lettering on a red background, stating "DO NOT OPERATE WITH SWITCH ENERGIZED".

.13 For Closed Transition Transfer Switches include:

.1 signs warning of closed transition transfer use in the following locations:

(a) each closed transition switch.

.2 2 #12 in EMT to the normal power breaker feeding the switch, connect to trip the breaker in the event of a fault with the transfer switch,

.14 Touch up small areas marred in transit or during installation with touch up paint.

.15 Provide rubber mats:

.1 3' wide 1/4" thick,

.2 17,000 volt rating,

.3 in front of each floor mounted transfer switch,

.4 at rear of transfer switches that require rear access,

.5 do not place mats until work is completed and room has been thoroughly cleaned.

.16 Provide a system compatible Ethernet cable in EMT from the communications module in each TS to the local Ethernet switch. Program the communications module as required to provide the operation specified.

.17 From each transfer switch supplying power to elevators, provide 4 #12 MICC fire rated cable, from the pre-transfer contacts in the transfer switch to the respective elevator controller and connect to initiate sequencing of the respective elevator bank during emergency power operation.

3.2 Manufacturers' Service Representation on Site

.1 Manufacturer to supply factory trained service representative to perform the following field services:

.1 check the installation of the equipment,
.2 conduct, or instruct the installation contractor in, the start-up of the equipment,
.3 calibrate controls,
.4 conduct site acceptance testing as described herein,
.5 participate in the commissioning program described herein,
.6 demonstrate the operation of safety controls to the facility operations staff,
.7 demonstrate the operation of the equipment over its entire performance range to the facility operations staff,
.8 provide training of the facility operations staff as described herein,

.2 Note that multiple visits will be required due to the phased construction. Provide all necessary visits in accordance with the Contractor's procedures.

.3 Submit copies of completed manufacturer start-up and test records prior to hand-over of equipment.

3.3 Site Acceptance Testing

.1 After completion of installation, but before equipment is permanently placed into service, conduct Site Acceptance Testing (SAT) in the presence of and to the satisfaction of the Independent Testing Organization and the Authority's representative(s).

.2 Conduct acceptance tests on each ATS and MTS in accordance with the reviewed test program.

.3 Perform on site acceptance testing in accordance with the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.22.3 Emergency Systems, Automatic Transfer Switches.

.4 For Closed Transition Transfer Switches include:

.1 waveform capture to demonstrate seamless transfer of load within 100ms,

.2 demonstration of protection circuitry to prevent paralleling of sources beyond 100ms.

.5 Verify engine start and control signals from each transfer switch through to the engine generator system.

.6 Dynamically verify all signals through to:

.1 elevator controllers,

.2 fire alarm system,

.3 uninterruptible power systems,

.4 building management system,

.5 load management system,

.6 generator control panel,

.7 remote annunciators,

.8 etc.

.7 Document test results.

.8 Record the results of the performance testing and submit completed report.

3.4 Commissioning Program

.1 In addition to the manufacturer's Site Acceptance Testing, installation contractor and manufacturer to provide field service personnel to participate in the commissioning of the equipment and/or system including:

.1 review of equipment and system commissioning procedures in addition to the manufacturer's own testing procedures,
.2 control of and operation of equipment during testing,
.3 adjusting of equipment controls as required to simulate load or fault conditions, and
.4 assist with record keeping of test results as directed.

3.5 Demonstration and Training

.1 In conjunction with the manufacturer's service representative, provide training to the facility operations staff:

.1 in the operation and maintenance of the TS's including their interactions with the power sources, monitoring, metering and control systems,

.2 allow for at least three 4 hour sessions,

.3 submit records of the training program.

.2 Note that the training sessions may be video recorded by the Authority.

END OF SECTION

HIGH VOLTAGE TRANSFER SWITCHES
26 36 23

1 GENERAL

1.1 General Requirements

.1 General Conditions as applicable.

.2 Section 26 05 01, Electrical General Requirements.

1.2 Applicable Codes and Standards

.1 Latest edition of:

.1 UL 1008A. Standard for Medium Voltage Transfer Switches,

.2 ANSI/IEEE C37.20.2 Standard for Metal-Clad Switchgear,

.3 ANSI/IEEE C37.06 Standard for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis,

.4 CSA C282 Emergency Electrical Power Supply for Buildings,

.5 CSA Z32 Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.3 References

.1 Section 26 32 13 - Power Generation Diesel.

.2 Section 26 05 53 – Equipment Identification.

.3 NEMA Standard ICS 10 - AC Automatic Transfer Switches.

.4 NETA, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.4 Scope

.1 Provide labour, materials, and equipment required for manufacture, testing and putting into proper operation complete systems as shown as specified and as otherwise required.

.2 Additional services are to be provided by the equipment supplier or their field service representatives and costs for this work are to be included in the Bid Amount.

.3 Services to be provided by the equipment manufacturer, supplier or their field service representatives to include:

.1 shop drawing preparation,

.2 fabrication and assembly as per "reviewed" shop drawings,

.3 interface control wiring diagrams, schedules and wire running lists between all components,

.4 factory testing and supplementary acceptance testing,

.5 provision of information as appropriate to install and test the equipment,

.6 technical supervision of equipment unloading, equipment site assembly, installation of power and control cables, cable connections, and all other work normal to the electrical trade,

.7 on site setup of timers and controls,

.8 on site programming of controls and communications equipment,

.9 on site testing,

.10 technical assistance during acceptance testing,

.11 technical assistance during commissioning,

.12 factory and field training of the Authority's staff in the complete operation of the system,

.13 warranty service on a priority basis,

.14 data book including schematic diagrams,

.15 check out of system one month prior to expiry of warranty period,

.16 services of a technical representative as required by the Authority to review production schedules, delivery dates, shop drawing changes, shipping details, shop and field testing and training programs.

.4 Manufacturer to correct deficiencies which occur during the 2 year warranty period at no additional cost to the Authority. Include all costs for material, labour, travel and accommodation. The manufacturer's technical representative to call back within 1 hour and be available on site on a priority basis i.e. within 2 hours of being notified of a deficiency requiring repair.

1.5 Submittals

.1 Shop drawings in accordance with Section 26 05 01 Electrical General Requirements.

.2 Provide one additional set of drawings shipped with the equipment for startup use.

.3 Spare Parts List

.1 a complete spare parts list, including parts location diagrams or drawings (to be included with the manufacturer's quotation),

.2 a list of spare parts which the manufacturer recommends to be on site during start-up and the first two year's of operation,

.3 a material list, listing the quantity, rating, type, and manufacturer's catalog number of all equipment on each unit.

.4 Installation, operating, and maintenance instructions to cover the equipment furnished.

1.6 Quality Control

.1 Manufacturer's Production Test and Records:

.1 Submit certified copies of reports of manufacturer's production testing for all transfer switches.

.2 Factory Acceptance Testing (FAT):

.1 Refer to Part 2 Product for requirements.

.3 Site Acceptance Testing (SAT):

.1 Refer to Part 3 Execution for requirements.

1.7 Preparation for Shipment

.1 The manufacturer to be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide equipment at the site in ex-works condition when handled by commercial carrier systems.

1.8 Shipping

.1 Any component shipped separately to be individually crated and tagged with unit number and the equipment number of the assembly to which it belongs.

.2 Provide each "shipping section" with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

1.9 Provisions for Handling and Field Erection

.1 Provide removable side panels, lifting angles or lifting plates to accommodate the use of slings or crane hooks for each shipping section.

.2 For floor mounted transfer switches, provide on each shipping section, removable steel channel base plates to permit use of pipe rollers or dollies without damaging the equipment.

1.10 Operation and Maintenance Data

.1 Provide operation and maintenance data for transfer switch equipment for incorporation into manual specified in Section 26 05 01 - Electrical General Requirements.

.2 Detailed instructions to permit effective operation, maintenance and repair.

.3 Technical data:

.1 schematic diagram of components, controls and relays,

.2 illustrated parts lists with parts catalogue numbers,

.3 certified copy of factory test results.

1.11 Warranty

.1 Supplier to provide a warranty for the equipment supplied under this Section, for a period of 2 years following final site acceptance, against:

.1 faulty or inadequate design, manufacture or operation,

.2 defective material or workmanship, or both,

.3 breakage or other failure that occurs under normal and proper operation of the equipment.

1.12 LEED requirements

.1 Selected products and installation to be in compliance with LEED Gold Certification.

.2 Provide necessary documentation to support LEED credit application process.

2 PRODUCTS

2.1 General Features

.1 Type A without any internal trip devices.

.2 Suitable for use as part of a code required emergency power system.

.3 Electrically operated, mechanically held contacts.

.4 Designed for unattended operation.

.5 4 breaker arrangement providing operation equivalent to a double throw switch with a two way bypass.

.6 3 pole.

.7 Rated for operation on the system shown:

.1 utility power 12.47 kV 3 phase 4 wire multipoint grounded,

.2 generator power: 12.47 kV 3 phase 3 wire low resistance ground

.8 Suitable for operation on both a solidly grounded and a low resistance grounded system without requiring a neutral connection and without introducing any load current into the ground connection.

.9 Switchgear:

.1 draw out metal clad construction,

.2 Voltage rating: 15 kV,

.3 BIL: 125 kV,

.4 provision for cable entry from above,

.5 space and provision for cable terminators.

.10 Sensing and control relays:

.1 continuous duty,

.2 industrial control quality except where indicated otherwise,

.3 utility grade for:

(a) synchronizing,
(b) overlap timers,
(c) overlap protection relays.

.11 Pilot lights:

.1 LED type,

.2 with “Push to Test” feature.

.12 Cable lugs:

.1 suitable for copper conductors,

.2 suitable for the cable sizes shown.

.13 Seismically certified to withstand the ground acceleration criteria and seismic demand requirements for non-structural equipment as specified in the Building Code for the geographic location of the installation.

2.2 Automatic Transfer Switches (HVATS)

.1 Basic operation of each HVATS:

.1 when any phase of the preferred source power at the transfer switch drops below 90% of preferred source voltage for the selected time, a relay on that transfer switch to operate to cause the Diesel engine to be started,

.2 when Diesel-alternator reaches rated voltage and frequency, the transfer switch to operate to transfer load to Diesel-alternator,

.3 when preferred source power supply is restored and voltage on all phases is 90% or more for the selected time, switch to transfer load back to preferred source power supply,

.4 after a preselected time delay the engine start signal is removed.

.2 Provide in each high voltage automatic transfer switch, as indicated by "HVATS" the following features:

.1 a microprocessor-based control panel with field accessible adjustments to such items as voltage pick-up and drop-out and timing controls,

.2 three phase true RMS over and under voltage sensing of both the preferred and alternative sources with programmable set points,

.3 over and under frequency sensing of both the preferred and alternative sources with programmable set points,

.4 engine start contacts,

.5 duplicate engine start contacts,

.6 time delays:

(a) on engine start after preferred source fails, adjustable from .5 to 6 seconds, set at 2 seconds,
(b) on transfer to alternative source, adjustable 0-300 seconds, set as indicated,
(c) on alternative source failure, adjustable from .5 to 6 seconds, set at 6 seconds,
(d) on transfer to preferred source after restoration of preferred source, adjustable 0-30 minutes, set as indicated,
(e) on transfer to preferred source following a test of the alternative source, adjustable 0-30 minutes, set at 30 seconds,
(f) on unloaded engine cool down, adjustable 0-60 minutes, set at 0 minutes,

.7 selector switches, mounted on outside of door with a guard to prevent accidental actuation:

(a) four position selector switch for engine control. Auto / Off / Engine Test / System Test
(b) reset switch for manual retransfer to preferred source with bypass of time delay,
(c) switch and circuitry to enable selection of the alternative source as the preferred source with override in event of failure of the alternative source,

.8 bypass/isolation feature:

(a) built-in two way manual bypass/isolation system,
(b) to allow the active switch elements to be removed from the system while the load remains energized from either the preferred source or the alternative source,
(c) bypass/isolation switch ratings: same as the active switch,
(d) safe operation as a manual transfer switch,
(e) auxiliary contacts to indicate when the transfer switch is in bypass mode,
(f) interlocks to prevent more than two breakers being closed at one time,
(g) interlocks to prevent two breakers from being closed at the same time unless the two sources are the same or are electrically synchronized,
(h) interlocks to prevent the following breakers from being closed at the same time:
- preferred side active breaker and alternative side bypass breaker,
- preferred side bypass breaker and alternative side bypass breaker,

(i) automatic shutters which close when the active elements are withdrawn, to provide isolation from live bus.

.9 soft closed transition transfer:

(a) a make before break switching operation in each direction,
(b) controls to ensure that both sources are available and within limits when transferring between live sources,

(c) interlocks to prevent closed transition operation when the two sources are not within limits,
(d) overlap time during the switching operation not to exceed 1200 cycles (20s) to meet BC Hydro standards,
(e) soft load control of the diesel generators during the closed transition period:
- to ramp up the load on the generators over the closed transition period when transferring to the alternative source,
- to ramp down the load on the generators over the closed transition period when transferring to the preferred source,
- adjustable load ramp rate.

(f) when transferring from a dead source to a live source the switching is to automatically change to a break before make operation,
(g) field convertible to a delayed transition transfer switch without replacement of components other than the interlocking linkage,
(h) install the interlocking linkage and set controls in the factory so that the switch will function as a delayed transition switch, until approval from the utility company is obtained for closed transition operation,
(i) when converted to a delayed transition transfer switch with a controlled time delay between the opening of one set of contacts and the closing of the other set of contacts, time delay to be:
- adjustable from 0 to 30 seconds,
- set at 0.5 seconds.

(j) relay to monitor if the overlap of the normal and emergency contacts exceeds a maximum of 1140 cycles (19s). In the event that the contact overlap time has been exceeded:
- circuitry to automatically and immediately open the switch power contacts for the source, to which the switch is attempting to transfer,
- switch power contacts, for the source from which the switch is being fed, to remain closed and maintain power to the load,
- pilot light to indicate the failure,
- alarm contact to operate for remote signalling of the failure.

(k) in addition to the standard relay, a utility grade relay, acceptable to the local electric utility, to monitor:
- Under Voltage (27) 3 phase
- Over Voltage (59)
- Under Frequency (81U)
- Over Frequency (81O)
- Reverse Power Towards Utility (32U)
- Synchronization Check (25)
- Timing (timing of the contact overlap period)

In the event that the relay detects an unacceptable condition: contact overlap time has been exceeded:

- contacts and circuitry to automatically and immediately open the normal power circuit breaker that feeds the transfer switch,
- alarm contact to operate for remote signalling of the failure.

Standard of Acceptance
- SEL

.10 Transfer inhibit circuit:

(a) transfer inhibit circuit to prevent a transfer in either direction upon closure of a remote contact,
(b) transfer to occur should the source, to which the HVATS is connected, fail, regardless of the status of the remote contact.

.11 pilot lights:

(a) to indicate transfer switch is in preferred source position,
(b) to indicate transfer switch is in alternative source position,
(c) to indicate preferred source power is available,
(d) to indicate alternative source is available,

.12 auxiliary contacts:

(a) contact to close when preferred source fails,
(b) four, closed when on preferred source,
(c) four, closed when on alternative source,

.13 remote test circuitry,

.14 terminal provisions for a remote customer contact to inhibit transfer to the preferred source,

.15 terminal provisions for a remote customer contact to inhibit transfer to the alternative source,

.16 automatic-manual selector switch allowing manual control of all functions when in the manual position but not overriding protective controls.

.17 electrical metering of the load side of the transfer switch, metering to be true RMS, 1% accuracy and to include the following:

(a) Voltages, 3 L-L
(b) Frequency
(c) Current, 3 phases
(d) %unbalance, Voltage and Current
(e) kW
(f) kVA
(g) kVAR
(h) power factor
(i) kWh

.18 ModBus Ethernet communications system to provide the following:

(a) transmission of the load side metering data to the building management system and to the generator control switchboard, including:
- Voltages, 3 L-L
- Frequency
- Current, 3 phases
- %unbalance, Voltage and Current
- kW
- kVA
- kVAR
- power factor
- kWh

(b) transmission of status conditions to the building management system and to the generator control switchboard, including:
- Loss of preferred source
- Preferred source available
- Alternative source available
- TS connected to preferred source
- TS connected to alternative source
- TS in bypass
- TS transfer inhibit

2.3 Circuit Breakers

.1 Three pole, electrically operated, mechanically and electrically trip-free, motor wound stored energy closing, drawout truck-mounted with ratings not less than specified.

.2 Sealed vacuum chamber interrupters.

.3 Non-automatic (no trip units).

.4 Spring charging motor voltage: 125 VDC

.5 Control voltage: 125 VDC

.6 Tripping mode: 125 VDC

.7 Horizontal roll-out type. Positive stops to be provided for the following positions:

- .1 Test/Disconnect position
- .2 Connected position

.8 In the Test/Disconnect position the primary disconnecting devices to be separated by a safe distance from line and load contacts.

.9 Mechanically operated automatic shutter to close the entrance to the high voltage stationary line and load contacts when the breaker is in the "disconnect" position.

.10 A device to enable breakers to be padlocked in the "test/disconnect" position.

.11 Mechanical interlocks to positively prevent the racking of the breaker to or from any position unless the breaker is open.

.12 Mechanical interlock to allow only the correct rating breaker to be inserted.

.13 The breaker stored energy spring mechanism to operate so that the closing speed is independent of both control voltage and the operator. Mechanisms using fluid or air power for operation are not acceptable.

.14 Safety features to ensure that the spring is automatically discharged before the breaker is withdrawn from the cell.

.15 Each breaker to have six primary drawout power disconnecting devices, three on the line side and three on the load side. The removable element to have flexibly mounted self-aligning assemblies of bridging segments, formed such that each segment to make a high pressure contact with the fixed terminal at one end and the circuit breaker terminal at the other end. All contact surfaces to be heavily silver plated to prevent reduction in current-carrying due to oxidation.

.16 Each circuit breaker to be provided with a multi-pole plug and socket low voltage coupling complete with flexible conductor to be used for connection of control circuits between the breaker unit and the housing. Flexible conductor to be protected from physical damage and kept away from moving parts. Provide sufficient slack to prevent breakage from movement or vibration.

.17 Breakers to be equipped with an operation counter.

.18 At least eight convertible 'a' or 'b' auxiliary switch contacts to be mounted on breaker. Contacts to be positively operated by the breaker contact assembly operating mechanism.

.19 A rugged copper bar-type grounding device to be provided on the breaker element to positively ground the breaker frame to the switchgear ground bus in the 'test' and 'connected' positions.

.20 Breakers to be at least capable of meeting the applicable ANSI and NEMA operational requirements under no load and full load conditions, without maintenance. The most rigid requirements to apply.

.21 Breaker to be provided with front mounted manual close or trip pushbuttons to operate breaker in case of loss of control power.

Standard of Acceptance

- ABB
- Eaton
- Square D (Schneider)

2.4 Control and Secondary Wiring (Breaker Element and Cubicle)

.1 Redundant 125 VDC control power will be provided to each switch. Provide a 125 VDC automatic transfer between the two sources to ensure availability of control power.

.2 Control and secondary wiring to be enclosed in metallic raceway.

.3 Wiring to outgoing circuits at shipping splits and devices mounted in hinged instrument panels, to terminate at terminal blocks.

.4 Terminal blocks to have numbered points for circuit identification.

.5 Terminal blocks to be General Electric Type EB or equal.

.6 Terminal blocks for current circuits to be shorting block type.

.7 Wiring to be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG size single conductor minimum, stranded, tinned copper extra flexible type throughout.

.8 Wires to be tagged at both ends with permanent plastic sleeve type markers. Insulation to be 600 V, working and 1500 V test.

.9 Secondary and control wiring within the high voltage compartment to be completely shielded in a protective metal covering.

.10 Wiring from CT's to be not less than #10 AWG.

.11 Fuse and terminal blocks to be easily accessible.

.12 Fuses of the proper type and rating to be supplied by the switchgear manufacturer. Fuses to be Class J HRC. DC fuses (one per pole) to be in dead front enclosure.

.13 Auxiliary wiring checks to be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.

.14 Final checkout of wiring to be made with the complete switchgear lineup assembly to assure wiring correctness and continuity. Polarity of current and potential transformers and devices to be checked to assure proper functioning of all protective devices and instrumentation.

2.5 Ratings

.1 Continuous duty at capacity specified without derating.

.2 Capable of withstanding fault currents of magnitudes ≥ the values shown, for the durations shown.

.3 Capable of functioning in the normal manner:

.1 following a fault, up to the maximum level and duration specified for the withstand rating of the switch,

.2 after closing into a fault of a magnitude not less than that specified for the withstand rating of the switch.

.4 The specified withstand ratings to be achieved without requiring the operation of a breaker or a fuse to protect the switch, except where shown otherwise.

.5 Provide transfer switches as shown on the drawings

.6 Enclosure:

.1 Type 1 with drip shield and gasketted doors,

.2 suitable for installation in a sprinklered room

.3 sized to accommodate the cables shown,

.4 doors:

(a) to be hinged,
(b) to open not less than 135°,
(c) equipped with a T-Handle 3 point locking system complete with lock and latch.

.7 Accessories:

.1 instrumentation and status lights to be visible without opening doors,

.2 Provide in each power compartment an infra-red camera to view the connections. Wire cameras out to a suitable communications port.

.3 Provide LED voltage indicators to be fastened to each leg of each incoming and outgoing cable (3 indicators per cable).

.4 Provide viewing windows of quantity and locations to allow viewing of each voltage indicator.

.8 Finish:

.1 rust-inhibiting metal treatment process,

.2 powder coat finish to UL50 3R,

.3 colour: ANSI #61 grey

.9 Provide a liter of matching paint to touch-up small areas marred during installation.

2.6 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 53 – Equipment Identification.

.2 Provide a nameplate on each HVATS. Nameplates to be 3 mm (1/8") thick, with white lettering on a red background, with bevelled edges.

.3 Lettering to be engraved and to be 5 mm (¼") high, except where indicated otherwise.

.4 Confirm wording on nameplates prior to manufacture.

.5 Nameplates to indicate:

.1 Name of the switch, eg: HVATS-1E (8 mm (5/16") high lettering)

.2 System voltage, eg: 12.47 kV, 3Ø, 3W

.3 Switch current rating, eg: 1200 A

.4 Preferred source, eg: PREFERRED SOURCE: SWBD-7N

.5 Alternative source, eg: ALTERNATIVE SOURCE: SWBD-4G

.6 Load supplied, eg: SUPPLYING: SWBD-4E

.6 Mechanically attach nameplates with stainless steel screws.

2.7 Phase Designations

.1 Coloured phase designations or numbering markings to be readily visible in each bus compartment, current transformer compartment, circuit breaker compartment and line and feeder cable compartment. Refer to Section 26 05 53: "Equipment Identification".

2.8 Mimic Bus

.1 A red mimic bus single line diagram to be rivetted on front of switchboard.

.2 Mimic bus to show every piece of equipment on board including stab connectors.

.3 Symbols used to be industry standards for each device.

2.9 Grounding

.1 In addition to grounding requirements as specified in CSA 22.2 No. 31, a readily accessible ground connection to be provided in each section of cable termination compartments.

2.10 Accessories

.1 Accessories to include necessary devices required for operation and maintenance of the equipment. Provide:

.1 necessary cranks, lift motors, wrenches, dollies or other tools required to manipulate the movable carriage structure - including a maintenance closing lever,

.2 a counterbalanced hoists on wheels with swivel boom, heavy duty winch with positive locking safety latch and lockable wheels, lifting yoke with hooks to allow lifting of a breaker element.

.3 an electrically operated breaker remote racking device with minimum 7.6m (25’-0”) long umbilical cord and operator pendant. Remote racking device to be capable of being locked-on to the breaker without opening the cubicle door and allow the operator to remotely open/close and rack in/out the breaker. Remote racking device to operate on an external 120V AC power supply.

.4 instruction and maintenance books for equipment furnished and copies of relay calibration, and final 'as left' settings,

.5 test plugs for relays,

.6 control jumpers, when required, to connect from the secondary device on the stationary structure, to the removable element when it is in the disconnected position, permitting electrical operation of the circuit breaker. Each jumper to consist of a receptacle and plug assembly, with interconnecting flexible cable.

.7 Two sets of spare fuses of each rating.

2.11 Factory Acceptance Testing (FAT)

.1 Provide FAT on transfer switches.

.2 FAT:

(a) to be in addition to manufacturer's standard post-production tests,
(b) to be witnessed by the Independent Testing Organization,
(c) may be witnessed by the Consultant, provide the Consultant with at least one week's notice of the FAT schedule and accommodate the Consultant's presence at the factory throughout the FAT.

.3 As part of the FAT, perform the following inspections and tests on each switch:

(a) physical inspection,
(b) compliance with specifications,
(c) proper operation of all control and interlocking systems,
(d) dynamic transfer between two sources,
(e) per the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.22.3 Emergency Systems, Automatic Transfer Switches: however, testing of "field" connections is not required,
(f) waveform capture to demonstrate seamless transfer of load within 10s,
(g) demonstration of protection circuitry to prevent paralleling of sources beyond 19s,
(h) testing of the switch in delayed transition mode,

.4 Submit certified copies of the FAT reports.

.5 Correct deficiencies prior to shipment.

2.12 Manufacturers' Service Representation on Site

.1 Refer to Part 3 Execution for requirements.

Standard of Acceptance
- ASCO Power Technologies 7000

3 EXECUTION

3.1 Installation

.1 Install switches in accordance with the manufacturer's instructions.

.2 Provide, under this division, a 100mm (4") reinforced concrete pad with beveled edges for each floor mounted transfer switch. Size the pad to accommodate the roll out of the breaker elements.

.3 Grout a minimum of two steel rails with anchor bolts into pad, for levelling purposes, for full length of transfer switch assembly.

.4 Seal the pad with paint or concrete sealer to prevent concrete dust from entering equipment.

.5 Anchor the concrete pad to the building structure in accordance with Section 26 05 48, Vibration Isolation and Seismic Restraints.

.6 Receive equipment at site and inspect for damage.

.7 Provide necessary cranes and miscellaneous equipment to unload and transfer equipment into its final location.

.8 Position transfer switches to provide:

.1 adequate clearance at the front, with draw-out elements in the drawn-out position,

.2 adequate clearance at the rear.

.9 Secure transfer switches to the concrete pad.

.10 Provide interconnecting, incoming and outgoing cable and control wiring connections as shown and as required.

.11 Terminate power cables with two hole long barrel compression connectors equal to Burndy YA-2N.

.12 Provide bonding of each transfer switch to perimeter ground bus with a #4/O green insulated copper conductor in PVC conduit. Terminate with Burndy YA-2N lugs.

.13 Provide signs warning of closed transition transfer use, to the satisfaction of the local utility in the following locations:

(a) doors to main high voltage room,
(b) each main high voltage disconnect switch,
(c) each closed transition switch.

.14 Provide 2 #12 in EMT to the normal power breaker feeding the switch, connect to trip the breaker in the event of a fault with the transfer switch.

.15 Provide a data drop to allow communication of the switch status directly to the local electric utility.

.1 secure inside the switch enclosure the delayed transition interlocking linkage, for future use.

.16 Touch up small areas marred in transit or during installation with touch up paint.

.17 Provide rubber mats:

.1 3' wide 1/4" thick,

.2 17,000 volt rating,

.3 in front of each floor mounted transfer switch,

.4 at rear of transfer switches that require rear access,

.5 do not place mats until work is completed and room has been thoroughly cleaned.

.18 Provide MICC, 2 hour fire rated interconnecting wiring between each automatic transfer switch and respective Diesel-generator control panel:

.1 2#12 for engine start signal,

.2 4#14 for ATS position (normal and emergency),

.3 6#14 for load management controls,

.4 2#12 for the remote test feature.

.19 Provide 18 #12 in EMT from each transfer switch to the Building Management System. As an alternative to #12 wires, #14 may be used if incorporated into a cable with at least 2 conductors per cable. Connect to indicate:

.1 alarm - preferred source failure

.2 status - engine start signal sent

.3 status - alternative source available

.4 status - switch connected to alternative source

.5 status - switch under load management control

.6 status - switch parked in neutral

.7 status - switch in bypass

.8 alarm - contact overlap time exceeded

.9 spare

.20 Provide a system compatible Ethernet cable in EMT from the communications module in each HVATS to the local Ethernet switch. Program the communications module as required to provide the operation specified.

.21 From each transfer switch supplying power to fire alarm equipment, provide 2 #12 MICC fire rated cable, from an auxiliary contact (closed on alternative source) to the fire alarm system and connect to indicate that the fire alarm system is on emergency power.

.22 From each transfer switch supplying power to elevators, provide 4 #12 MICC fire rated cable, from the pre-transfer contacts in the transfer switch to the respective elevator controller and connect to initiate sequencing of the respective elevator bank during emergency power operation.

3.2 Manufacturers' Service Representation on Site

.1 Manufacturer to supply factory trained service representative to perform the following field services:

.1 check the installation of the equipment,
.2 conduct, or instruct the installation contractor in, the start-up of the equipment,
.3 calibrate controls,
.4 conduct site acceptance testing as described herein,
.5 participate in the commissioning program described herein,
.6 demonstrate the operation of safety controls to the facility operations staff,
.7 demonstrate the operation of the equipment over its entire performance range to the facility operations staff,
.8 provide training of the facility operations staff as described herein,

.2 Note that multiple visits will be required due to the phased construction. Provide all necessary visits in accordance with the Contractor's procedures.

.3 Submit copies of completed manufacturer start-up and test records prior to hand-over of equipment.

3.3 Site Acceptance Testing

.1 After completion of installation, but before equipment is permanently placed into service, conduct Site Acceptance Testing (SAT) in the presence of and to the satisfaction of the Independent Testing Organization and the Authority's representative(s).

.2 Conduct acceptance tests on each HVATS in accordance with the reviewed test program.

.3 Perform on site acceptance testing in accordance with the NETA Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems, Section 7, #7.22.3 Emergency Systems, Automatic Transfer Switches.

.4 Include:

.1 waveform capture to demonstrate seamless transfer of load within 10s,

.2 demonstration of protection circuitry to prevent paralleling of sources beyond 19s,

.3 demonstration of load ramp up and ramp down on emergency generators.

.5 Verify engine start and control signals from each transfer switch through to the engine generator system.

.6 Dynamically verify all signals through to:

.1 fire alarm system,

.2 uninterruptible power systems,

.3 building management system,

.4 generator control panel,

.5 remote annunciators,

.6 etc.

.7 Document test results.

.8 Record the results of the performance testing and submit completed report.

3.4 Commissioning Program

.1 In addition to the manufacturer's Site Acceptance Testing, installation contractor and manufacturer to provide field service personnel to participate in the commissioning of the equipment and/or system including:

.1 review of equipment and system commissioning procedures in addition to the manufacturer's own testing procedures,
.2 control of and operation of equipment during testing,
.3 adjusting of equipment controls as required to simulate load or fault conditions, and
.4 assist with record keeping of test results as directed.

3.5 Demonstration and Training

.1 In conjunction with the manufacturer's service representative, provide training to the facility operations staff:

.1 in the operation and maintenance of the ATS's including their interactions with the power sources, monitoring, metering and control systems,

.2 allow for at least four, 4 hour sessions,

.3 submit records of the training program.

.2 Note that the training sessions may be video recorded by the Authority.

END OF SECTION

APPENDIX 1B(II)

CAMPUS COMMUNICATIONS HUB TECHNICAL SPECIFICATIONS

Table of Contents

Section 1—General Information

1. Introduction

.1 The Campus Communications Hub (CCH) is a room that shall be built to data center standards and will house:

.1 The Authority's primary core network equipment, the Authority's standard Data Center core equipment (DC COREs), telecom PBX, Authority's eHealth Network Gateway (eNG) Gateway, WLAN controllers, Distributed Antenna System (DAS) head end and the primary fiber distribution frame (MFDF).

.2 Direct care, clinical support, and site operations capabilities including Authority user access, image and voice processing, transmission and printing capabilities through network attached storage (NAS), storage area network (SAN), clinical system backup, domain controllers, print servers and remote vendor access.

.3 Core equipment for such systems as Building Automation and Management, Security, Access Control, Audio Visual and Video Conferencing, Virtual Care (Telehealth), etc.

.2 The CCH will also perform the function of the main Equipment Room (ER) for the Facility and a Telecommunications Room serving the floor it resides on.

.3 The CCH will be 279 m^2 (3000 ft^2) in size and rectangular in shape. At its maximum capacity, the CCH will be equipped with eighty-eight (88) sever cabinets arranged in multiple hot aisle containment PODs. (POD A, B, C & D). There are twenty-two (22) server cabinets in POD A that are to be provided in Phase 1. In addition, twenty-six (26) 4-post equipment racks and four (4) totally enclosed (ducted) equipment racks with wire management are to be provided in Phase 1.

.4 The CCH and its associated infrastructure will be designed and constructed to be a be a robust, modular, flexible, and productive environment capable of supporting its ultimate fit out and in accordance with the CCH drawings and written specifications contained herein and in the following related documents:

.1 CCH Drawing Package (T201-T214). This includes:

- T201 – Equipment Layout Plan View
- T202 – Copper Basket Tray Plan
- T203 – Fiberguide Cable Tray Plan
- T204 – Electrical Ladder Cable Tray Plan
- T205 – Server Cabinet and Rack Grounding Layout
- T206 – Elevation Pod A R1.1 to R1.11
- T207 – Elevation Pod A R2.1 to R2.11
- T208 – Fiber and Copper Connectivity
- T209 – Mechanical
- T210 – Elevations
- T211 – Elevations and Details
- T212 – Hot Aisle Containment Details
- T213 – Ceiling Infrastructure and Cross-Section Plan
- T214 – Copper CAT 3 Schematic

.2 Schedule 1, Statement of Requirements

.3 Appendix 1B(I) – Energy Centre Technical Specifications

.4 Appendix 1B(III) – Campus Perimeter Pathway System Technical Specifications

.5 Appendix 1I(II) – IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List

.6 Appendix 1I(III) – HSSBC Communications Infrastructure Standards and Specifications

.5 Changes to these specifications must be approved in writing by the Authority to be valid.

.6 The Authority reserves the right to inspect and unilaterally reject installations that do not conform to its standards of workmanship, neatness, and cleanliness. Materials used in this project that do not conform to the CCH drawings and specifications or receive written approval for substitution will not be compensated for.

2. Critical Adjacencies

.1 Entrance Facility Room (EF)

.1 The EF Room consists of pathways, spaces, cables, connecting hardware, protection devices and other passive and active equipment that support access and service providers.

.1 The RCH Main Campus X-connect GigaBIX field is located within the EF room.

.2 The TELUS main entrance cable c/w primary protection and Shaw Cable main CATV entrance cable is also located in the EF room.

.3 Wall space to be allocated for City of New Westminster fiber to support future connections through the “intelligent city” network.

.2 The EF Room will accommodate access provider equipment and racks and cellular service provider’s base transceiver stations or Node B equipment for LTE and HSPA services, as well as fiber connectivity to enable backhauling of cellular traffic to the cellular service providers’ core networking equipment.

.3 The EF Room will be located adjacent to Campus Communication Hub and will have a minimum size of 53 m^2 to accommodate a single Authority 482 mm (19”) wide demarcation rack with two (2) 152 mm vertical high density vertical managers and fourteen (14) 584 mm (23”) wide racks dedicated for access and cellular provider equipment. The racks dedicated for access and cellular provider equipment will be provided by the carriers and third party providers.

.4 The final size of the Entrance Facility Room shall meet known and projected requirements for cable termination hardware, protectors, splicing hardware, cabling pathways, space for cable pulling equipment, electrical equipment, air conditioning equipment, third party and campus inter-building cabling, access and cellular provider racks and Authority Equipment and demarcation racks.

.5 The location shall be a $M_1I_1C_1E_1$ environment.

.6 The EF Room shall be accessed without going through the CCH.

.2 Tech Room - The Tech Room is a critical IT space dedicated to the support of the CCH and the broader campus network. The Tech Room shall be situated adjacent to the CCH and will accommodate:

.1 Work space for a minimum of four (4) IT (HSSBC) techs that would be supporting the site and the CCH.

.2 Test bench for testing, configuring, upgrading, fixing and staging network hardware.

.3 Storage space for critical network hardware spares, project materials and consumables.

.4 The Tech Room shall be accessed without going through the CCH.

.3 UPS room – A separate room shall be provided to contain the CCH's UPS system, batteries, external wrap around bypass and associated electrical transformers and components. The UPS room shall be sized to accommodate 4 x 550 kVA complete UPS systems and associated components. Refer to the Schedule 1, Statement of Requirements and its associated appendices for further requirements.

3. Location

.1 In the indicative design, the CCH is located on the top floor of the Mental Health and Substance Use Building. This location was selected because of the space constraints associated with the indicative design of the Energy Centre and concerns over vibration, electromagnetic interference and other hazards that may be present within the Energy Centre environment.

.2 The Design-Builder has the flexibility to locate the CCH anywhere in the Facility provided that following conditions are met:

.1 The structural and non-structural components, anchorages and equipment of the CCH meet the post disaster standards defined in Schedule 1, Statement of Requirements.

.2 The location shall be a $M_1I_1C_1E_1$ environment.

.3 The location and the design and fit-out of the CCH shall comply with all the requirements and specifications stated in the CCH drawings and in the Schedule 1, Statement of requirements and all associated appendices.

.4 The CCH is located at or above grade on a floor that has the structural capabilities to support the equipment.

.5 The CCH is co-located with its critical adjacencies.

.6 The CCH maintains its function as the main Equipment Room for the Facility.

.7 The diverse Service Entrance Facilities terminate in the Entrance Facility Room and the CCH.

.8 The CCH is located away from all hazards such as the cooling towers.

.9 The CCH and its critical adjacencies shall not be placed in areas that are triangle, L, curved or any other odd shape of room.

.10 All water lines, sprinkler lines, duct work and gas lines serving areas outside the CCH and its critical adjacencies do not pass through the CCH and its critical adjacencies.

.11 All supply lines, ductwork and telecommunications pathways serving the CCH and its critical adjacencies shall not pass through the rooms of other areas if maintenance cannot be guaranteed.

4. Early Access

.1 Refer to the Schedule 1, Statement of Requirements, Section 2.11.12 for further details.

5. Standards

.1 Only new equipment and materials which are durable, of superior quality and easy to maintain and operate are to be used in this project. All items will be from reputable and qualified companies and meet prevailing industry standards. All equipment and individual connections will be verified by the Authority before completion.

.2 Comply with the latest British Columbia Building Code, and Canadian Electrical Code including all provincial and other amendments, local by-laws, rules and regulations.

.3 Equipment and materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having jurisdiction. Include in the contract all costs associated with obtaining local approvals.

.4 ASHRAE's Structural and Vibration Guidelines for Datacom Equipment Centers shall be consulted when designing the structure of the CCH and its adjacencies.

.5 Design, install and test CCH infrastructure in accordance with the following standards:

- The Canadian Electrical Code Part 1, C22.1-15 edition.
- Underwriters Laboratories (UL): Applicable listings and ratings
- TIA-526-7, Measurement of Optical Power Loss of Installed Singlemode Fiber Cable Plant—OFSTP-7
- TIA-526-14, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant—OFSTP-14
- TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard Part 1: General Requirements (May 2001)
- ANSI/TIA 568-D.1-2015 Generic Telecommunications Cabling for Customer
- Premises standard.
- ANSI/TIA -568-0-D-2015 Commercial Building Telecommunications Cabling
- Standard
- ANSI/TIA-568-C.2-2009 Commercial Building Telecommunications Cabling

- Standard – Balanced Twisted Pair Cabling Components.
- ANSI/TIA-568-C.3-2008 Optical Fiber Cabling Components Standard.
- ANSI/TIA-569-D-2015 Commercial Building Standard for
- Telecommunications Pathways and Spaces.
- ANSI/TIA-606-B-2011 Administration Standard for Commercial
- Telecommunications Infrastructure. IA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces (February 1998)
- J-STD-607-B-2011 Commercial Building Grounding (Earthing) and Bonding
- Requirements for Telecommunications.
- ANSI/TIA-570-C-2012 Residential Telecommunications Cabling Standard.
- ANSI/TIA-758-B-2012 Customer Owned Outside Plant Telecommunications
- Cabling Standard.
- ANSI/TIA-1179-2010 Health Care Telecommunications Cabling Standard.
- ANSI/TIA-942-A-2012 Telecommunications Infrastructure Standard for Data
- Centers.
- ANSI/TIA-TSB-162-A Telecommunications Cabling Guidelines for wireless
- Access Points.
- ANSI/BICSI 004-2012, Information Technology Systems Design and
- Implementation Best Practices for Healthcare Institutions and Facilities
- ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design
- and Implementation Best Practices
- ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building
- Telecommunications Cabling
- BICSI 607-2011, Standard for Telecommunications Bonding and
- Grounding Planning and Installation Methods for Commercial Buildings
- Information Technology Systems Installation Methods Manual
- Network Systems and Commissioning (NSC) reference
- Outside Plant Design Reference Manual 5th Edition
- Telecommunications Distribution Methods Manual 13th Edition

.6 Where a discrepancy between this document and local building codes or building control standards occurs, the more stringent shall apply.

6. Commissioning

.1 The Design-Builder shall ensure that all systems are designed, installed, functionally tested and capable of being operated and maintained according to the Authority's design intent and operational needs. This includes testing of failure modes and operational procedures that cannot be performed once the CCH is in production.

.2 The following systems shall be included in the commissioning plan for the CCH:

- Electrical Systems
- HVAC Systems
- Control and Monitoring Systems
- Fire Protection and Suppression Systems
- Security Systems
- IT Infrastructure Components and Cabling
- Grounding Systems
- Leak Detection Systems
- Critical exhaust and ventilation
- Life Safety and systems required by codes and AHJ

.3 The Design-Builder shall complete functional performance testing and testing of failure modes on all systems identified above. Functional performance tests shall ensure all systems and equipment is operating efficiently and in accordance with design intent. System calibration, manufacturer's testing guidelines and other requirements shall be completed and documented.

.4 Prior to scheduling final acceptance testing, the Design-Builder shall power and operate each of the systems during a burn-in period. The length of the burn-in period shall be five consecutive days.

.5 The Design-Builder shall complete Acceptance Testing of all systems. Acceptance Testing shall:

.1 Be performed after the completion of a successful and complete burn-in period.

.2 Include testing of individual devices and equipment for proper operation and system response.

.3 Be complete and test documentation approved by the Authority prior to project completion.

.6 Clear testing guidelines shall be provided by the Design-Builder in the construction specification documents. The guidelines shall define the performance requirements for each system and include checklists and procedures with specific areas for recording and documenting all tests and inspections.

.7 Testing documentation shall be provided by the Design-Builder that includes the following:

.1 Full details of all commissioning tests as well as factory testing reports provided by the manufacturer with the equipment.

.2 Lists of any deficiencies.

.3 Full documentation of the test results of each acceptance test performed.

.8 The Design-Builder shall correct any deficiencies identified during the Acceptance Testing process. Upon completion of all corrections, the equipment and or system shall be re-tested to demonstrate proper operation, integration and performance.

.9 The Design-Builder shall be responsible for all labour, materials and other required support for the supervision and observation of any re-testing of failed components or systems.

7. Documentation

.1 At a minimum, the Design-Builder shall provide the following documentation through the course of the Project:

- `Construction documents and drawings for all applicable disciplines.
- Equipment Specifications, System Submittals and Bill of Materials all items identified in this specification.
- Extended Warranty Manufacturers Certificate for cabling contractor personnel working on the Project.

- AMP NetConnect or Belden Authorized Installer Certificate for cabling contractor personnel working on the Project.
- Documentation of the cabling contractor's copper and fiber testing procedures, including referencing procedures for fiber optic testing, testing equipment used (manufacturer and model number), and their most recent date of calibration
- Name and contact information of any cable assembly manufacturer that will be used to make cabling installed in the CCH
- Commissioning Plan and Sequence of Operations
- Schedules and timelines
- Start-up and testing plans and schedule
- Training Program
- Commissioning Issues log
- Test reports from manufacturers, contractors and Commissioning Agent
- Final Commissioning Report
- Operations and Maintenance Manual (separate manual to be provided for the CCH)

.2 Operations and Maintenance Documents shall include warranties, summary of all product information (such as shop drawings and datasheets), test results, equipment operations and maintenance (O&M) manuals, as-builts and control drawings and controls sequences.

.3 O&M manuals shall also include a Link Spreadsheet identifying each Pre-terminated Cable c/w MPO-LC cassette attached to link. Identify the location of the End Points (Rack/Patch panel/Cassette position) including patch panel labels. The Link Spreadsheet shall include for every pre-terminated channel link:

.1 The associated factory test result certificates and the link loss values.

.2 The test results from the testing on site.

.4 Warranty certificates shall be provided for the data cabling installation. Warranty description shall identify all applications that can be supported on the cabling system.

.5 Equipment O&M manuals shall include:

.3 Detailed installation, operating, troubleshooting, and maintenance procedures.

.4 Certifications provided by the manufacturer that indicate compliance with any regulatory requirements, codes, or standards.

.5 Site-specific instructions for routine and emergency operations and maintenance.

.6 Complete warranty information, including the client's responsibilities for maintaining the warranty.

.6 Refer to Schedule 1, Statement of Requirements, and Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for further requirements.

8. Training

.1 The Design-Builder will hold at least two separate instruction sessions for training the Authority's operating staff on all the systems associated with the CCH.

.1 The first session is conducted during acceptance testing to provide the initial training needed to operate and maintain the system. This is the minimum level of training that needs to be supplied prior to Early Access. The first training session shall include at a minimum:

.1 General familiarization and operating instructions for each specialty system.
.2 Routine maintenance procedures.
.3 User level programming of software and systems where applicable.

.2 The second training session shall be conducted after the final acceptance to fill in gaps and answer questions that develop once the staff has become familiar with the system.

.2 Instruction on complicated systems and components should be provided by factory-trained technicians.

.3 For each training session, the Design-Builder shall provide all the necessary training materials, including:

.1 An overview of the implementation and commissioning program.

.2 A description of how the training is to be conducted.

.3 The date, time, and location of the training.

.4 The names and company affiliations of instructors.

.5 A summary of the content.

.6 Recommended reference material

.4 The Design-Builder shall record training sessions for repeat training and reference for additional staff. Included on the video(s) will be a complete review of the posted sequence of operation for each control system.

.5 Requirements for system training, training materials, and recordings shall be included within the construction documents.

9. Clean-up Requirements

.1 Debris generated during installation and testing of the room's infrastructure systems—power, cooling, data cabling, emergency lights, and fire suppression—must be removed by the Design-Builder upon conclusion of its work.

.2 At the conclusion of all construction, the CCH and its critical adjacencies shall be professionally cleaned at the sub-micron level by a company that is specialized in cleaning critical environments prior to turning over the rooms to the Authority. The cleaning shall remove all construction-related dust and debris from all surfaces, the ceiling plenum, equipment racks and server cabinets.

.3 Prior to turning over the rooms to the Authority, the Design-Builder shall conduct air quality testing and provide the Authority with a report and analysis of particle counts before and after the cleaning of the CCH and its adjacencies.

.4 The Design-Builder shall provide clean room sticky mats, booties, curtains and plastic strip doors and air scrubbers as required to keep the CCH and its critical adjacencies clean until target substantial completion of the Facility is achieved.

10. Monitoring

.1 Electrical, UPS power, cooling, and fire suppression systems shall be connected to a building automation and monitoring systems.

.2 UPS is also to be connected to the Authority's network via a network card and the Design-Builder is to provide the licenses required to monitor the UPS system remotely.

.3 Monitoring Overall CCH Efficiency

.1 Provide metering equipment to calculate PUE (Power Usage Effectiveness). This measurement shall be the total CCH energy divided by the CCH IT energy consumption. The Design-Builder shall identify the metering points during the design phase of the Project.

.2 The CCH IT energy consumption includes the UPS energy consumed by each CCH equipment rack and server cabinet PDU.

.3 The total CCH energy consumption includes all energy consumed solely by the CCH, which includes at a minimum:

.1 The CCH IT energy consumption.
.2 Energy consumed by Mechanical systems serving the CCH (pumps, indirect-air economizers, MUA unit, Humidifier, BMS control, Fire Protection System).
.3 Energy consumed by Electrical systems serving the CCH (Power transformers, UPS primary, Fire Alarm, Lighting)

Section 2—Room Infrastructure

1. Architectural

.1 Campus Communications Hub

.1 Roof Systems

.1 CCH roofing shall be designed to handle the loading requirements of the roof top mechanical systems. The four indirect evaporative air coolers shown on the plans are 13,154 kg (29,000 lbs.) each when operational.
.2 The roof system shall be designed to provide a continuous seal above the entire CCH and its adjacencies. Parapets and coping systems shall be of construction to ensure moisture infiltration is prevented.
.3 No penetrations other than what is required for servicing the room shall be made in the roof over the CCH and its

adjacencies. When penetrations are required, they shall be designed correctly to ensure no water intrusion or physical damage occurs at the interface between building infrastructure (pipes, conduits, etc.) and the exterior wall or roof of the building. Additionally, roof drains and leaders shall be kept away from the CCH and it adjacencies.

.2 Room Envelope

.1 CCH perimeter walls need to be full height, hard wall construction.

.2 The CCH will have no building exterior doors or exterior windows.

.3 The room is to have no windows to an interior corridor.

.4 Walls separating the CCH, Tech Room, UPS Room and Entrance Facility room within the building shall be a minimum of 1-hour separation or as required by applicable codes and regulations.

.5 Doors and frames within a rated wall shall match the rating of the wall construction.

.6 The perimeter walls of the CCH shall provide the appropriate level of airtightness suitable for a clean agent fire suppression system. All wall penetrations shall be fire sealed and sealed to prevent chemical fire suppression leaks.

.7 Design-Builder shall mitigate any EMF/EMI inside the CCH by building the room envelope and network infrastructure within the limits of ANSI/TIA-569-D-2015 Commercial Building Standard for Telecommunications Pathways and Spaces and the ANSI/TIA-942-A-2012 Telecommunications Infrastructure Standard for Data Centers. When there are power distribution transformers mounted on the other side of any CCH wall the Design-Builder shall use shielded transformers.

.8 Accommodate boxes and piping to be installed in the wall. Coordinate the thickness as all electrical and mechanical items shall be recessed or flush mounted. Electrical panels shall be surface mounted.

.9 All walls should be caulked around the inside perimeter of the room where the walls rest on the floor slab and the walls intersect with the ceiling slab above.

.10 Where partitions touch a deck or vertical structural members, a joint isolator shall be provided to prevent transfer of vibration and structural loads.

.11 Walls and other structural elements shall be design for minimum deflection and securely fastened with isolation from all mechanical units and isolation pads or caulking at the top of partitions.

.12 For envelope walls separating the CCH from a non-conditioned or exterior space, insulation is to be provided as necessary to stabilize temperature migration.

.13 A moisture/vapor seal shall be provided to completely surround humidity controlled spaces to prevent vapor infiltration to or from the CCH.

.14 Drywall should be caulked at the joints of the walls and floor, and at the roof or floor above.

.15 Any penetration, including all conduit, cable trays, outlets, switches and wire troughs must be fire caulked and sealed.

.3 The CCH walls shall be finished with non-particulating water-based epoxy paint finish, smooth prior to painting, drywall board shall be sealed with a compatible sealing primer.

.4 Fire-Rated Plywood Walls

.1 Provide ¾" fire rated plywood on full length of all walls of the CCH and the Entrance Facility Room.

.2 Install plywood from floor level to 2440 mm above finish floor.

.3 Paint all plywood with light colored fire-retardant type paint. Do not paint over the fire retardant treated plywood stamp.

.5 Doors

.1 Doors shall be large enough to move equipment between various rooms.

.2 Doors must be high enough to allow equipment entry on pallets without tilting.

.3 Doors shall have a minimum thickness of 45 mm (1.75 in) and be a minimum of 1.1 m (3.67 ft.) wide by 2.6 m (8.5 ft.) high for a single door or 1.8 m (6 ft.) wide by 2.6 m (8.5 ft.) high for a pair of doors.

.4 Doors shall be mounted within steel frames, have a solid core, and be of steel construction.

.5 The primary access door to the CCH room shall be a pair of doors, meeting the requirements listed above. These doors shall have neither a center post nor doorsills.

.6 All doors and frames within a rated partition assembly (1-hour or 2-hour) shall be rated at the code required rating of that assembly for occupancy rated separations.

.7 Doors shall have air tight and fire-rated weather stripping all around the opening.

.8 Latching mechanisms are necessary and door closures may be required.

.9 All doors must have a threshold and sweep installed.

.10 If doors must remain open, an electromagnet door holder will be required and released prior to clean agent discharge.

.11 Glazing shall be provided in the doors between the CCH and the Tech Room.

.12 Glazing within rated doors shall be fire rated and set in metal frames.

.13 Glazed openings within rated partitions shall not exceed code limitations as set by the building code.

.6 Floor Finish

.1 The floor cement pad will be coated with an electro-static dissipative water-based epoxy resin composition surface sealant designed for high-technology environments.

.2 Acceptable Manufactures and Products:

.1 Electro-Flor “W” ESD, Crossfield Products Corp. (Dex-O-Tex.) Product standards used as basis of standards specified herein. Other acceptable products:

.2 Sherwin-Williams 3425E Static Control Water-Based Epoxy Coating is a high solid, two component epoxy.

.3 Approved water-based epoxy equal.

.3 Composition: Water based self-leveling epoxy electro-static dissipative coating.

.4 Bond Coat/Prime Coat and Maintenance Sealer: As required by manufacturer of static dissipative coating.

.5 Coating System Thickness: Minimum of 14 mils.

.6 Color: Selected from manufacturer’s standard colors

.7 Physical Properties:

.1 Provide a flooring system that meets or exceeds the listed minimum physical property requirements when tested according to the referenced standard test method listed.

.2 Electrical Transmission Properties (Point to Point and Point to Ground resistance) ANSI/ESD STM 7.1 Static Dissipative: 1E6-1E9 ohms.

.3 Microbial Resistant ASTM G 21 Passes, Rating 1

.4 Flexibility,1/8” mandrel ASTM D 522 Passes

.5 Adhesion Resistance ASTM D 4060 5B

.6 Impact Resistance (Direct/Reverse 160/160 in-lbs.) ASTM D 2794 Passes

.7 Abrasion Resistance (CS-17 wheels, 1 kg, 1000 cycles) ASTM D 4060 40 mg

.8 Chemical Resistance ASTM C 868, ASTM C 267, ASTM D 1308 As listed by manufacture

.8 Copper Foil:

.1 22 Mil Copper Sheets (24 gauge) x 51 mm (2 inch.) wide. Conductive adhesively applied under coating and on wall.

.2 Length: Extend 305 mm (12 inch) onto slab and extend vertically up against wall 457 mm (18 inch.).

.3 Spacing: 2.5 meters on center.

.4 See CCH drawing T205 for connection of copper strips to ground bar

.7 Ceiling System

.1 Provide an extruded aluminum suspended Structural SrewSlot ceiling grid system as indicated on CCH drawing

T213. Acceptable Manufactures and Products: Gordon, Inc. "DG 1.5 ScrewSlot Data Center Ceiling Grid or equal.

.2 Ceiling Materials:

.1 Factory finishing is to be manufacturer's Black Jack PDR-20407 powder coat. All grid members to receive a micro-etched pretreatment prior to receiving an electro-statically applied Polyester powder coat paint finish.

.2 Manufacturer's standard ceiling panel hold down clips.

.3 Hot Aisle ceiling panels – 622 mm x1232 mm Aluminum DataVENT Panels for the hot aisles for hot aisle exhaust, 90% open, white

.4 Typical ceiling panels - Manufacturer's extruded twin-wall polycarbonate panels, 10 mm thick. Finish to be "ice". Panels will be sized to fit into DG 1.5 ceiling modules.

.3 Level the entire ceiling grid to within 2.54 mm (.10") overall and/or 0.15 mm (0.06") in any 3-meter length.

.4 Structural:

.1 Ceiling system with 1220 mm x 1220 mm suspension shall be capable of supporting a fully populated ceiling grid, including blank panels, HVAC supply and return registers, and light fixtures, plus directly supporting cable trays and utility racks and other accessories.

.2 The ceiling system shall be capable of supporting uniform loads to 244.12 Kilograms per square meter, dynamic. Maximum point load of 172.3 Kilograms, static. Distribute the cable tray load as required. Contact manufacturer for job-specific load requirements.

.3 Coordinate all work with other trades.

.4 Brace grid for seismic conditions. Provide Seismic Engineer's Certificate.

.5 Design-Builder to ensure the weight distribution of all cabling required for the eighty-eight (88) server cabinets and thirty (30) equipment racks (shown on CCH drawings for all three phases) comply with the capacity of the ceiling grid) In locations where the grid cannot support the three-tiered tray system, fasten directly to the structure above the grid.

.5 Refer to Schedule 1, Statement of Requirements, for additional requirements.

.2 Entrance Facility Room

.1 When selecting the location for the Entrance Facility Room avoid areas that are restricted by building components that limit expansion such as elevators, building core, outside walls or other fixed building walls.

.2 The Design-Builder shall design and construct the Entrance Facility in accordance with the following requirements:

.1 Walls will be to underside of slab.

.2 All walls will be lined with rigidly installed 20 mm (3/4"), AAA G1S plywood painted with two coats of light coloured fire resistant paint applied to all sides. Sanding between coats is mandatory. The plywood panels will extend from floor level to a height of 2438 mm. Expose certified stamped mark.

.3 Wall shall be light in colour to enhance the brightness of the room.

.4 Floor coverings shall be linoleum composite sheeting (i.e. “Marmolium”) and light in colour to enhance the brightness of the room. Vinyl tiles or sheeting are not acceptable.

.3 Doors

.1 Doors shall meet the requirements in Section 2.1.1.5.

.2 If the door must swing into the room, the size of the room will be increased by the width of the door to compensate for lost space.

.4 Ceiling

.1 Minimum clear height in the space shall be 2.4 m (8 ft.) without obstructions. The height between the finished floor and the lowest point of the ceiling shall be a minimum of 3 m (10 ft.) to accommodate taller frames and overhead pathways.

.2 For maximum flexibility, false (suspended) ceiling shall not be provided.

.5 The Entrance Facility Room shall not have exterior windows.

.6 Clearances

.1 Access clearance of 1 m in the front, side and behind the rear of the equipment racks shall be provided.

.2 Where several rows of equipment racks are located side by side, the row spacing shall be a minimum of 1 m.

.3 A minimum clearance of 50 mm shall be maintained between one side of the equipment rack vertical manager and the wall.

.4 All clearances are to be measured from the face of any equipment mounted to the wall and from the front of the vertical cable managers.

.7 The Design-Builder will locate the Entrance Facility Room away from services and conditions that may be obvious or hidden within the fabric of the building that will endanger or adversely affect telecommunications equipment and cabling. This includes, but is not limited to:

.1 Gas lines and pneumatic tubing will never be installed directly above, in or through the Entrance Facility Room. This includes inside adjoining walls.

.2 Electrical feeders and branch circuits (not directly associated with servicing the Entrance Facility Room) or devices such as transformers, large motors, generators, etc. that generate electromagnetic interference (EMI) will not be allowed to reside in or transit through the Entrance Facility Room. This includes adjoining walls and floor slabs.

.3 Mechanical ducting, water/sewer/steam/drain pipes, sprinkler risers and radiant heating will not reside in or transit through the Entrance Facility Room. This includes adjoining walls and floor slabs.

.4 Mechanical systems and associated ducting for supply and return air that are used to cool and control the environment within the Entrance Facility Room must not be housed within the Entrance Facility Room as this will inhibit the placement of overhead cable tray and lighting and constrain the optimal layout of the space.

.8 The Entrance Facility Room is not to be used as a catch-all space in which to add utility chases, equipment or panels.

.3 Tech Room

.1 The Design-Builder shall design and provide the finishes, accessories, lighting, power and the environmental conditions (air circulation, clean air, provision of comfortable temperatures for an occupied space with the ability for the occupants to control temperatures) for the Tech Room to meet the intended function and purpose of the space. Refer to Schedule 1, Statement of Requirements, for additional requirements.

.2 Design-Builder shall provide:

.1 Work bench space for four (4) technicians. The workbench will be wired with a minimum three (3) duplex 20A-120V 5-20R receptacles and three (3) dual Category 6A outlets per technician in a 6000 series wiremold product. The workbench also requires lockable shelving above the workbench. Include four (4) workstation controlled LED lighting below the shelving for the workbench surface.

.2 Additional dual Category 6A outlets to be provided for wall and or ceiling mounted displays.

.3 Locked storage facility using a Wire Mesh Partition type product equal to Chatsworth or Wirecrafters. Wire mesh partition is from 50 mm AFF to ceiling level. Include two (2) sliding 1520 mm wide x 3048 mm high alarmed doors controlled by card readers

.4 Provide industrial bulk storage racks that have shelves that are adjustable and support a minimum 975 kg (2150 lbs.) capacity

.5 Build storage shelving unit to allow standard sized pallets to be inserted below the storage shelves with a pallet jack. In addition, there shall be a minimum of 812 mm (32 inches)

clear pathway to walk along the front of the shelving unit when pallets are inserted.

.3 Flooring finishes provided shall be the same as the CCH. Refer to Section 2.1.1.6 for further details.

2. General Paths of Access and Mandatory Clearances

1. General

.1 An unobstructed pathway of access shall be provided by the Design-Builder that connects the CCH, Entrance Facility Room and Tech Room to the building exterior. The unobstructed pathway of access shall allow for the delivery of telecommunications and IT equipment, racks, cabinets and related components to the CCH and its critical adjacencies. All entrances, corridors, doorways, elevators, and other openings along this path shall allow for the delivery of equipment as large as 1.5 m (5 ft.) long by 1.2 m (4 ft.) deep by 2.4 m (8 ft.) high and be capable of supporting a minimum weight of 2268 kg (5000 lbs.) The routes for mechanical and electrical equipment servicing the CCH and its critical adjacencies shall be large enough to permit the installation of new equipment and the removal of old equipment. Clear height requirement shall consider the height of equipment, packaging and moving equipment. The Design-Builder shall identify the pathway of access connecting the CCH, Entrance Facility Room, Tech Room to the building exterior with all associated clearances on the Facility floorplans during the design phase.

.2 The maximum floor slope for any ramps that may be encountered in the general path of access to the CCH and its adjacencies is 8 degrees from horizontal.

2. Campus Communications Hub

.1 Clear pathways allowing for the movement of server cabinets, equipment racks and network equipment and hardware shall be provided throughout the space in a direct pathway.

.2 The following are the minimum clearance between equipment and structural elements of the CCH (Refer to CCH drawing T201 for minimum clearances):

.1 front (cold aisle) of the all server cabinets is 1220 mm
.2 rear (hot aisle) of all the server cabinets is 1067 mm
.3 front of equipment racks R9.1 to R9.8 is 1220 mm
.4 rear of equipment racks R9.1 to R9.8 is 1220 mm
.5 front of equipment racks R13.1 to R13.8 is 1220 mm
.6 rear of equipment racks R13.1 to R13.8 is 1047 mm
.7 front of equipment racks R12.1 to R12.6 is 1100 mm
.8 rear of equipment racks R12.1 to R12.6 is 800 mm
.9 front of equipment racks R10.1 to R10.3 is 1220 mm
.10 rear of equipment racks R10.1 to R10.3 is 1220 mm
.11 front of equipment racks R11.1 to R11. is 1220 mm
.12 rear of equipment racks R10.1 to 11.5 is 1220 mm

.3 There must be at least 1220 mm clear pathway between the entrance of CCH room and the front of all equipment racks and server cabinets.

.4 There must be at least 3.6 meters from the finished floor to the bottom of the false ceiling (Gordon Grid Ceiling). This space allows for the 48U server cabinets, the seismic ISO-Base, the three (3) tier cable tray trapeze and clearances between trays, ceiling and top of server cabinets.

.5 At least 450 mm (18 in.) clearance from sprinklers to raceways, server cabinets and equipment racks shall be maintained to ensure they do not disrupt the sprinkler distribution pattern subject to the AHJ.

3. Structural

.1 The CCH and its critical adjacencies must be built to a post disaster standard as stipulated in Schedule 1, Statement of Requirements.

.2 The structural design criteria shall allow for the CCH structure to be easily adapted to meet future requirements over its lifespan. Specific aspects of adaptability shall consider the ability to accept future heavier live loads, future routing of overhead supported piping, cable tray and cabling and conduit runs, future structural penetrations and the possibility for new large and or heavy Datacom equipment to be installed.

.3 Floor slabs shall be as per the calculations of the structural engineer based on the live load for the final fit out of the CCH and its adjacencies. The minimum acceptable floor loading in the CCH and its adjacencies shall be 7.2 kPa (150 lbf/f^{t2}).

.4 For elevated slabs, the concrete topping over metal deck flutes shall have a thickness of at least 100 mm (4 in.) to allow for the adequate embedment of epoxy and anchor bolts.

.5 Hanging dead load that can be supported from the underside of the roof shall be as per the calculations of the structural engineer based on the final fit out of the CCH and its adjacencies. The minimum acceptable hanging dead load in the CCH and its adjacencies shall be 1.2 kPa (25 lbf/ft^2). The design load and quantity of cables or cable fill percentage will be identified on the construction and as-built drawings for the CCH.

.6 All sources of external and internal vibration shall be eliminated or mitigated. Equipment that generates vibration must be configured to ensure that any vibration energy is not transitioned to the structure. Refer to the Table of Vibration Limitations in the Schedule 1, Statement of Requirements.

4. Security

.1 The following areas are to be covered by digitally recorded closed- circuit television color cameras, monitored by Security:

.1 All entrances and exits into the CCH

.2 Entrance to the Entrance Facility

.3 Inside all Hot Aisle Containment aisles.

.4 CCTV coverage of the CCH so that there are no blind spots.

.2 Entrances will be controlled by a card access control system and equipped with local door alarms that will sound if the door is propped open for an extended period of time. Emergency

exit doors are to be alarmed, but not equipped with card access control. Minimum card readers required are:

.1 Double Door Entrance to Tech Room

.2 Double Door Entrance to CCH room

.3 Double Door Entrance to Entrance Facility Room

.4 Both sliding door entrances to the Hot Aisle Containment POD A

.5 Sliding Door Entrances to Storage Cage (Tech Room)

.3 The access control system shall allow for easy modification of access control, be completely programmable and provide a digital and hard copy of all access to the CCH and its adjacencies.

.4 There should be no access through the CCH to another room not related to the CCH, such as offices or an electrical room.

.5 Wireless Access Control to each server cabinet (Front and rear) Refer to server cabinet description below.

5. Server Cabinets and Equipment Racks

.1 Server Cabinets

.1 The Design-Builder shall order and install twenty-two (22) sever cabinets to completely fit out Pod A. Refer to CCH drawing T201 for further detail.

.2 The server cabinets shall be equal to or better than a Belden X2S48-1S0002 and have the following characteristics and features:

.1 48RU high c/w engraved U markings starting with 1U at the top to 48U at the bottom.
.2 610mm wide x 1220mm deep.
.3 Steel construction painted black medium texture.
.4 Perforated (78% open area) front door with a KS100 Server Cabinet locking swing handle.
.5 Perforated (78% open area) rear door with KS100 locking swing handle.
.6 Bottom panel solid.
.7 Two (2) pairs of adjustable 11 GA EIA rails with square M6 clips nuts, fifty (50) M6 mounting hardware.
.8 Top panel with solid front and two (2) 150mm x 100mm Panduit Cool Boots (or equivalent) in the rear. Refer to the server cabinets detail on CCH drawing T211.
.9 Two (2) side panels painted black medium texture, with lock.
.10 48U vertical PDU manager support bracket (89 mm / 3.5” wide) to support both PDU on the same side.
.11 Two (2) 48U vertical wire managers (100 mm wide) One on each of the sides at the rear of the server cabinets.

.3 The server cabinets are to be equipped with two (2) vertical PDUs. PDUs are to be mounted on left side at the rear of the server cabinets using the vertical support brackets. The PDUs provided by the Design-Builder shall be Powerware EBA310-10 (Basic Vertical PDU) with the following characteristics:

.1 Input: L21-30P 3-meter cord w/molded male cord ends
.2 (1) 5-20R receptacle
.3 (30) C13 receptacles
.4 (6) C19 receptacles

.4 Provide blanking plates for all twenty-two (22) 48U server cabinets.

1. Use a combination of 10U, 6U, 4U, 3U, 2U and 1U blanking plates. The exact breakdown will be determined by the Authority during shop drawing approval.

2. Blanking plates will be made of black powder coated aluminum.

3. Allow for sufficient number of plates to blank 75% of the total U space of all twenty-two (22) server cabinets installed in Phase 1.

.5 The server cabinets are to be labelled with a 50mm x 150mm lamacoid (25mm white lettering on black background) mounted to the front and rear of the server cabinets. Refer to CCH drawing T201 for further detail.

.6 The server cabinets will be placed on heavy duty seismic ISO-Base platforms provided and installed by the Design-Builder. The ISO-Base platforms shall be equal to or better than Heavy-Duty ISO-Base Planks. Refer to detail on CCH drawing T211.

.1 Modular ISO-Base planks are to be secured to standard ISO-Base planks via frame connectors to support a walkable 6 mm (¼") platform that extends down the middle of the row.
.2 ISO-Base to be outfitted with bonded Dish Liners to reduce vertical vibration.
.3 Maximum weight of the server cabinets when fully loaded is 1134 kg (2500 lbs.)
.4 ISO-Base to support the sliding door assembly at both ends of the hot aisle containment Pod. The entire POD will move as a complete unit. There must be 310 mm (12") of unobstructed space in the horizontal plane to allow the POD to move during a seismic event.
.5 All power and communication cabling must have sufficient slack loop in the cable drop to the top of the server cabinet to allow for the server cabinets to move 305 mm (12") horizontally in any direction during a seismic event.
.6 Provide manufacturer's Structural (Seismic) Engineer's sign off upon completion of the project.

.7 Mount Polygon Slack managers to the top exterior of each server cabinets. Use an adhesive to attach the ring with Velcro. Use the slack manager to store three (3) meters of Fiber optic trunk cabling

.8 The server cabinets are to be grounded as per CCH drawing T205.

.9 Provide server cabinets with a fully functional wireless Access Control for door locks (front and rear) on each server cabinet in POD A. System description:

.1 Aperio Server Cabinet Locks and wireless hubs. Product # KS100-640H
.2 KS100 Server Cabinet locks (front and rear) with SFIC (small format interchangeable core) key override for manual unlock capability.
.3 Provide 24DC power supply to each door lock.
.4 Provide normally open DPS wired to the KS100 to monitor door position.
.5 Provide Aperio Wireless Hubs (utilizes 802.15.4 wireless communication between Hub and locks) c/w RS485 wiring to the buildings Access Control System for a fully functional system.
.6 Integrate into the building access control system.

.2 Equipment Racks

.1 The Design-Builder shall order and install thirty (30) four-post adjustable open equipment racks. Twenty (20) equipment racks are to be 610 mm wide x 915 mm deep and six (6) equipment racks are 610 mm wide x 762 mm deep. A single 610 mm wide x 762 mm deep equipment rack equipped with two (2) 152 mm vertical high density vertical managers shall be provided in the Entrance Facility Room to terminate fiber and copper ties cables to the CCH and house Authority equipment.

.2 Four (4) of the equipment racks (R.9.1 and 9.2 and R.13.1 and R.13.2) supplied will house equipment with different supply and return venting requirements. Therefore, these specific equipment racks need to be enclosed and provided with S/A and R/A ducting in order to work with the hot and cold aisle arrangement. The Design-Builder shall design, procure and install an appropriate solution to meet the supply and return venting requirements of this equipment in consultation with the Authority.

.3 The four-post adjustable open equipment racks shall be equal to or better than a Belden XDRS8419-610S02 and have the following characteristics and features:

.1 At a minimum, the racks will meet the Telcordia (Bellcore) GR-63-CORE Standard – Equipment racks and server cabinets will be independently tested and certified to meet or exceed established Seismic Zone 4 NEBs Telcordia GR-63-CORE standards and specifications.
.2 Anchored with to the concrete floor as appropriate for the
.3 seismic demand in accordance with local seismic codes. Provide Seismic Engineer's Certificate of Assurance indicating the equipment rack installation and anchoring is Zone 4 certified.
.4 44U high c/w engraved U markings starting with 1U at the top to 44U at the bottom.
.5 Painted black medium texture.

.4 Provide between all equipment racks a double-sided high density finger style vertical cable manager that is 310mm wide x 228mm deep front & rear (equal to or better than Belden BHVHH12).

.1 Provide two sets of three (3) slack management spools per vertical cable manager (equal to or better than Belden BKSK020). (1 set for the front and 1 set for the rear)
.2 Provide an air seal between the front and rear section of the vertical managers.
.3 The rear section of double-sided high density finger style vertical managers is used for dressing the three (3) meters of fiber optic slack cable.

.5 Provide at the end of each row of equipment racks a double-sided high density finger style vertical cable manager that is 152 mm wide x 228 mm deep front & rear (equal to or better than Belden BHVHH06).

.1 Provide two sets of three (3) slack management spools per vertical cable manager (equal to or better than Belden BKSK020). (1 set for the front and 1 set for the rear)
.2 Provide an air seal between the front and rear section of the vertical managers.
.3 The rear section of double-sided high density finger style vertical managers is used for dressing the three (3) meters of fiber optic slack cable.

.6 Provide 3U horizontal managers on each equipment rack (equal to or better than Belden BHH193U). Refer to CCH drawing T208 for exact location and count.

.7 Provide blanking plates for thirty (30) 44U equipment racks.

.1 Use a combination of 10U, 6U, 4U, 3U, 2U and 1U blanking plates. The exact breakdown will be determined by the Authority during shop drawing approval.
.2 Blanking plates will be made of black powder coated aluminum.
.3 Allow for sufficient number of plates to blank 75% of the total U space of all thirty (30) equipment racks installed in Phase 1.

.8 Provide fifteen (15) solid rack mount shelves (equal to or better than Belden 9010-1919-S01).

.1 Twelve (12) GA steel welded construction.
.2 181 kg. (400 lbs.) Weight limit.
.3 Colour: Black.

.9 PDUs

.1 Equipment racks are to be equipped with two (2) vertical PDUs. PDUs are to be mounted on left and right side at the rear of the equipment rack using the vertical support brackets. The PDUs provided by the Design-Builder shall be

Powerware EBA310-10 (Basic Vertical PDU) with the following characteristics:

.1 Input: L21-30P 3-meter cord w/molded male cord ends
.2 (1) 5-20R receptacle
.3 (30) C13 receptacles
.4 (6) C19 receptacles

.2 The following equipment racks do not require PDU's: R13.6, R13.5, R13.3, R9.6, R9.5 and R9.3.

.10 Equipment Racks are to be labelled with a 50 mm x 150 mm lamacoid (25 mm white lettering on black background) mounted to the front and rear of the equipment rack. Refer to CCH drawing T201 for further detail.

.11 Equipment racks are to be grounded as per CCH drawing T205.

Section 3—Electrical System

1. Uninterruptible Power Supply

.1 The CCH's standby power system will be designed with an Uninterruptible Power Source (UPS), placed in a dedicated adjacent UPS Room.

.2 The UPS system provided by the Design-Builder will be an Eaton Power Xpert 9395 High Performance UPS. This is the only UPS system acceptable to the Authority.

.3 The UPS distribution system is 2N (A distribution and B distribution). Each equipment rack and server cabinet is fed from an A and B distribution panel.

.4 UPS batteries will support a run time of 10 minutes at full load.

.5 Power will be provided from Power Distribution Units (PDUs) and carried to electrical panels installed on perimeter wall of the CCH.

.6 Branch circuits feeding the two (2) Vertical PDU's to each of the equipment rack and server cabinet will be on dedicated A and B distribution 3P30A breakers.

.7 Power will be distributed from the breaker panels by 4C#10 copper teck cables to Industrial grade L21-30A twist lock receptacles mounted to the underside of the cable runner tray system.

.8 The electrical systems and equipment serving the CCH and its adjacencies will be designed in compliance with BCBC requirements for a post disaster building.

.9 Refer to the Schedule 1, Statement of Requirements and Appendix 1B(I) [Energy Centre Technical Specifications] for further details and requirements on the specifications on the UPS system and all power distribution requirements within the CCH and to other Communications Rooms in the Facility.

2. Entrance Facility Room

.1 For the Entrance Facility, allow for the provision of the following above the 14 Carrier racks: 14 x 20A-120V and 14 x 30A-208V 1Ph. twistlock receptacles. Exact locations to be confirmed prior to construction. Each receptacle to be on a dedicated circuit from the Vital distribution panel in the room.

3. Convenience Outlets

.1 For the CCH, provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 6m and one at each interior column. Connect 50% of receptacles to vital power and the remainder to conditional power. Each receptacle to be on a dedicated circuit.

.2 For the Entrance Facility and Tech Room, provide general purpose 15/20A T-slot receptacles along the perimeter wall at a maximum spacing of one every 3m. Connect 50% of receptacles to vital power and the remainder to conditional power. Each receptacle to be on a dedicated circuit. Refer to Section 2.1.3 and CCH drawing T201 for additional electrical requirements in the Tech Room.

4. Lighting

.1 The lighting systems provided in the CCH and its adjacencies shall adhere to local code requirements, including, but not limited to emergency lighting and energy efficiency requirements.

.2 The CCH and its adjacencies shall have a minimum of 500 lux (50 ft.-candles) maintained in the horizontal plane and a minimum of 200 lux (20 ft.-candles) maintained in the vertical plane of the server cabinets and equipment racks, both measured at 1 m (3 ft.) above the finished floor.

.3 The lighting uniformity within the CCH shall not exceed 90% before any server cabinets and equipment racks are installed.

.4 Lighting control in the CCH and its adjacencies shall be located at the room's exits. Provide all rooms with occupancy sensors to control the lights in each room.

.5 All room lights in the CCH and its adjacencies are to be connected to the emergency generator system.

.6 Lighting fixtures in the Entrance Facility Room are to be mounted 2.8 m AFF.

.7 Provide LED linear lighting as identified on CCH drawings T201 (inside the POD) and T210 in the cold aisle of all four PODs, the hot aisle of POD A and the front and rear of the equipment racks. Equal to Manufacturer: Edge- Cat. # VRAP1.

.8 Life safety components, (exit lights per code, security, and so on) are also to have battery packs installed per codes.

5. Telecommunications Bonding and Grounding

.1 Campus Communications Hub

.1 Provide a Telecommunication grounding system as per CCH drawing T205 as a minimum requirement.

.2 Use compression H-taps and two-hole compression lugs for all connections.

.3 Provide TMGB equal to Panduit GB4B0624TPI-1(6 mm x 102 mm x 610 mm) telecommunication grounding busbar.

.4 For each of the six (6) DAS equipment racks, provide a vertical ground bar mounted to the equipment rack for consolidating equipment grounds. Constructed of 5/8"H x 1/4" W (15.88 mm x 6.4 mm) hard-drawn electrolytic tough pitch 110 alloy copper bar with pairs of #1/4-20 tapped mounting holes on 5/8" (15.88 mm) centers. The 72" L (1830 mm) bar has two sets of #5/16 self-clinching studs on 1" (25.4 mm) centers at both ends for attachment of a ground conductor.

.5 Provide paint piercing washers on the attachments to equipment.

.2 Entrance Facility Room

.1 Refer to CCH drawing T205 and Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for Telecommunications Grounding Requirements.

.2 Provide TGB equal to Panduit GB4B0624TPI-1 (6 mm x 102 mm x 610 mm) telecommunication grounding busbar.

Section 4 - Raceways

1. Campus Communications Hub

.1 General

.1 Size of the pathways shall consider quantities of cable when the CCH is fully occupied and all expansion areas are built.

.2 Data cabling for the CCH shall not be routed through spaces accessible by the public or by non-authorized personnel unless the cables are enclosed in conduit or other secure pathways.

.3 Access to pull boxes for CCH cabling (including entrance cabling) that are located in public spaces shall be controlled. The pull boxes shall be monitored by the building security system using a camera or remote alarm.

.4 The distance between power cables or lighting fixtures and balanced twisted-pair cables shall be maintained per ANSI/TIA-569-D.

.5 Cable pathways shall not be located where they interfere with proper operation of fire suppression system. Cold aisle shall remain unobstructed by cable pathways.

.6 Overhead cable pathways shall not block airflow into or out of server cabinets and equipment racks. Cold aisle shall remain unobstructed by cable pathways and associated power and data cabling shall not obstruct return air path.

.7 Pathways shall be bonded and grounded as per CCH drawing T206 as a minimum requirement.

.2 Cable Trays

.1 Provision and Installation of a three (3) tier overhead cable tray system in CCH. Refer to CCH drawing T202, T203, T204 and T210 for further details and requirements.

.2 The weight of the fully occupied cable tray system shall be calculated and coordinated with a Structural Engineer.

.3 Planning of cable trays shall be coordinated with architects, mechanical engineers and electrical engineers that are designing lighting, plumbing, air ducts, power and fire protection systems for the CCH.

.4 The access head room between the top of a tray or runway and the bottom of the tray above shall be provided and maintained as specified in ANSI/TIA-569-D.

.5 Branch circuit power, fiber and copper cabling between the server cabinets and equipment racks will be run over the ceiling in cable trays, using waterfall supports when entering or exiting equipment racks and server cabinets.

.6 The top cable tray is a 610mm wide cable runner tray (Chatsworth Part # 10250-X24 or equal) for server cabinets and equipment racks power cabling.

.1 The cable runner is used for the supporting of the 4C #10 AWG copper teck cable power feeders to each vertical PDU twist lock in the CCH from the UPS breaker panels.

.2 L21-30R Industrial grade twist lock receptacles, two (2) per server cabinet and equipment rack are to be mounted on the underside the cable runner facing down above the vertical PDU location.

.3 Provide manufacturer radius bends for all changes in cable tray direction.

.7 The middle cable tray is a 310mm wide yellow fiber runner tray (Panduit FiberRunner series or equal) for server cabinet and equipment rack fiber cabling.

.1 The fiber runner is used for routing all fiber optic cabling between the server cabinet and equipment rack in the CCH. Refer to CCH drawing T203 and T210 for location and minimum tray size.

.2 Provide manufacturer radius bends for all changes in direction

.3 Provide fiber runner manufacturer drop out fittings for the server cabinet and equipment rack. One (1) per server cabinet and two (2) per equipment rack.

.4 L21-30R Industrial grade twist lock receptacles, two (2) per equipment rack and server cabinet are to be mounted on the underside the cable runner facing down.

.8 The bottom cable tray is a 610 mm wide basket tray (Cablofil or equal) for server cabinet and equipment rack copper cabling.

.1 The basket tray is used for routing all copper cabling between the server cabinet and equipment rack in the CCH. Refer to CCH drawing T202 and T210 for location and size.

.2 Provide manufacturer cable drop out fittings over the side of the tray at each cable exit point. Minimum requirement is for two (2) drop out fittings at each server cabinet and equipment rack.

.3 Provide a vertical section of tray from the floor to ceiling level at all locations where riser conduits enter the room from the floor below. Minimum requirement is one (1) in CCH and one (1) in the Entrance room

.3 Sleeves

.1 All sleeves are to be 4” Hilti Speed Sleeves c/w ganging plates. Refer to CCH drawing T202 for the minimum number of sleeves required. Provide FS gang plate cap CFS-SL GP CAP on all unused openings.

2. Entrance Facility Room

.1 Provision and Installation of an overhead cable tray system in Entrance Facility Room # RMT-05B. Refer to CCH drawing T202.

.2 The top cable tray is a 610 mm wide cable runner tray (Chatsworth Part # 10250-X24 or equal) for all communications cabling.

.3 Provide a vertical section of cable tray for any floor entrance conduits/sleeves.

.4 All sleeves are to be 4” Hilti Speed Sleeves c/w ganging plates. Refer to CCH drawing T202 for the minimum number of sleeves required. Provide FS gang plate cap CFS-SL GP CAP on all unused openings.

3. Service Entrance Facilities

.1 The diverse Service Entrance Facilities for the Facility will terminate in the Entrance Facility Room and the CCH.

.2 Refer to Schedule 1, Statement of Requirements, and Appendix 1B(lll) [Campus Perimeter Pathway System Technical Specifications] for further details and requirements.

Section 5—Cooling and Containment

1. Campus Communications Hub - Cooling

.1 General

.1 HVAC availability and redundant power access in the CCH shall conform to the requirements of class F3 as defined by ANSI/BICSI 002-2014 (Data Center Design and Implementation Best Practices) at a minimum. The mechanical systems will possess redundancy so that any system or component may be taken off-line without impacting the system's ability to meet the "N" cooling capacity required. The level of redundancy required will be either at a system level or at a component level in order to ensure that all mechanical components can be maintained without impacting IT operations. A failure of any element in

the mechanical systems will not result in the loss of cooling capability for the load. Single points of failure shall not exist within the overall cooling system.

.2 The mechanical systems and equipment serving the CCH will be designed in compliance with BCBC requirements for a post disaster building.

.3 The cooling design shall consider and provide for:

.1 Controls for temperature and humidity at the server and network equipment inlet.
.2 Adequate filtration and ventilation.
.3 Special needs of direct cooled equipment and equipment with unique supply and return air requirements.
.4 Airflow patterns for heat dissipation within the room.
.5 Avoidance of recirculation of hot air.
.6 Redundant cooling systems as required for a class F3 facility.
.7 Architectural features such as a tight vapor barrier.

.4 The Design-Builder will provide the necessary infrastructure to limit or eliminate disruption or impact to the Facility when the Phase 2 IEC units are installed. This includes, but is not limited to ducting, platforms/catwalks, structural steel support, footings, curbs and anchors.

.5 The CCH environment limits are 18 to 27 ˚C (64.4 to 80.6 ˚ F) and relative humidity to the ASHRAE 2015 Thermal Guidelines for Data Processing Environments Fourth Edition.

.6 During the design phase, the Design-Builder shall complete a Computational Fluid Dynamics (CFD) model and analysis to demonstrate the cooling and containment solution put forward meets the Authority's operational requirements through each phase of the CCH's fit out and over a range of thermal conditions and load densities.

.7 The placement of mechanical equipment, piping, ducting and associated components shall not compromise the layout and or reduce the quantity of server cabinets and equipment racks in the CCH.

.2 Cooling System

.1 Unit Description

.1 Type: Indirect Airside Economizer
.2 Coil Type: Polymer tube air-to-air heat exchanger
.3 Dual feed with integral automatic transfer switch
.4 Integral DX cooling circuit. DX cooling circuit is for worst case temperature events and should not be required at an ambient WB (<19.44 C) < 67 F.
.5 CCH supply CFM rating per unit: >43,000
.6 CCH supply temperature: 23.8 C (75F)
.7 CCH return temperature: 35 C (95F)
.8 Ambient wet bulb design: 23.5 C (74.3F)
.9 Units with filters: 50%
.10 Filter type: 101.6 mm (4") MERV 8

.2 System Energy Performance:

.1 Annual average PUE: <1.1 (PUE of heat rejection system only)
.2 Annual KWH: <600,000 (All units running full design load, no DX in calculation).
.3 Energy analyses to be submitted to the owner's consultant as part of submittal package
.4 At the conclusion of the CCH fit out, system redundancy will be 3N+1 with integral automatic transfer switches.

.3 Project Phasing

.1 CCH cooling load, all phases (maximum fit out) MAX: 780kW
.2 Phase 1 load of 260 kW (Install 2 x 43,000 CFM units) Note: The Phase 1 cooling load of 260 kW is distributed in the CCH as per the following: The 22 Servers Cabinets R1.1 to R1.11 and R2.1 to R2.11 will have 160 kW of the cooling load. The remaining 100 kW cooling load will be distributed over the 30 Racks.
.3 Phase 2 cooling load 520 KW (Two (2) additional 43,000 CFM units to be installed in Phase 2)

.4 System Operation

.1 System maintenance can be performed at any time without affecting the cooling system's rated capacity.
.2 A cooling unit failure will not affect the system's rated capacity
.3 Failure in the primary source of water will not affect the system rated capacity. A backup source of water must be available.
.4 Electrical system maintenance can be performed at any time without affecting the system's rated capacity via the use of automatic transfer switches on each unit.
.5 Failure in the control system shall not affect the system's rated capacity.
.6 After a power interruption fans to fully ramp up to rated speed in <50 seconds. (40 sec + 10 sec for vital power).
.7 After a power interruption DX circuit to provide full rated capacity <75 seconds. (65 sec + 10 sec for vital power).

.5 Refer to the Schedule 1, Statement of Requirements and Appendix 1B(I) [Energy Centre Technical Specifications] for further details and requirements on the specifications for the Indirect Air Side Economizers, Make-up Air and Humidifiers.

.6 Refer to the Authority's preliminary CFD report and analysis data located in the Data Room.

.3 Supply Air Ducting Layout

.1 A comprehensive design approach is necessary to ensure maximum efficiencies during the life cycle of the CCH.

.2 Provide the complete supply air ducting required for a fully loaded CCH as noted on the drawings.

.3 Supply air temperature must be controlled to very near the design inlet temperature for the project.

.4 To maximize air flow efficiencies, provide all the dampers required to allow for incremental growth of the server and hot aisle containment pods over the lifetime of the CCH.

.5 Supply air ducting will be inside the return air plenum space. Insulate the supply air ducting.

.4 Return Air Layout

.1 Return air should be positioned to capture the highest heat concentration such as return air intakes directly over the hot aisles when using a return air system to reduce recirculation.

.2 A ceiling height of at least 3.6 m above the finished floor will allow for an effective return air area above server cabinets and equipment racks and optimize the return air path.

2. Campus Communications Hub - Hot Aisle Containment

.1 This hot aisle containment system shall enclose two adjacent rows of server cabinets. The system shall include sliding doors at the ends of each aisle and an aisle containment plenum supported from the ceiling and independent of the server cabinets. Rack Gap Panels, Upper and Lower Tier Vertical Panels, sealing materials and blanking panels are to be included as needed.

.2 Provide a similar solution for the hot aisle containment of the five separate rows of equipment racks.

.3 The containment system must allow for easy access to the rear of the row of equipment racks, both ends when available.

.4 Refer to the Authority's preliminary CFD report and analysis data located in the Data Room.

.5 Manufacturers

.1 Basis of Design: Product specified is PolarPlex HACS as manufactured by Polargy.

.2 Subject to compliance with this specification, the following Manufacturers may be proposed on this Project: Polargy or equal

.6 Equipment Description

.1 Refer to CCH drawings T210 & T212 for reference.

.2 Ceiling Supported Aisle Containment System with Upper Tier (above server cabinet) Vertical Panels and Lower Tier (server cabinet level) and Rack Gap Panels used for Hot Aisle Containment.

.3 Each HACS is to consist of an aisle containment plenum supported from the ceiling and independent of the equipment cabinets. Also, each HACS will have sliding doors supported from the containment plenum and independent of the server cabinets. Each HACS will include Rack Gap Panels supported from the containment plenum to fill empty server cabinet and equipment rack spaces.

.4 The HACS shall be designed to be capable of supporting vertical and lateral structural loads in accordance with local structural codes.

.5 In addition to the self-weight of the HACS, the HACS shall be capable of resisting the required earthquake forces for this area, in accordance with the provisions of the Authority Having Jurisdiction.

.6 Each HACS shall be capable of accommodating 78 mm of total vertical movement (50 mm downward, 25 mm upward) at the interface between the HACS plenum and the top of the server cabinets and equipment racks.

.7 Provide a sliding door at the end of each HACS. The sliding door should be a dual door, center opening type with auto-close and hold open features.

.8 The HACS shall have the capability to remove 1 or more server cabinets and equipment racks from the continuous row without removal of the HACS to allow the entire exchange of a fully loaded server cabinet and rack.

.9 HACS Upper Tier Vertical Panels shall be moveable or removable to allow access to the cable trays from the contained side of the aisle.

.10 Where server cabinets or equipment racks are not installed, each HACS shall include Rack Gap Panels and provisions to toollessly mount and remove them. The Rack Gap Panels shall accommodate the vertical movement noted above. Securing of Rack Gap Panels shall be to the HACS plenum structure.

.11 The HACS shall have containment integrity such that no gaps are larger than 6mm other than the door bottoms that serve as safety pressure relief path when exhaust air and supply air fall out of balance.

.7 Structure

.1 The aisle containment plenum shall be prefabricated in flat-packed sections that are lifted into place and secured to the ceiling. The plenum shall be supported from the ceiling structure and flush to the ceiling. Sliding doors shall attach to the plenum and floor and accommodate the lateral movement specified above. Rack Gap Panels shall secure to the plenum and also accommodate the lateral movement specified above.

.2 The HACS plenum structural frame shall consist of pre-fabricated vertical and horizontal framing elements that hold the upper tier vertical panels.

.3 HACS plenum Upper Tier Vertical Panels shall either slide in a track or be toollessly removable to allow access to the cable trays from the contained side of the aisle. Vertical panels above the aisle ends shall be fixed.

.4 A 102 mm tall brush gasket shall seal the gap between the bottom of the plenum and top of the server cabinets and equipment racks.

.5 Rack Gap Panels shall have provisions for toollessly fastening to the HACS plenum. Panels shall hook onto an embedded support channel along the bottom of the plenum and be captured at the floor with an F-bracket that accommodates the vertical movement noted above.

.6 Rack Gap Panels shall consist of 8mm twin-wall polycarbonate trimmed at the top with aluminum. Panel sizes and quantities shall be coordinated with the Authority.

.7 Sliding Doors shall have automatic closing with no threshold and include a mechanism for holding the door in an open position; the mechanism shall be removable without tools in order to accommodate sites where operators prefer to make this feature temporary.

.8 Sliding Doors shall be adjustable in height to easily accommodate various heights of server cabinets and equipment racks and shall have an adjustment range to accommodate heights between 42U and 50U.

.9 Sliding Doors shall have clear, twin-wall polycarbonate windows comprising over 75% of each door opening. Twinwall material shall be Class A fire-rated material. Twin-wall panel shall be field replaceable to easily swap out damaged inserts with a replacement time of less than 20 minutes in order to minimize disruption to containment.

.10 Empty server cabinets and equipment racks shall be blanked off with 48U full length blanking panels. 48U-blanking panels shall install without tools using push rivets.

.11 Miscellaneous gaps shall be sealed with fire safe air dam foam or air dam barriers. Air dam foam shall be provided in 610mm x 610mm x 50mm sheets that are pre-scored at 25mm increments so that various sizes and shapes can be easily made. Air dam barriers shall be provided in various sizes and shall include magnetic or Velcro options for attaching the barriers to server cabinets and equipment racks.

.8 Performance Requirements

.1 The HACS shall have containment integrity to meet or exceed a minimum combined surface area leakage of no more than 3.0% of the total contained zone surface area within the server cabinet containment areas and no more than 7.0% of the total contained zone surface area within the equipment rack containment areas.

.2 Ceiling Supported Aisle Containment System with Upper Tier (above server cabinet/equipment rack) Vertical Panels and Lower Tier (server cabinet/equipment rack level) Rack Gap Panels used for Hot Aisle Containment

.9 Submittals

.1 Design Submittals

.1 Product Data: Provide cut sheets, specification sheets, installation instructions, and material characteristics for manufactured products and assemblies.
.2 Indicate HAC system layout, plans and elevations, rough dimensions, weights, and system components requiring interface with other systems or structures.
.3 Include the time required for preparing shop drawings, descriptive literature, and material lists.
.4 Include a schedule of the time required for manufacturing and onsite final fabrication and installation time.
.5 Indicate a preferred sequencing and coordination with other trades and installation activities.

.2 Action Submittals

.1 Product Data: For each product and accessory include dimensions and manufacturers' technical data on features, performance, ratings, and finishes.
.2 Shop Drawings for each HACS: Dimensioned plans, elevations, sections, and details. Include floor plans showing dimensioned layout and support locations, type of support, and weight on each support.
.3 Documents shall also be submitted in PDF for Drawings and Microsoft Word for text format documents.

.3 Closeout Submittals:

.1 Spare and Accessory Part/Price List.
.2 Final Shop Drawings if as built substantially different from original drawings.

3. Entrance Facility Room

.1 The Entrance Facility Room will be cooled by two separate dedicated AC self-contained units that will be mounted in the ceiling space.

.2 Two units are installed to meet N+1 redundancy. During normal operation, each unit will operate at part load to meet the cooling demand of the space which will be determined in consultation with the Authority at the time of design.

.3 Refer to the Schedule 1, Statement of Requirements and its associated appendices for further requirements.

Section 6—Data Center Infrastructure Management (DCIM)

1. Summary

.1 The Design-Builder is to provide the following:

.1 Provide a common model of information for IT and facilities to work with to understand the real-time data and, trends to be able to correctly provision power and cooling at the actual level required, with the intelligence of alarm notification where a set threshold may be breached.

.2 Centralized Monitoring Requirements:

.1 Collect and analyze real-time data for monitoring of the environmental conditions and power consumption.
.2 Provide a comprehensive event management and alarm notification system.
.3 View device-level data and trends and generate reports with ease.
.4 Measure efficiency and comply with industry-approved efficiency metrics (PUE and DCIE).
.5 Unified dashboard to view energy usage and operating efficiency together to ensure compliance, maximize energy usage and minimize energy waste.

2. Hardware:

.1 Supply complete breaker panel branch current sensor monitor and environment monitoring system. The system includes two current strips (up to 72 breakers total), the current strip interface modules (electrically isolated from the controller), the main control module/gateway, the remote User Interface (LCD, Alarm LEDs and pushbuttons), the (optional) remote Breaker Status LED unit, and the remote VPE-100 Environment Monitor Hubs for °C, %RH, CO, H2O leak detection. The controller/gateway, and interface modules are DIN rail mounted for easy installation.

.2 Built in web server to allow the user to program all alarm and operating settings for the breaker and environment variables. Email alerts are programmed for Low, High, Zero Load Alarm (breaker only) and Water Leak Alarms.

.3 Data and alerts to be viewed graphically on standard mobile devices and tablets (IOS & Android).

.4 The breaker data to be transmitted on a programmed time interval to a remote server location for data logging and kWh calculations for status and billing services. All environment data can also be logged to a separate or same remote server location.

3. Device Locations - Environmental Monitoring

.1 QTY 1 x Environment sensing / monitoring / alarm indicating transmitter installed in every third server cabinet and equipment rack.

.2 For pod based architectures, there will QTY 2 pressure differential sensors included in each POD and equipment rack containment area at equal spacing. The sensors will monitor the pressure differential between the hot aisle and the cold aisle.

.3 QTY x 1 environment sensing / monitoring / alarm indicating transmitter installed on each Indirect Airside Economizer.

4. Device Locations - Branch circuit monitoring

.1 All electrical panels feeding the CCH equipment rack and server cabinet power distribution units.

5. Leak Detection Monitoring

.1 Provide a zone leak detection system with moisture sensing cables in the CCH reporting to the DCIM system.

.2 Provide detection sensors that monitor moisture sensing cables.

.3 The zone leak detection system will operate a dry-contact output that integrates into the DCIM monitoring system.

.4 Examples of areas that will need leak detection are:

.1 Along the top of the POD A server cabinets.

.2 Along the hot aisle ISO-Base platform.

.3 The perimeter of POD A around the ISO-Base platform.

.4 Water lines.

.5 Drains.

.6 CCH perimeter

Section 7—Fire Protection

NTD: this section will be updated with the selected Fire Protection solution before the Effective Date.

1. Suppression

.1 Suppression used within a contained aisle shall meet the minimum requirements for suppression systems used in the surrounding space and shall comply with local regulations.

.2 Pre – Action Sprinkler System

.1 The Design-Builder shall provide a fire sprinkler double interlock pre-action system in the CCH and its critical adjacencies.

.2 The sprinkler system shall be valved separately from other sprinkler systems.

.3 Valves controlling water to the CCH and its critical adjacencies sprinkler system shall be labelled as separate from valves controlling sprinkler water to the rest of the building.

.4 Sprinkler heads shall be flush mount pendant type where there is a suspended ceiling. Where no suspended ceiling is provided, sprinkler head shall be covered with a wire cage to prevent accidental impact and discharge.

.5 Sprinkler heads shall be installed as per applicable local codes, standards and regulations.

.3 Clean Agent Fire Suppression System (Sapphire)

.1 In addition, the pre-action sprinkler system identified for the base price, the Design-Builder shall ensure the CCH can be equipped with a clean agent fire suppression system in the future if so desired by the Authority.

.2 The Design-Builder shall space plan for all the gas fire suppression tanks (identified on the CCH drawings) including all the gas piping and VESDA system for a gaseous agent extinguishing system inside the CCH room and Hot Aisle Containment systems.

.3 In Phase 1, provide all controls, appropriate dampers and room integrity measures required for the operation of the clean agent fire suppression system.

.4 Ensure that the Hot Aisle Containment system for Phase 1 is designed and installed to support the requirements of the gas fire suppression systems noted above.

.4 The Design-Builder shall train Authority staff on the use and function of the fire detection and extinguishing systems of the CCH, Entrance Facility and Tech Room.

2. Fire Detection

.1 Provide addressable smoke detectors of self-correcting type to maintain consistent sensitivity in the CCH and its critical adjacencies.

3. Fire Extinguishers

.1 Provide fire extinguishers complete with recessed or fully recessed cabinets. Locate each fire extinguisher within the space it serves, and ensure it is of appropriate size and hazard classification for that space.

.2 Extinguishers that use dry chemical shall not be deployed within the CCH as they can damage electronic equipment. Clean agent handheld fire extinguishers shall be provided.

4. Labeling and Signage

.1 Signage explaining fire suppression system functions will be installed adjacent to system controls and alarm components. The following two images are examples of appropriate signage.

Section 8—Data Cabling System

1. Scope of Work

.1 The CCH will consist of thirty (30) equipment racks and (2) rows of eleven (11) server cabinets each (22 server cabinets in total). Network connections within the CCH and between the CCH and Entrance Facility Room will be provided via copper and fiber structured cabling. Refer to CCH drawings T201-T214 for additional detail and requirements.

.2 Structured cabling will be run over the ceiling in cable trays, using waterfall supports when entering server cabinets and equipment racks.

.3 All structured cabling for this project will be plenum/low smoke zero halogen rated.

.4 All cable, jacks, connectors, pigtails, patch panels and patch cords shall be manufactured by Belden or Amp NetConnect.

2. Execution of Cabling

.1 The Design-Builder shall install all cabling and devices as shown on the CCH drawings.

.2 The Design-builder shall use an authorized "AMP NetConnect ND&I" and/or Belden CSV cabling system installer from the Authority's prequalified vendor list to install all data cabling within the CCH and its critical adjacencies.

.3 Work shall be done by qualified personnel in a neat, high quality manner and in accordance with Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] and to the most stringent of applicable building codes and control standards.

.4 The Design-Builder shall ensure that all floor and wall penetrations are fire stopped in accordance with Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] and all applicable codes.

3. Copper Cabling – Category 6A

.1 All copper structured cabling for this project will be Category 6A terminated on 1U 48 port high density Category 6A flat patch panels at both ends.

.2 From each server cabinet: run six (6) Category 6A to equipment rack R9.6 side A and six (6) Category 6A to equipment rack R13.6 side B.

.3 The Category 6A product is a 10G Ethernet small diameter UTP cable that will exceed the Category 6A standard requirements for 100-meter channels. Equal to better than Belden 10GSX.

4. Fiber Cabling (Server Cabinet to Equipment Rack) – OM4 Multimode

.1 All OM4 multimode fiber optic cabling will be OM4 low loss MPO-MPO (male) Type B 12F trunk cabling. Equal to better than Belden FM4MMB10XXM Mini-distribution 4.8 mm trunk cabling.

.2 From each server cabinet: run two (2) 12F MPO-MPO (male) type B trunk cables from equipment rack R9.5 side A and two (2) 12F MPO-MPO type B (male) trunk cables from equipment rack R13.3 side B with Erika Violet jacket.

.3 Terminate the server cabinet end into 1U high density fiber patch panels (4 Cassette capacity). Provide a 12 port (24 fiber) – 2 MPO Type A cassette on this end of the link. Provide Erika Violet adaptors.

.4 Terminate the equipment rack end of the link into 4U High Density Housing fiber patch panels (16 Cassette capacity) – 2 MPO Type A Alternate cassette on this end of the link. Provide Erika Violet adaptors. Provide 1U High Density fiber panels where applicable, refer to CCH drawing T208 for exact requirements.

.5 Provide a minimum of 3 meters of slack at one end only (Note: Not at the main fiber distribution rack(s)). This is in addition to the slack loop that allows for the movement of the server cabinet on the ISO-Base.

.6 Maximum Connector performance IL for LC and MPO per OM4 type fiber:

.1 The maximum connector IL (insertion loss) for the LC connector performance will be 0.15 dB.

.2 The maximum connector IL (insertion loss) for the MPO connector performance will be 0.2 dB.

5. Fiber Cabling (Equipment Rack to Equipment Rack) – OM4 Multimode

.1 Refer to CCH drawing T208 fiber connectivity schematic between equipment racks.

.2 All OM4 multimode fiber optic cabling will be multiples of OM4 low loss MPO-MPO (male) Type B 12F trunk cabling.

.3 Provide a minimum of 3 meters of slack at one end only (Note: Not at the main fiber distribution rack(s)). This is in addition to the slack loop that allows for the movement of the server cabinet on the ISO-Base.

.4 For each 24F OM4 fiber count, provide a 12 port (24 fiber) – 2 MPO Type A cassette on one end of the link and a 2 MPO Type A Alternate cassette on the opposite end of the same link. Provide Erika Violet adaptors.

.5 Provide 4U high density housing fiber patch panels (16 Cassette capacity) at the main fiber distribution rack.

6. Fiber Cabling – OS2 Singlemode

.1 All OS2 Singlemode fiber optic cabling will be tight buffered distribution type cabling and shall be provided in twenty-four (24) fiber units. Refer to CCH drawing T208 fiber connectivity schematic between equipment racks.

.2 Provide a minimum of 3 meters of slack at one end only (Note: Not at the main fiber distribution rack(s)). This is in addition to the slack loop that allows for the movement of the server cabinet on the ISO-Base.

.3 Provide LC single mode pigtails and fusion splice to the single mode cable.

.4 Provide twelve (12) port (24F) splice cassettes (equal to or better than Belden FCSH12LDFS) for single mode fusion splicing in 4U fiber panels (minimum 72F capacity for single mode) and 1U high density fiber panels. Provide 1U high density fiber panels where applicable. Refer to CCH drawing T208 for exact requirements.

.5 Provide multiples of 12 x LC duplex to LC duplex (24F) splice cassettes.

.6 The maximum connector IL (insertion loss) for the LC connector performance will be 0.25 Db.

.7 Single mode tie cable between the DAS racks (R12.4) and Campus Fiber Racks and Authority Rack in the EF need to be terminated in SC/APC connectors. Refer to the DAS

Section of the Statement of Requirements for further details and requirements as it relates to the termination of this fiber.

7. Copper UTP Backbone

.1 All copper UTP backbone and tie cabling between equipment racks and GigaBIX termination walls will be Category 3 UTP cable terminated on Belden GigaBIX mounts and Category 6 UTP HD patch panels (VP1, VP2) where identified on CCH drawing T214.

.2 Run 100 pair Category 3 backbone cable from the EF room GigaBIX termination wall to the CCH GigaBIX termination wall.

.3 For each typical Telecommunications Room in the Facility run a 50 pair Category 3 backbone cable from each TR GigaBIX termination wall to the CCH GigaBIX termination wall.

.4 For each typical TR in the Facility, run 2 x 25 pair Category 3 tie cables from the GigaBIX termination wall to the equipment rack (Category 6 UTP HD patch panel). Refer to Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications] for further details.

.5 Run 2 x 25 pair Category 3 tie cables from Telecom Rack R9.8 (terminated on Cat6 HD Patch panels) in CCH room to the CCH GigaBIX termination wall.

.6 Run 2 x 25 pair Category 3 tie cables from the TR rack R11.1 (terminated on Cat6 HD Patch panels) in CCH room to the CCH GigaBIX termination wall.

8. Patchcords

.1 Provide the following fiber optic patch cords for the CCH:

- .1 Provide two (2) 3 mm duplex fiber optic patch cords for each pair of backbone and trunk cabling terminated inside the CCH in Phase 1. Note: allow for 10% 7.62 m (25') length cords; 15% 6.0 m (20') length cords; 25% 4.57 m (15') length cords; 25% 3.0 m (10') length cords; 25% 2.0 m (6') length cords;
- .2 Fiber patch cords will be bend insensitive.
- .3 Fiber patch cords will match the cable plant connectivity. Example is SC APC to match the DAS Singlemode product and LC duplex for the remainder.
- .4 Equal or better than the fiber plant quality and specifications.
- .5 During the shop drawing approval phase the Authority will determine the exact breakdown of patch cord lengths required.

.2 Provide the following copper Category 6A patch cords for the CCH:

- .1 Provide two (2) Category 6A patch cords for each Category 6A horizontal cable terminated inside the CCH in Phase 1. Note: allow for 80% 3.0 m (10') length cords; 10% 2.0 m (6') length cords; 10% 0.91 m (3') length cords;
- .2 Category 6A patch cords will be 28 AWG stranded with an outer diameter less than or equal to 4.72 mm (0.186 inches).

.3 During the shop drawing approval phase the Authority will determine the exact breakdown of patch cord lengths required.

9. Labelling

.1 Each server cabinet and equipment rack shall be labeled on the front and back with its identifier. All patch panels, cables, equipment cords, and patch cords shall be properly labeled per TIA-606-B and Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

.2 Design-Builder shall allow for coordination with FHA to determine exact labelling requirements on all elements of the cabling infrastructure. Contractor will submit sample labels for approval.

10. Testing

.1 All testing will be performed on the completely installed system. Any disturbance of a termination after testing will invalidate the certification of that link and require retesting.

.2 Test results must be permanently recorded and presented in both hard copy and computer-readable format to the Authority for review. Any installation failing to meet the standards and requirements listed herein will be removed and replaced at no cost to the Authority with an installation that proves through testing to meet the standards. The installation will not be accepted until all installed cabling meets the appropriate standards and requirements.

.3 All test equipment used will have been factory calibrated (or by an approved calibration service provider). The field-test instrument will be within the calibration period as required by the manufacturer and HSSBC, (12 months).

.4 Design-Builder shall test all Category 3 and Category 6A cabling in accordance with Appendix 1I(III) [HSSBC Communications Infrastructure Standards and Specifications].

.5 Design Builder will test all Fiber optic cabling including the pre-terminated product as per:

.1 TIA-526-7, Measurement of Optical Power Loss of Installed Singlemode Fiber Cable Plant—OFSTP-7.

.2 TIA-526-14, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant—OFSTP-14.

.6 The Design-Builder shall also provide the cabling manufacturers factory test results on all pre-terminated product and include in the O&M manuals.

LEGEND

- CR — CARD READER
- L21-30R 120/208V 3PH-4W TWISTLOCK RECEPTACLE
- 6000 WIREMOLD & DATA / 5-20R RECEPT. ABOVE THE BENCH
- 4 FT LINEAR LED LIGHTING - THE LIGHT EDGE INC. CAT.# VRAP1
- 5-20RA DUPLEX RECEPTACLE
- +2133mm — 5-15R DUPLEX RECEPTACLE AND DATA 2x CAT6A HORIZONTAL OUTLET @2133MM AFF

DIV.27 CONTRACTOR TO MAKE ALLOWANCE FOR TOTALLY ENCLOSED DUCTED CABINET 915mm x 1220mm CABINETS (R9.1, R9.2 AND R13.1, R13.2. THE CABINETS NEED TO BE DUCTED WITH SUPPLY AIR AND AIR BAFFLES TO RE-DIRECT THE EXHAUST TO THE HOT AISLE. ALLOW FOR COORDINATION WITH THE AUTHORITY

PROVIDE A HOT AISLE CONTAINMENT SYSTEM FOR RACKS R9.1 TO R9.8 C/W ENTRANCE END OF HOT AISLE

IN ADDITION TO THE OUTLETS IDENTIFIED ON THE PLANS; ALLOW FOR THE PROVISION OF THE FOLLOWING POWER OUTLETS ABOVE THE 14 CARRIER RACKS: 14 x L5-20R AND 14 x L6-30R TWISTLOCK RECEPTACLES. EXACT LOCATION TO BE CONFIRMED PRIOR TO CONSTRUCTION.

"B" SIDE UPS DISTRIBUTION "A" SIDE UPS DISTRIBUTION
4 x42CCT 120/208V 600A BREAKER PANELS

"B" SIDE UPS DISTRIBUTION "A" SIDE UPS DISTRIBUTION
4 x42CCT 120/208V 600A BREAKER PANELS

"B" SIDE UPS DISTRIBUTION
4 x42CCT 120/208V 600A BREAKER PANELS

"B" SIDE UPS DISTRIBUTION "A" SIDE UPS DISTRIBUTION
4 x42CCT 120/208V 600A BREAKER PANELS

1 x42CCT 120/208V BREAKER PANEL GENERATOR DISTRIBUTION

GAS SUPPRESSION SYSTEM TANKS

CCH ROOM #: RMT-05A

EF ROOM #: RMT-05B

CATV TERM SPACE | CWA/FIBER SPACE | GENERATOR

R1.1 IS AN AUTHORITY RACK PROVIDED IN PHASE 1) FOR TIE CABLING TO THE CCH ROOM
THE REMAINING (14) RACKS ARE PROVIDED BY THE CARRIERS

GIGABIX TERMINATION WALL SPACE

HOT AISLE | COLD AISLE | HOT AISLE | COLD AISLE

ENTRANCE DUCTS

FRONT OF RACKS

PROVIDE A HOT AISLE CONTAINMENT SYSTEM FOR RACKS R13.1 TO R13.8 C/W ENTRANCE TO THE HOT AISLE AT BOTH ENDS

ENTRANCE DUCTS
PRIMARY RISERS

PODS B,C & D ARE IN PHASE 2/3

8753

610MM LOCKABLE SHELVING ABOVE THE WORK BENCH @ 1500MM AFF

TECH ROOM

T-BAR CELING @ 3352MM AFF

CARD READER FOR SLIDING-DOORS

CO-LO CAGE SLIDING-DOOR | CAGE STORAGE | CO-LO CAGE SLIDING-DOOR

INDUSTRIAL 2133mm HIGH ADJUSTABLE BULK STORAGE RACKS
2150LBS min. Shelf Capacity

THREE SHELVES 1830mm W x 812mm D | BOTTOM OPEN FOR PALLET, UPPER (2) SHELVES ONLY 1524mm W x 812mm D | THREE SHELVES 1830mm W x 812mm D | BOTTOM OPEN FOR PALLET, UPPER (2) SHELVES ONLY 1524mm W x 812mm D | THREE SHELVES 1830mm W x 812mm D

VESDA PANEL
SUPPRESSION PANEL

GAS SUPPRESSION SYSTEM TANKS

CCH & MER GIGABIX TERM.

DIVERSE RISERS

PROVIDE A HOT AISLE CONTAINMENT SYSTEM FOR RACKS R12.1 TO R12.6 C/W ENTRANCE END OF HOT AISLE

PROVIDE A HOT AISLE CONTAINMENT SYSTEM FOR RACKS R11.1 TO R11.5 C/W ENTRANCE END OF HOT AISLE

PROVIDE A HOT AISLE CONTAINMENT SYSTEM FOR RACKS R10.1 TO R10.3 C/W ENTRANCE END OF HOT AISLE

CONTRACTOR TO ALLOW FOR TWENTY-FOUR (24) COMMUNICATION WALL OUTLETS, EACH WITH 2 x CAT6A CHANNEL LINKS THROUGHOUT THE CCH AND ENTRANCE FACILITY. EXACT LOCATIONS TO BE DETERMINED BY THE AUTHORITY PRIOR TO CONSTRUCTION.

EL: 31800

NOTE: ALL THIS IS IN PHASE 2 WORK

T201- EQUIPMENT LAYOUT PLAN VIEW — **LEVEL ROOF** — 1 : 50

N

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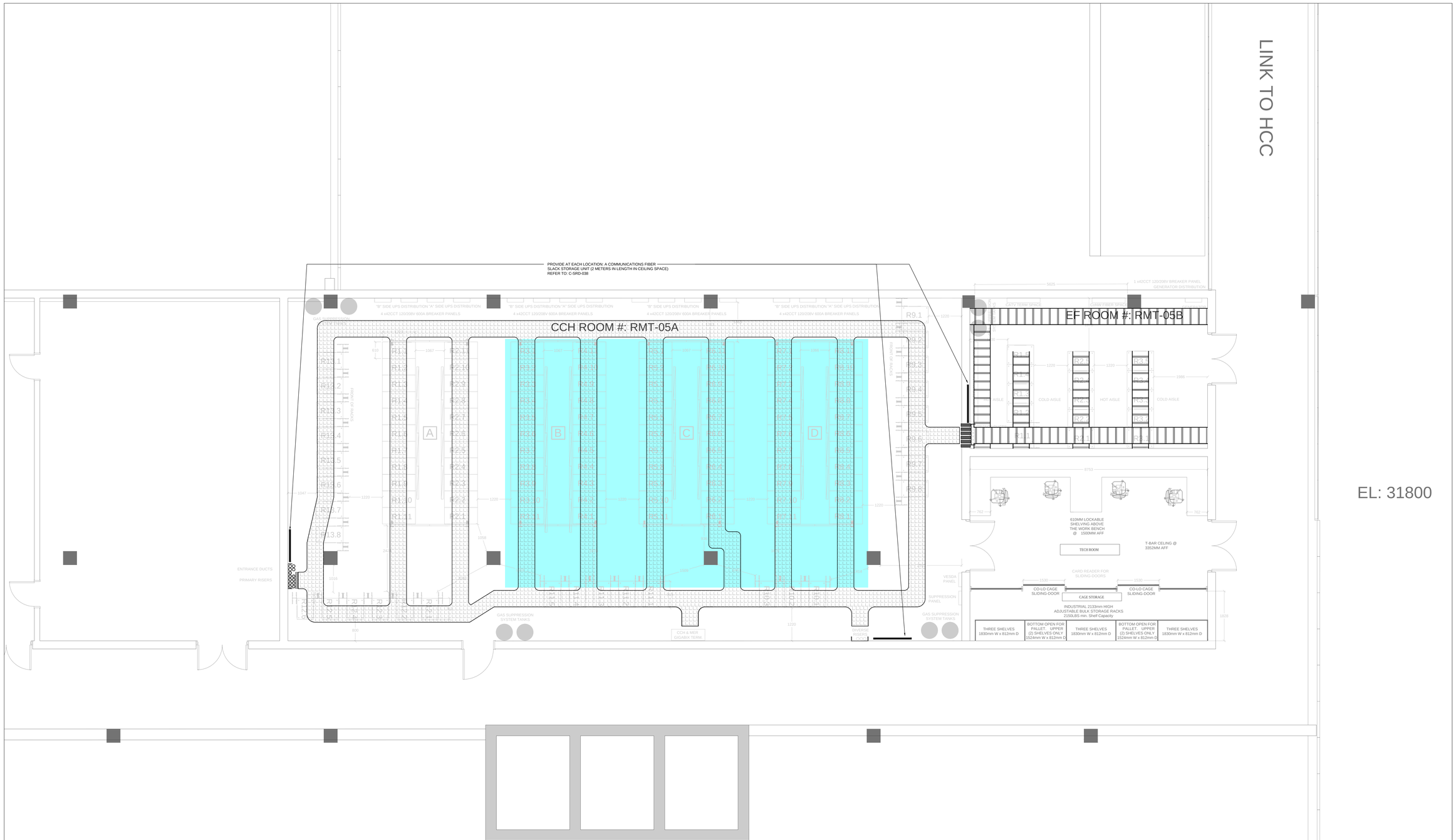
Issued - May, 2016



NOTE: ALL THIS IS IN PHASE 2 WORK

ALL OTHER WORK IS PHASE 1

T202 - COPPER BASKET CABLE TRAY PLAN

LEVEL ROOF

1 : 50

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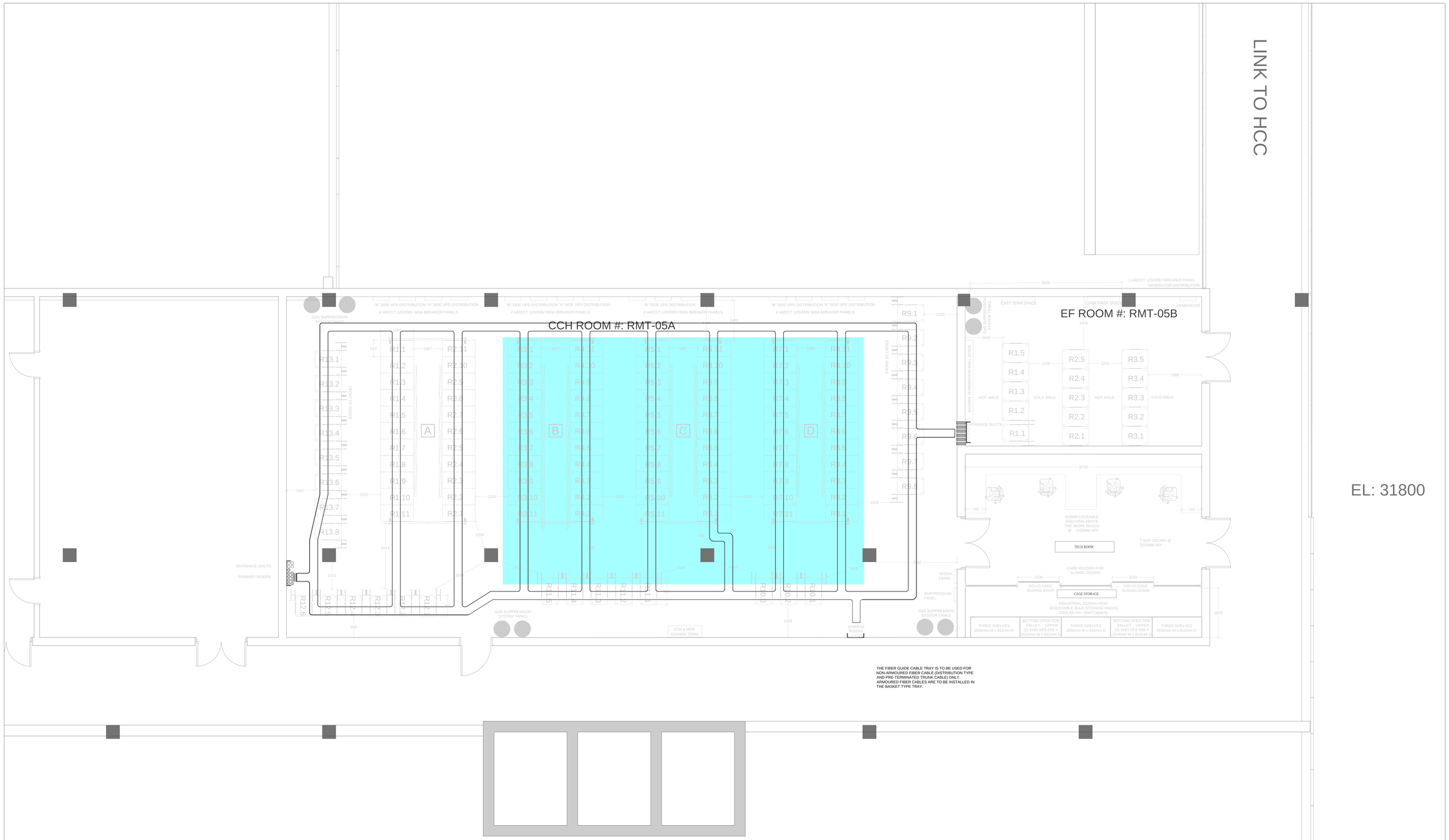

NOTE: ALL THIS IS IN PHASE 2 WORK

ALL OTHER WORK IS PHASE 1

T203 - FIBERGUIDE CABLE TRAY PLAN

LEVEL ROOF

1 : 50

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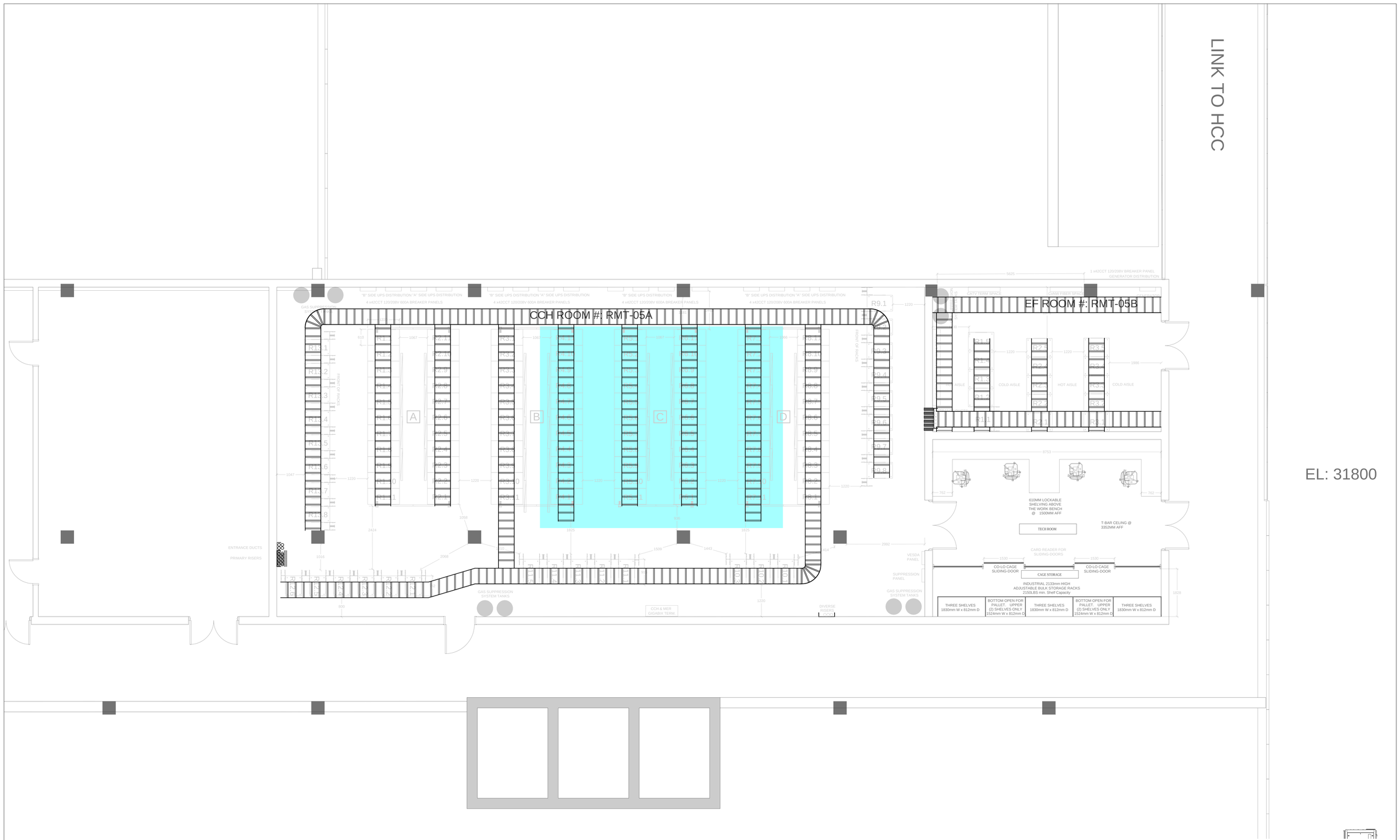

NOTE: ALL THIS IS IN PHASE 2 WORK

ALL OTHER WORK IS PHASE 1

T204 - ELECTRICAL LADDER CABLE TRAY PLAN **LEVEL ROOF** 1 : 50

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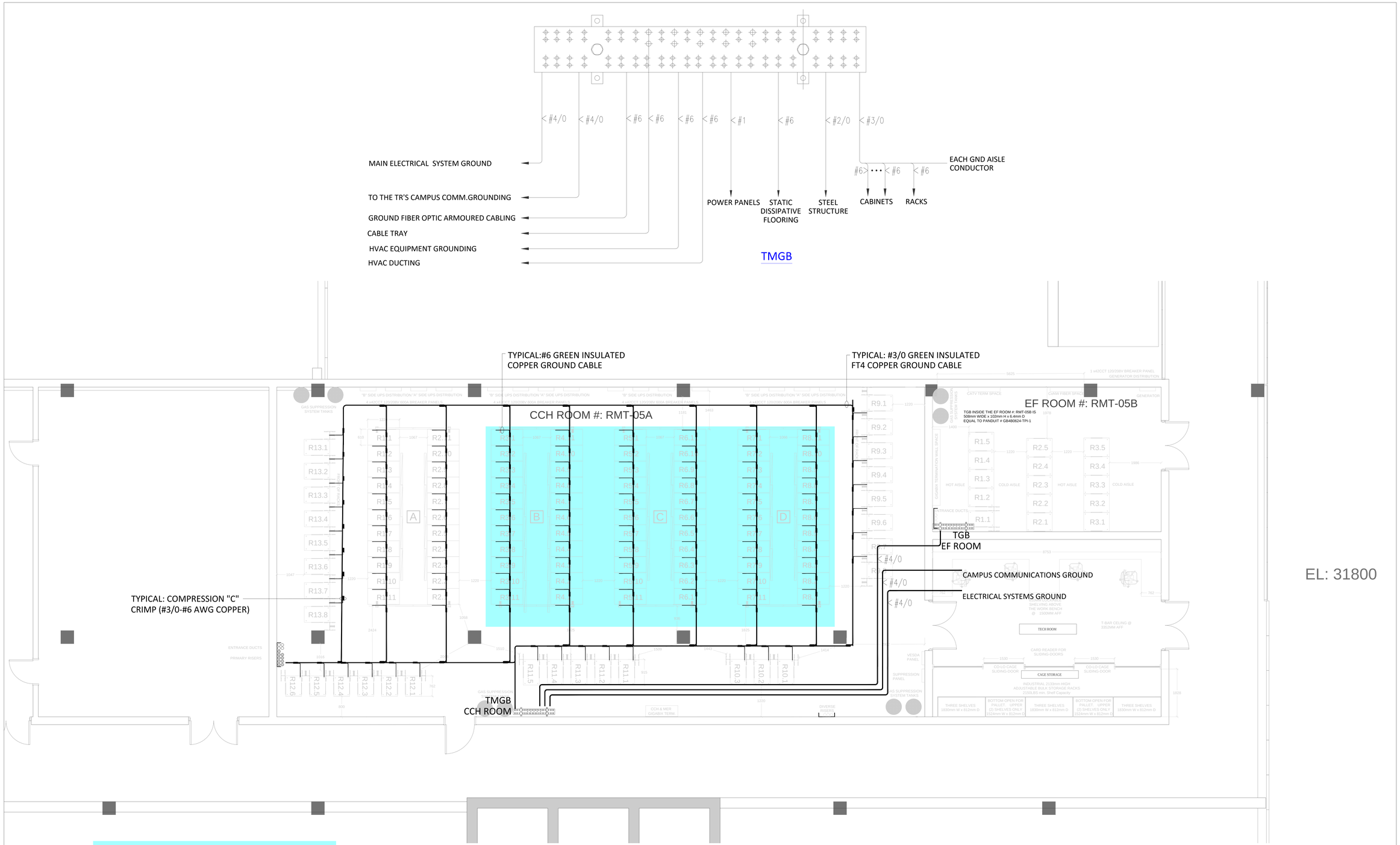

NOTE: ALL THIS IS IN PHASE 2 WORK

ALL OTHER WORK IS PHASE 1

T205 - SERVER CABINET AND RACK GROUNDING LAYOUT

LEVEL ROOF

1 : 50

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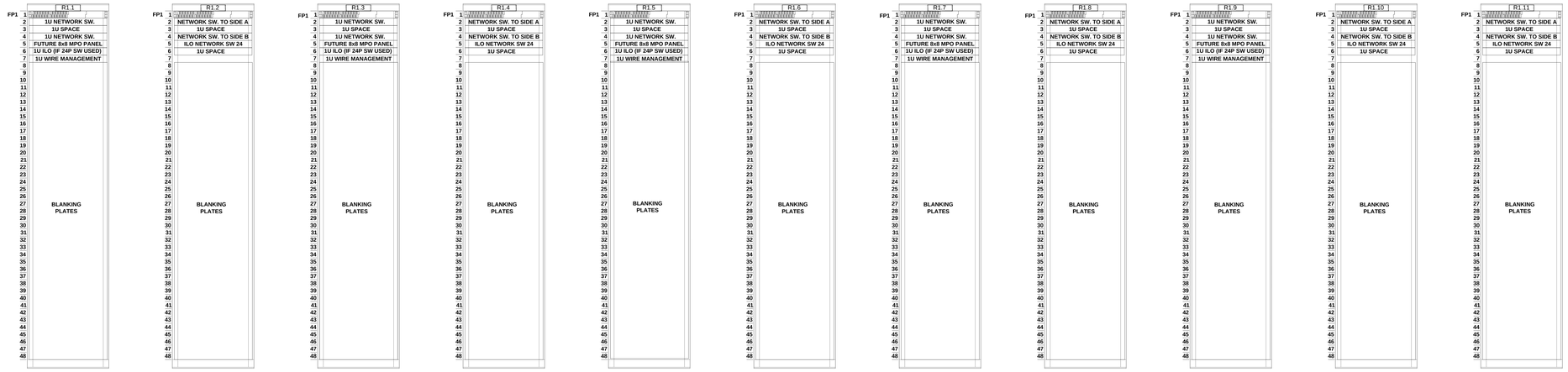
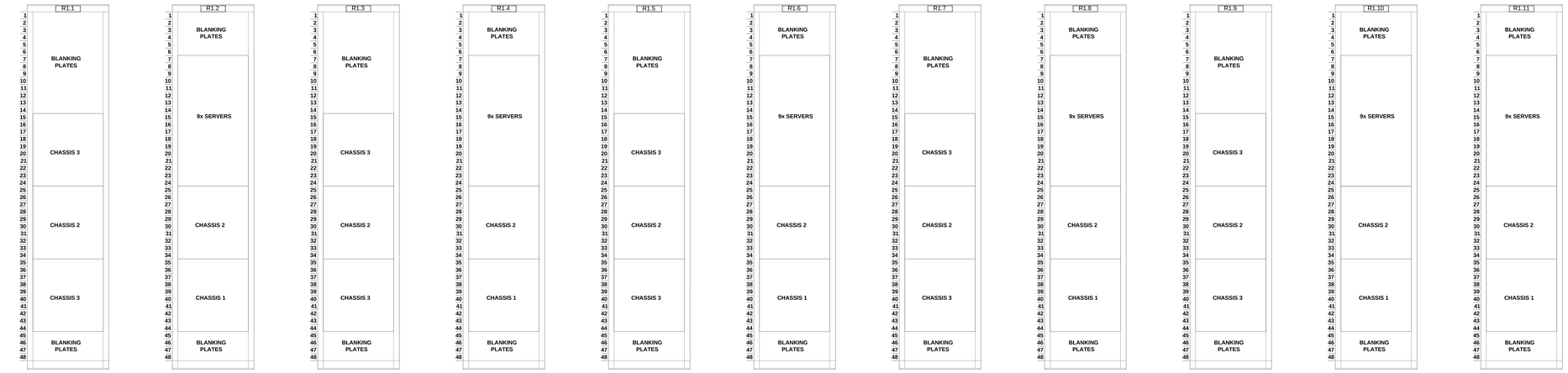
POD A R1.1 - R1-11 REAR



SERVER CAB R1.1 REAR | SERVER CAB R1.2 REAR | SERVER CAB R1.3 REAR | SERVER CAB R1.4 REAR | SERVER CAB R1.5 REAR | SERVER CAB R1.6 REAR | SERVER CAB R1.7 REAR | SERVER CAB R1.8 REAR | SERVER CAB R1.9 REAR | SERVER CAB R1.10 REAR | SERVER CAB R1.11 REAR

POD A



SERVER CAB R1.1 FRONT | SERVER CAB R1.2 FRONT | SERVER CAB R1.3 FRONT | SERVER CAB R1.4 FRONT | SERVER CAB R1.5 FRONT | SERVER CAB R1.6 FRONT | SERVER CAB R1.7 FRONT | SERVER CAB R1.8 FRONT | SERVER CAB R1.9 FRONT | SERVER CAB R1.10 FRONT | SERVER CAB R1.11 FRONT

POD A R1.1 - R1-11 FRONT

T206 - ELEVATION POD A R1.1 TO R1.11

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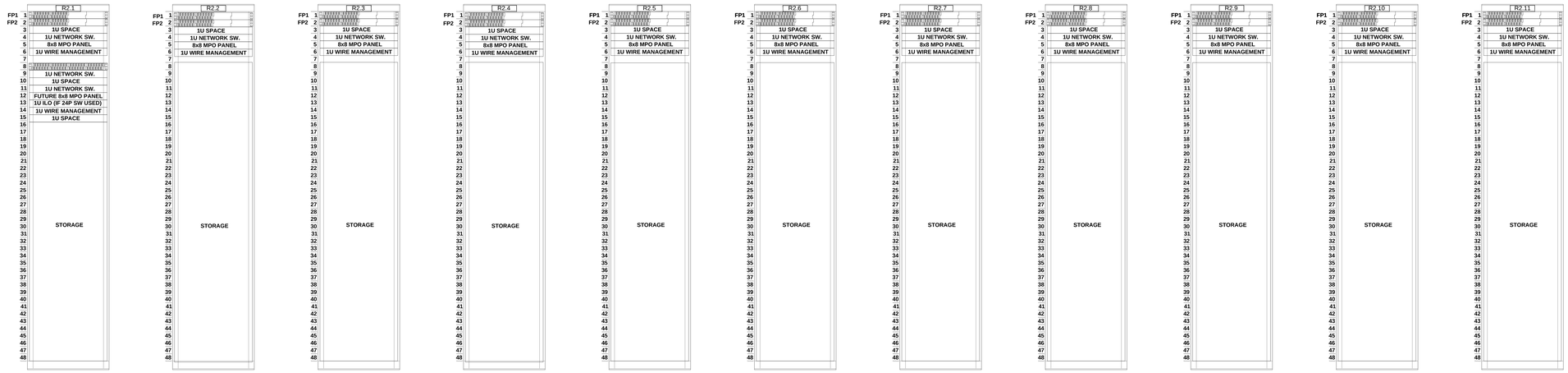
POD A R2.1 - R2-11 REAR



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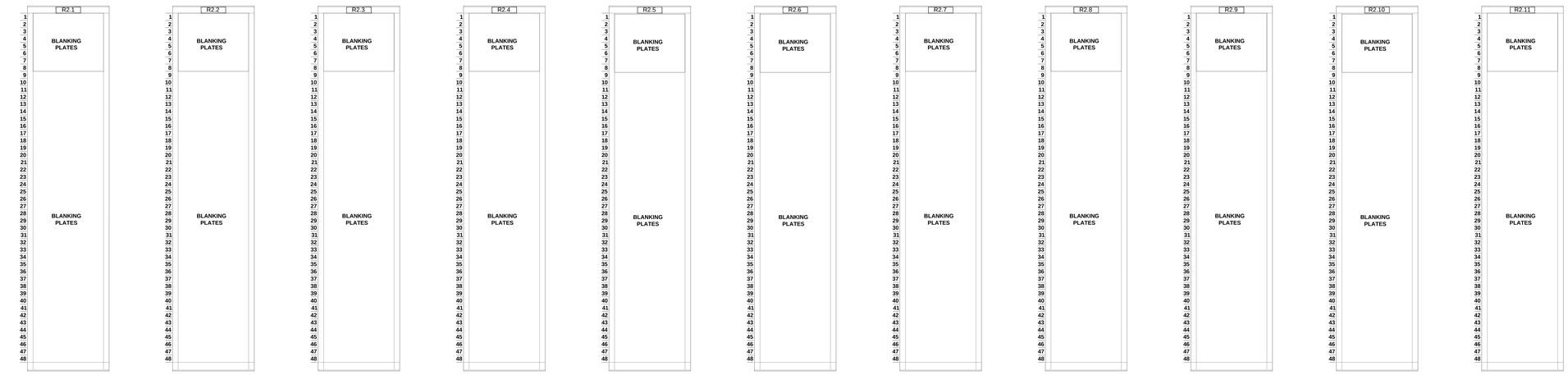
POD A



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POD A R2.1 - R2-11 FRONT

T207 - ELEVATION POD A R2.1 TO R2.11

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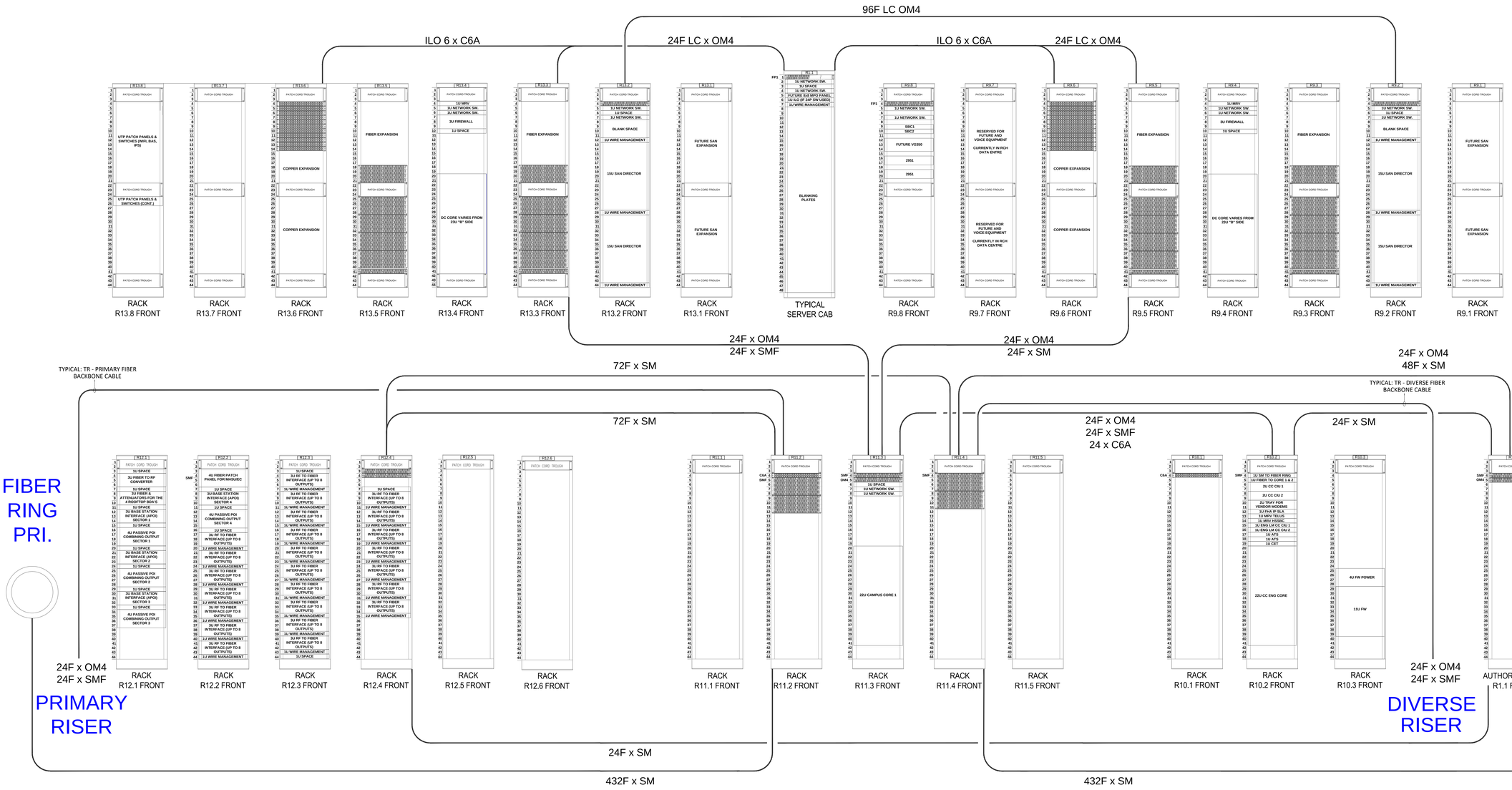
STORAGE RACKS
SIDE B

DATA CENTRE RACKS
SIDE A



DAS RACKS

CAMPUS FIBER RACKS
CORE 1

ENG RACKS

ENTRANCE FACILITY

T208 - FIBER & COPPER CONNECIVITY

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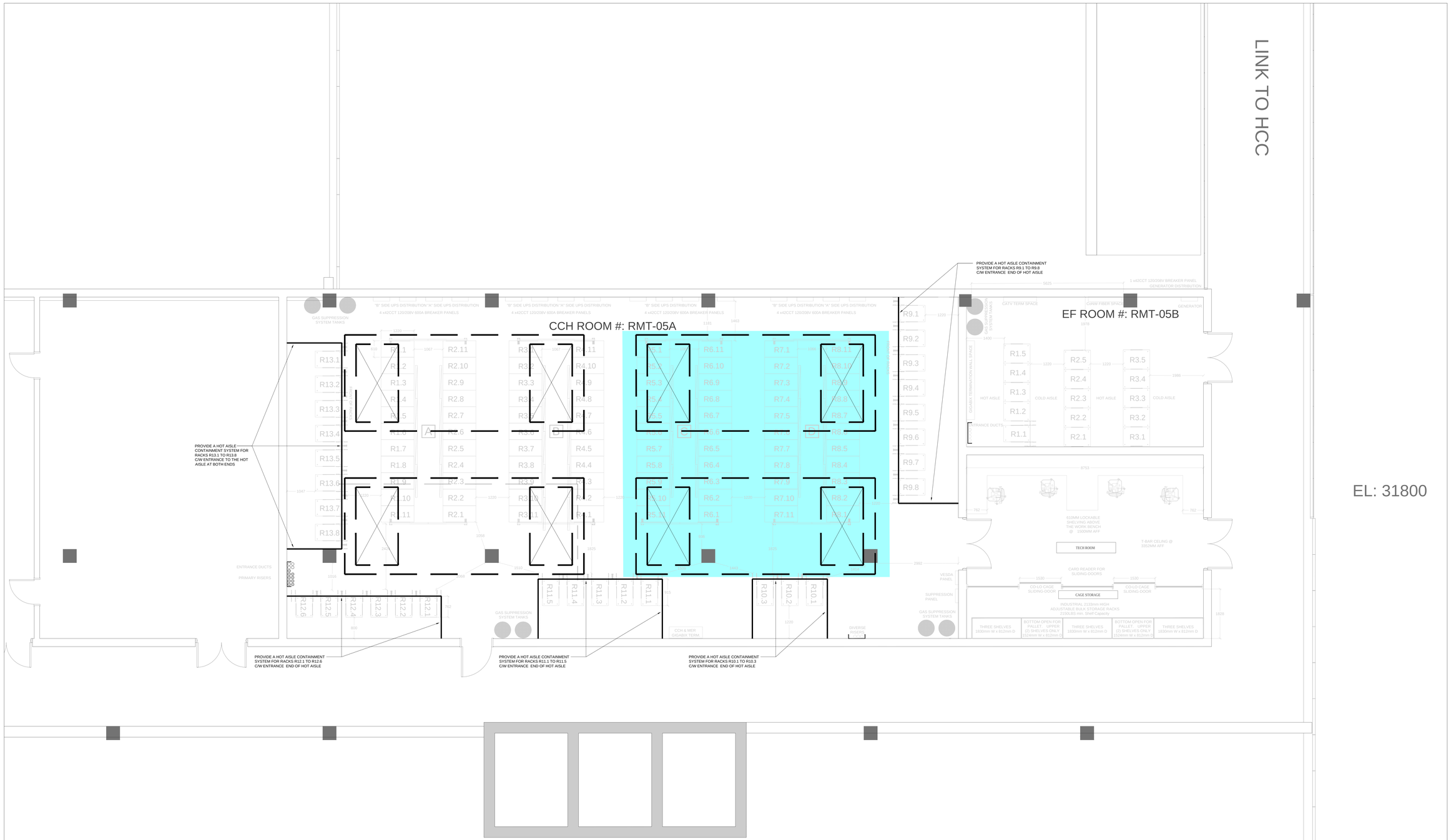

NOTE: ALL THIS IS IN PHASE 2 WORK

NOTE: ALL DUCTING AND MECHANICAL SUPPLY DUCTING AND RETURN AIR GRILLS ARE IN PHASE 1
INCLUDES ALL ELECTRICAL AND WATER LINES FOR ALL MECHANICAL EQUIPMENT

T209 - MECHANICAL

LEVEL ROOF

1 : 50

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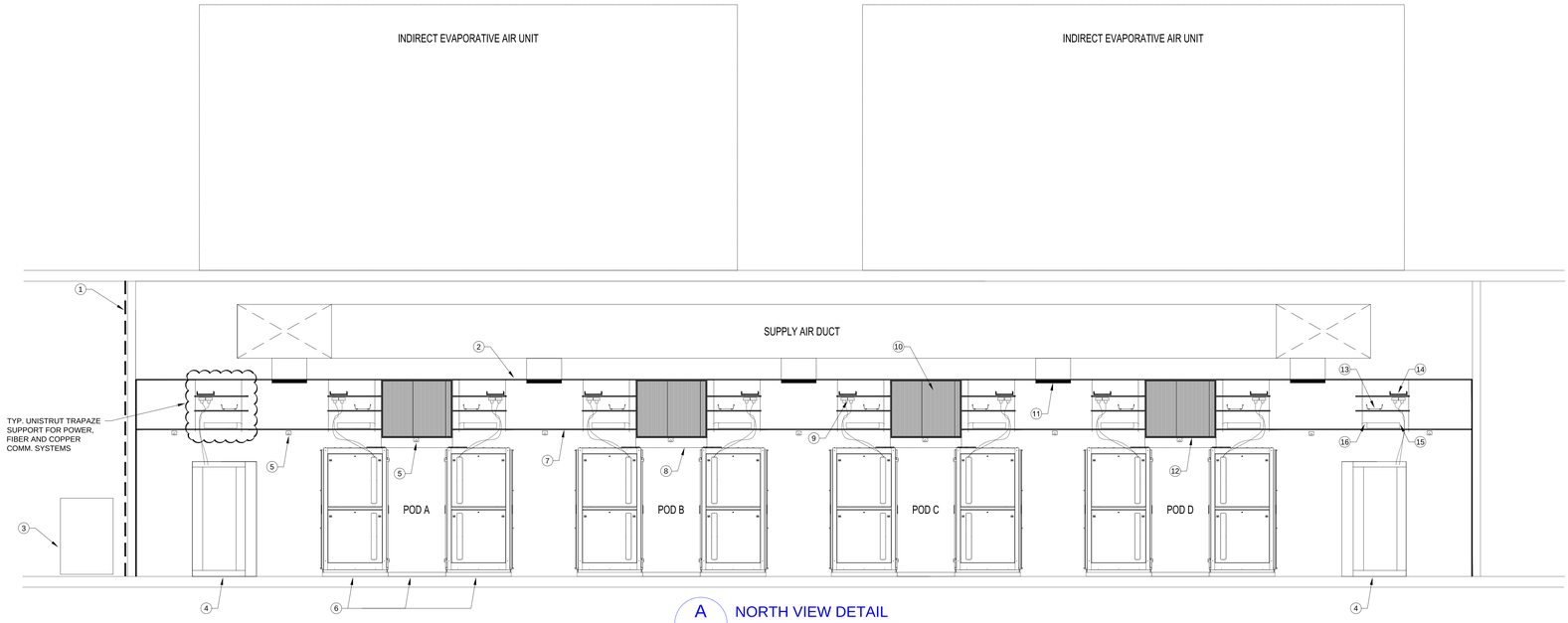
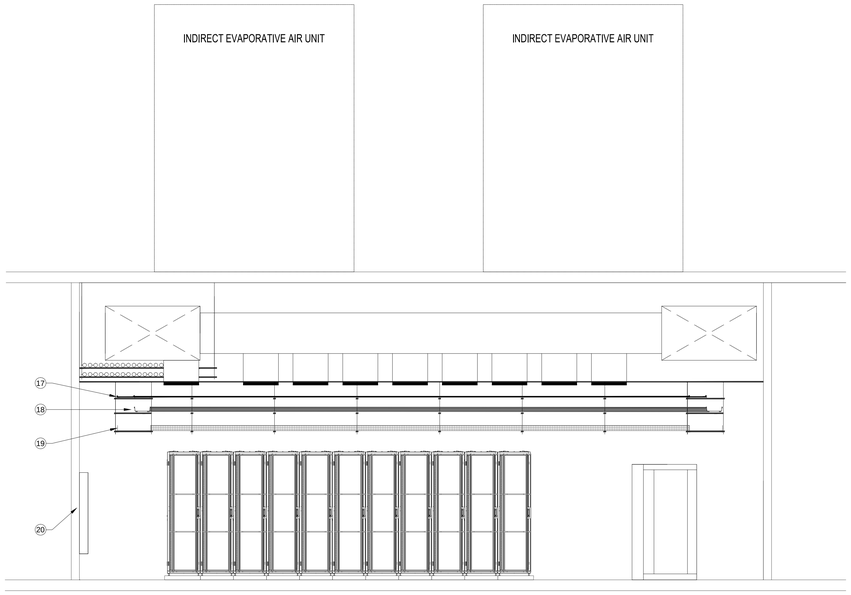


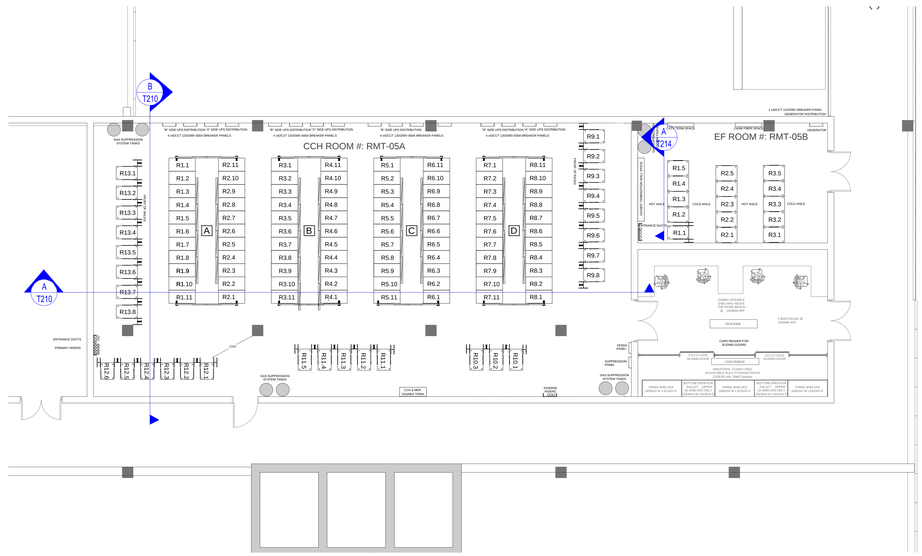
A T210 NORTH VIEW DETAIL
SCALE: 1:50

DRAWING T210 REFERENCE NOTES:

1. LINE THE ENTIRE WEST WALL OF THE CCH (ELECTRICAL ROOM SIDE) FLOOR TO CEILING
2. GORDON GRID CEILING SYSTEM
3. ELECTRICAL DISTRIBUTION TRANSFORMERS
4. 4 POST RACK
5. TYP. LED LINEAR LIGHTING
6. ISO-BASE
7. UNISTRUT MOUNTED BETWEEN TRAPAZE UNITS TO SUPPORT LIGHTING AT THIS ELEVATION
8. TYP. OUTLINE OF 150MM BRUSH FASTENED TO UNDERSIDE OF POLARGY CONTAINMENT SYSTEM
9. TYP. 102MM SQUARE DEEP BOXES C/W L21-30R TWISTLOCK RECEPTACLES. FACING DOWN. TWO PER RACK AND/OR CABINET (A & B SIDE DISTRIBUTION). EPDU'S PLUGGED IN. CABLE IS 4C #10AWG COPPER TECK CABLE
10. POLARGY HOT AISLE CONTAINMENT SYSTEM
11. TYP. SUPPLY AIR GRILLS
12. UNISTRUT MOUNTED AT BOTTOM OF POLARGY UNIT TO SUPPORT LED LINEAR LIGHTING
13. TYP. FIBER RUNNER CABLE TRAY SYSTEM
14. TYP. CABLE RUNNER FOR BRANCH CIRCUIT POWER. (TECK CABLES)
15. TYP. 610MM X 102MM BASKET TYPE CABLE TRAY
16. TYP. CABLE TRAY DROP OUT FITTING
17. CABLE RUNNER FOR POWER
18. FIBER RUNNER TRAY
19. COPPER BASKET TRAY
20. 120/208V 3PH 4W 600A 42 CCT PANEL



B T210 EAST VIEW DETAIL
SCALE: 1:50



AS SHOWN

N

T210 - ELEVATIONS

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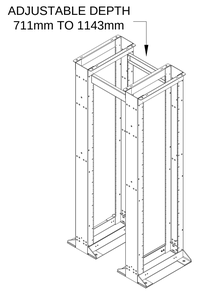
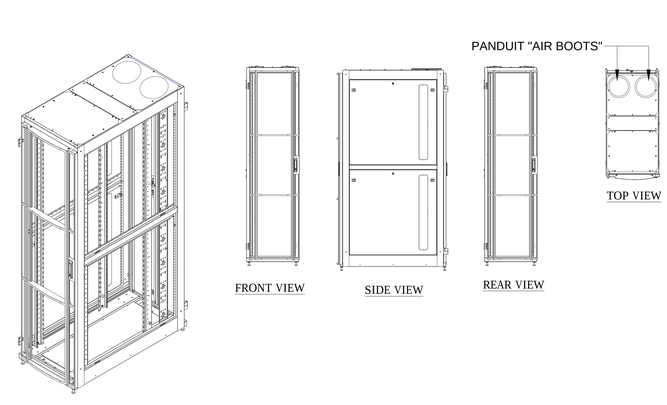


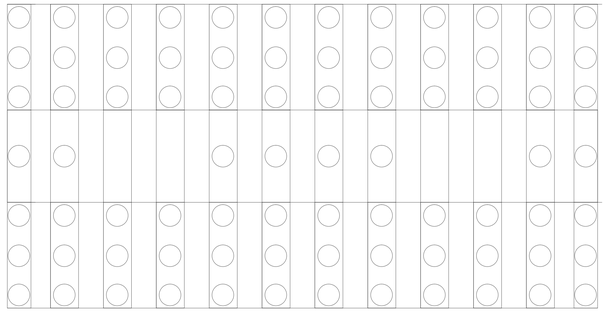
A T211 — 4-POST ZONE 4 RELAY RACK

N.T.S.



B T211 — SERVER CABINET DETAILS

N.T.S.



C T211 — EXAMPLE OF POD ISO-BASE PLATFORM

N.T.S.

T211 - ELEVATIONS & DETAILS

N.T.S.

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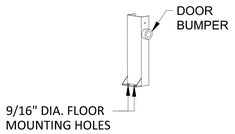
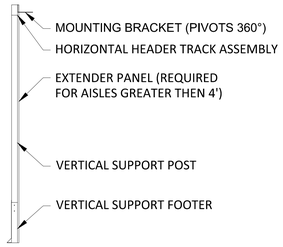
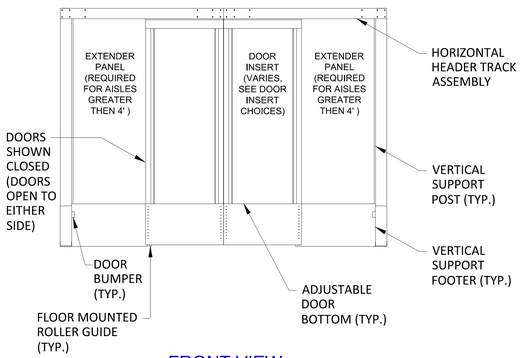


VERTICAL SUPPORT
FOOTER DETAIL

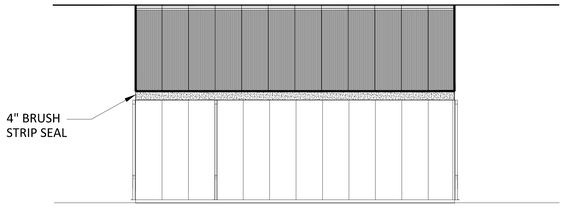


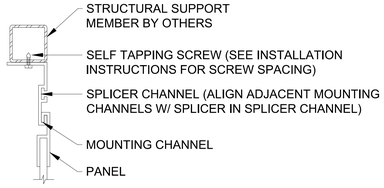
SIDE VIEW

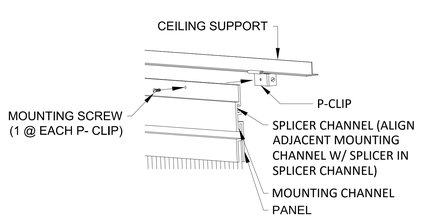
TOP VIEW



FRONT VIEW







FLAT WALL MOUNT TO
T-BAR MOUNTING DETAIL

FRONT VIEW

RIGHT
SIDE VIEW

T212 - HOT AISLE CONTAINMENT DETAILS

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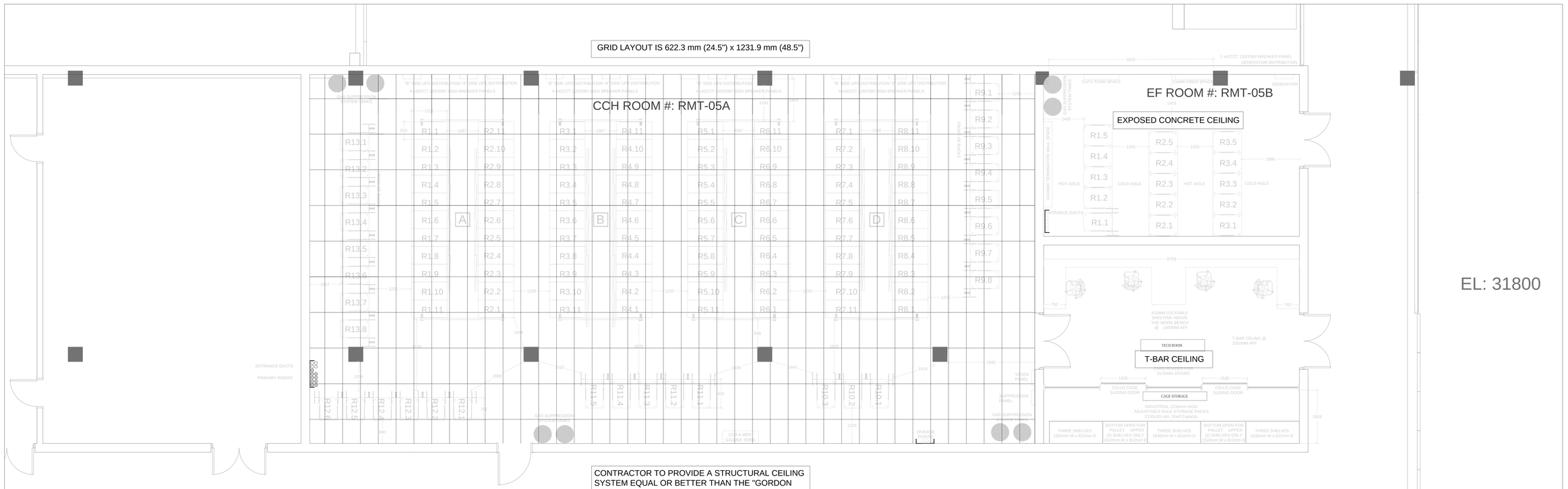
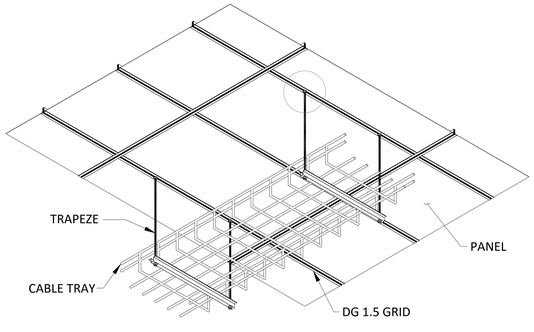
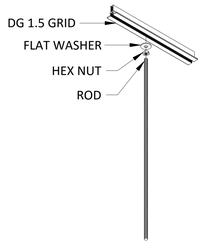
GRID LAYOUT IS 622.3 mm (24.5") x 1231.9 mm (48.5")

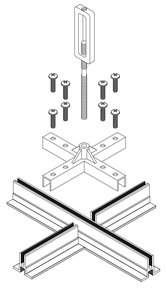


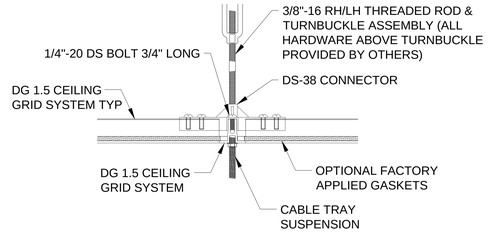
EL: 31800

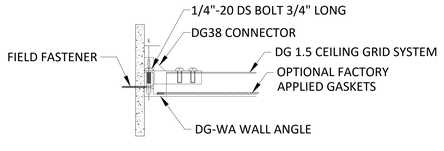
CONTRACTOR TO PROVIDE A STRUCTURAL CEILING SYSTEM EQUAL OR BETTER THAN THE "GORDON GRID" CEILING SYSTEM DESCRIBED IN THE SCHEDULE 1 STATEMENT OF REQUIREMENTS AND ITS APPENDICES

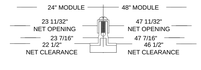












FIXTURES DIMENSIONS ARE TYPICALLY MODULE SIZE LESS 7/8" (MAXIMUM O.D.)

THE STRUCTURAL SUPPORT CEILING SYSTEM DEPICTED IS A GORDON GRID CEILING SYSTEM

NOTE: ALL THIS IS IN PHASE 1 WORK

T213 - CEILING INFRASTRUCTURE & CROSS-SECTION PLAN **LEVEL ROOF**

1 : 50

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fraserhealth

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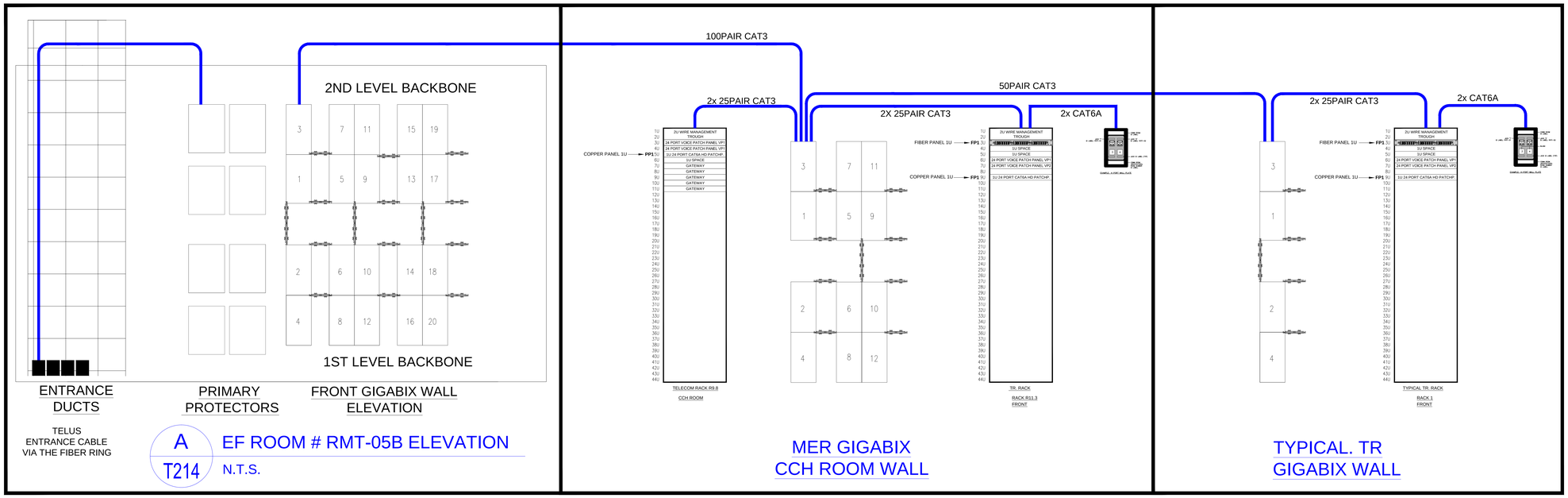
Issued - May, 2016



T214 - COPPER CAT 3 SCHEMATIC

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APPENDIX 1B(III)

CAMPUS PERIMETER PATHWAY SYSTEM TECHNICAL SPECIFICATIONS

Table of Contents

PART 1. GENERAL

1. System Overview

.1 The Campus Perimeter Pathway System (CPPS) will:

.1 Provide the distribution system around the Royal Columbian Hospital (RCH) campus for all inter-building fiber and copper cabling systems.

.2 Connect to TELUS and City of New Westminster structures to enable cabling infrastructure and telecommunications services from third parties to be brought into and distributed throughout the RCH campus.

.2 The Campus Perimeter Pathway System shall be designed and installed to enable the Authority to deploy a physical fiber optic ring typology around the perimeter of the RCH campus that will connect to new and existing buildings.

.3 Design-Builder shall construct the Campus Perimeter Pathway System for the Authority. The design and alignment shall be approved by the Authority and the City of New Westminster.

.4 The Authority's Campus Perimeter Pathway System is to be concrete encased and jointly installed with the City of New Westminster's electrical duct system in the same trench.

.1 It is the Design-Builder's responsibility to coordinate and work with the City of New Westminster to meet the Authority's requirements.

.2 The Design-Builder shall be required to sign a Works and Services Agreement with the City of New Westminster,

.5 The Authority shall be responsible for securing the Municipal Access Agreement with the City of New Westminster to install its duct and manholes on public property.

.6 The Authority shall be responsible for securing the necessary agreements and permits from TELUS to connect to their structures.

.7 The Authority shall be responsible for the installation, splicing, termination and testing of all inter-building fiber optic and copper cabling.

.8 The Campus Perimeter Pathway System shall be completed a year in advance of the Substantial Completion date of the Facility. This completion timeframe is needed to provide sufficient time for the Authority and other third parties to install and commission the outside plant fiber and copper facilities that will connect the Campus Communications Hub (CCH) to the rest of the RCH campus and to the Authority's regional healthcare network. Refer to the Schedule 1, Statement of Requirements, Section 2.11.12 for further details.

2. Related Documents and Sections

.1 The Campus Perimeter Pathway System will be designed and constructed in accordance with the drawings and written specifications contained herein and in the following related documents:

.1 Schedule 1 – Statement of Requirements

.2 Appendix 1B(II) – Campus Communications Hub Technical Specifications

.3 Campus Perimeter Pathway System (CPPS) Drawings which includes:

- 15-0575-KP Key Plan
- 15-0575-TS1 Typical Sections
- 15-0575-F1-1 Keary Street – West
- 15-0575-F1-2 Keary Street – East
- 15-0575-F2-1 East Columbia Street - South
- 15-0575-F2-2 East Columbia Street - North
- 15-0575-F3-1 Sherbrooke Street – East
- 15-0575-F3-2 Sherbrooke Street – East
- 15-0575-F4-1 Lane - South
- 15-0575-F4-2 Lane - North

3. Applicable Standards and References

.1 All materials supplied and construction performed shall be in accordance with the City of New Westminster Bylaw No. 7142, the latest edition of Worksafe B.C., the latest edition of the Master Municipal Contract Documents (MMCD), the current edition of the City of New Westminster supplementary specifications, City of New Westminster Specifications for Underground Electric Distribution Structures and applicable design criteria specifications and standard drawings and construction specifications and shall be carried out under their inspection.

.2 All materials supplied and construction performed shall be in accordance with the latest edition of the Canadian Electrical Code.

.3 Other standards applicable to the design and construction of the Campus Perimeter Pathway System are:

- BICSI Outside Plant Design Reference Manual, Current Edition.
- ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
- BICSI Telecommunications Distribution Methods Manual, Current Edition (Volume 1 and 2)
- ANSI/TIA-758-B, Customer Owned Outside Plant Telecommunications Infrastructure Standard,
- ANSI/TIA-568.1-D, Commercial Building Telecommunications Infrastructure Standard
- ANSI/TIA-569-D, Telecommunications Pathways and Spaces
- ANSI/TIA-606-B, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- ANSI/TIA-607-B, B-1 and B-2 Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
- ANSI/TIA-942-A, Telecommunications Infrastructure Standard for Data Centers
- ANSI/TIA-1179, Healthcare Facility Telecommunications Infrastructure Standards.
- CSA 22.1, Safety Standard for Electrical Installations
- CSA 22.2, Canadian Electrical Code, General Requirements
- CSA 22.3, Canadian Electrical Code Outside Wiring
- CSA A-22.4, Precast Concrete Materials and Construction Standard
- CSA A-23.3, The Design of Plain or Reinforced Concrete Structures

.4 In the event there is a conflict between the standards identified in this Section and the Statement of Requirements and it associated appendices, the more stringent standard or requirement will apply.

4. Quality Assurance

.1 All installation work for the Campus Perimeter Pathway System shall be performed in a neat and workmanlike manner.

.2 Equipment and materials shall be of the quality and manufacture indicated. Any material substitution and or change in design must obtain written approval from the Authority prior to the commencement of construction

.3 Any change and or revision to the approved Issued for Construction (IFC) permit drawings must be approved by the Authority. The City of New Westminster shall be notified of any substitution and/or change in design. Any change in design will require a drawing revision.

.4 The Authority shall inspect the installation in progress. It is the responsibility of the Design-Builder to schedule regular and milestone inspection times with the Authority's designated Inspector. It is incumbent upon the Design-Builder to verify that the installation and material used has been inspected before it is enclosed within building features, buried, or otherwise hidden from view. The Design-Builder shall bear costs associated with uncovering or exposing installations or features that have not been inspected.

.1 All work shall pass the inspection of the engineering department of the City of New Westminster and the Authority.

.2 The Authority shall have the right to reject any work that is not in compliance or defective in any manner.

.3 The right to inspect at any stage during the construction is reserved by the Authority. Structures or construction which do not conform to the specifications or are rejected because of substandard workmanship will be replaced at the expense of the Design-Builder.

.4 Failure to inspect and accept or reject the work shall not relieve the Design-Builder from the obligation of furnishing satisfactory material and work.

.5 Should defects be discovered through the course of inspection, the Design-Builder shall be liable for the replacement and remediation of all defects.

.5 Video scoping

.1 If a duct fails the mandrel test, the Authority will direct the Design-Builder to inspect by video scoping any or all of the sections that are deficient. The cost of the video scoping is to be borne by the Design-Builder.

.2 The full cost of additional video scoping to verify that proper remedial action has been taken will be by the Design-Builder.

.6 All material testing must be done in accordance with the MMCD; testing to be carried out by qualified material testing firm and paid for by the Design-Builder. The Design-Builder is to provide copies of all test results to the Authority.

5. Submittals and As-Builds

.1 Quality Assurance and Control Submittals

.1 Provide submittal information for review before materials are ordered and construction commences. These submittals include:

.1 Manhole specifications

.2 Duct specifications
.3 Duct spacer specifications
.4 Rebar specifications
.5 Warning tape specifications
.6 Sieve analysis for granular materials

.2 Provide the following submittals during construction:

.1 Concrete test results
.2 Compaction test results
.3 Asphalt test results

.3 Provide standard manufacturer's cut sheets and the operating and maintenance (O&M) instructions at the time of submittal review for each device in the system, regardless of whether it is submitted as specified or as an approved equal. These instructions shall detail how to install and service the equipment and shall include information necessary for rough-in and preparation of the building facilities to receive the materials.

.2 Maintain at the job site a minimum of one set of Record Drawings, Specification, and Addenda. Record Drawings shall consist of redline markups of drawings, specifications and spreadsheets, including manhole butterfly drawings.

.1 Document changes to the system from that originally shown on the IFC permit documents and clearly identify system component labels and identifiers on Record Drawings.

.2 Keep Record Drawings at the job site and make available to the Authority at any time.

.3 Keep Record Drawings current throughout the course of construction. ("Current" is defined as not more than one week behind actual construction).

.4 Show identifiers for major infrastructure components on Record Drawings.

.3 Closeout Submittals and As-Builds

.1 At the completion of the project, submit information from product data submittals (above), updated to reflect any changes during the course of construction, to the Authority in a telecommunications-specific Operations and Maintenance (O&M) Manual.

.1 O&M Manual will be in a suitably labelled, hard back, D-Ring type commercial binders each complete with an index and tabbed title sheets for each section. All binder pages will have self-adhesive reinforcing rings at each binder ring.
.2 All O&M data will be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. Drawings will be printed on 11" x 17". Each manual will have a title sheet which is labelled "Operation & Maintenance Manual", and will list the Project name, Contractor's & Communications Consultant's names, date submitted, and a Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.
.3 Soft copy of the O&M Manual in PDF format on a separate USB Memory Key.

.2 As-Build drawings will:

.1 Identify the location and elevation of all new and existing works and underground routes encountered on the project.

.2 Identify duct lengths (measured by tape), wheeled distance from the center of manhole lid to center of next manhole lid, center of manhole lid to center of bend, center of man hole lid and center of bend to stubbed ducts.

.3 All changes to approved IFC permit drawings including but not limited to duct trench details, offset adjustments, duct window assignments and locations of stubs and bends and any other change that is different than permitted.

.3 As-Build drawings are to be provided in the latest version of AutoCAD (bind all x-Ref files) and in PDF format.

.4 Provide as many hard and digital copies of the As-Build drawings as required by the Authority Having Jurisdiction (AHJ) and one full set for the Authority.

.5 Provide three (3) USB Memory Keys of As-Build Drawings.

.4 Warranty

.1 Refer to the Design-Build Agreement for warranty requirements.

PART 2. PRODUCTS

1. Duct

.1 The number, size, raceway duct material and arrangement shall be as indicated on the CPPS drawings and or as specified herein.

.2 All main way and service ducts shall be 103mm (metric designator) (4 inch) PVC, DB2, orange in color

.3 All sweeping bends shall be factory made and be 10 times the diameter of the duct. Bends shall have a minimum 910mm radius.

.4 Provide bell ends on all duct terminations.

.5 Splice ducts with fittings approved by the conduit manufacturer for the specified applications.

.6 Spacers shall provide a 25mm (1”) separation between ducts to allow for concrete to totally encase each duct as well as allow for a 50mm encasement of the system.

.1 Spacers shall be of a type that allows for re-enforcing bar to be part of the system.

.2 Spacers shall be interlocking or strapped.

.3 Material: High density polyethylene

.7 PVC duct fittings, terminators and end caps will accommodate 103mm DB2 ducts.

.8 Place a mule tape in all ducts. Mule tape will be Greenlee 4435 or approved equal.

.9 Watertight expandable duct plugs that seals the duct against water, gas, litter and vermin shall be installed at both ends of every Service Entrance Facility duct.

2. Pre-Cast Manholes

.1 Provide manholes as specified in the CPPS drawings and as specified herein.

.2 The manholes and accessories such as risers, grade rings and lids shall be exposed to all climatic conditions and soil conditions that may exist through the Province of British Columbia. The range of temperatures the manholes will be exposed to is -40 Celsius to +40 Celsius.

.3 Manholes are to be precast concrete chamber type PLMH 2102 vaults (length 2.0m x width 1.0m x height 2.0m) or approved equivalent and shall be constructed and or placed as shown on the plans.

.1 The internal dimensions of the manhole and service vaults shall be held within plus or minus 1% of the designated dimension.

.2 The space in each joint shall be uniform to a maximum tolerance of 2mm.

.4 The manhole shall be designed to withstand a maximum cover of 1.5m measured from final grade to the outer surface of the manhole roof.

.5 The openings shall be designed to accept precast extension rings.

.6 The structural design of the manholes and their lids shall meet the following:

.1 The design shall be in accordance with the provisions of S6-1978 CSA A-23.3, The Design of Plain or Reinforced Concrete Structures, latest revision.

.2 The effect of the precast windows and knockout sections in the end walls shall be taken into account, together with all possible loads or combinations thereof.

.3 Notwithstanding paragraphs in Section 2.2.3, a design resulting from actual physical tests made by reproducing all loads required in this Specification shall be deemed acceptable, providing the cracking of test unit at service loads is limited to hairline cracks and the unit supports the equivalent ultimate test load without collapsing.

.4 Wheel loading shall be MS200 (H20).

.5 The design shall allow for a soil pressure equivalent to a fluid pressure of liquid of 800 kg/cubic meter unit mass.

.7 Knockouts shall be provided in each end wall. The remaining parallel walls are to remain free of conduit entrances as these will be allocated for cable support and splicing operations.

.8 Reinforcing bars shall not protrude into the knockouts in the end walls unless a tie bar is required at the joining section for shipping.

.9 The bottom inside edge of the circular openings in the roof shall have a minimum chamfer of 25mm at 45 degrees.

.10 The floor shall be sloped towards the sump a minimum of 25mm over the length of the manhole.

.11 Pulling eye inserts shall be 32mm (1 1/4”) in diameter and have a minimum allowable pull out strength of 29 kN and ultimate pull out strength of 67 kN and be complete with dust caps. Eight (8) pulling eyes will be supplied with each manhole by the precast vendor.

.12 Inside walls, ceiling and roof openings to be painted with one coat of Emcrete or equivalent.

.13 A knockout shall be provided in the floor for a sump. It shall be centered at one end of the structure.

.14 A sump, backwater valve and “p” trap will be provided for all precast manholes.

.15 Drain pipes will be 103mm PVC SDR-28 material with all joints caulked and or cemented or use “O” ring seal.

.16 Floor channel inserts in the base unit shall be tied to the reinforcing cage to provide an electrical ground.

.17 An electrical ground symbol shall be set in the concrete at the top of the structure.

.18 Provide and install all hardware in precast manholes such as pulling irons, pulling eyes, ground rods and cable racks suitable for the support of cables and splice cases.

.1 All manhole hardware shall have a hot dipped galvanized finish.

.2 Cable racks are to be manufactured from 38-mm x 14-mm x 5-mm hot-rolled steel channel, T-slots spaced at 38-mm and provided with cable supports.

.19 Manhole covers shall have a cast-in logo that prominently indicates the manhole is owned by the Authority. The specific details of the logo will be provided to the Design-Builder by the Authority. The cover is also to be marked “TELECOMMUNICATIONS” with the manhole ID assigned by the Authority.

.20 Manhole lids shall be secured with a cam lock mechanism.

.21 Furnish and install manhole signage within chimney: to include manhole ID, measured distance to the next manhole and or building, conduit assignment, North designation and direction to adjoining maintenance holes and building entrance points. Signage shall be stamped metal with a red background and white letters attached to the chimney.

3. **Concrete Extension Rings**

.1 Steel reinforced concrete extension rings shall be provided as required.

.2 The measured differences between major and minor axis shall not exceed 1% for any cross section, based on the inside diameter.

.3 The major axis is defined as the maximum inside diameter.

.4 The minor axis is defined as the minimum inside diameter.

4. **Warning Tape**

.1 A 152mm wide yellow warning marker tape shall be placed in the trench on centerline of duct bank approximately 300mm below final grade.

PART 3. EXECUTION

1. **General**

.1 Any conflicts in the requirements of these specifications shall be communicated to the Authority.

.2 The locations of the existing utilities, as shown on the CPPS drawings, are approximate only and this information may not be fully accurate or complete. Prior to the start of construction, the Design-

Builder shall locate and expose all existing utilities at all tie-in and crossing points, at all points where a conflict may arise during the construction of the proposed works, and to confirm design elevations. The Design-Builder shall assume all costs and expenses that may occur for damages, support of and repair to such plant by reason of the negligence of his operations. (Existing utilities shown are derived from as-built information and all utilities may not be necessarily shown.)

.3 The Design-Builder shall:

.1 Provide all services, labor, materials, tools, and equipment required for the complete and proper installation of the Campus Perimeter Pathway System as called for in these specifications and the CPPS drawings.

.2 Have complete control of the work and shall effectively direct and supervise the work so as to ensure conformance with the contract documents, subject to the Authority's rights as specifically set out in the contract documents to give directions regarding work.

.3 Be solely responsible for construction means, methods, techniques, sequences and procedures and for coordinating the various parts of the work under the contract.

.4 Comply with all requirements of the AHJ as to the manner in which the work is done.

.5 Be responsible for security deposits, permit fees and any other payments required to allow for construction to commence.

.6 Maintain the work in a tidy condition and free from the accumulation of waste, debris, and waste products, other than that caused by the Authority or its employees.

.7 Be familiar with B.C. Gas Safety Regulations, Provincial Blasting Regulations and all AHJ specifications.

.8 Be solely responsible for construction safety at the place of work as and to the extent required by applicable construction safety legislation, regulations and codes, including the Workers' Compensation Act and applicable regulations, and by good construction practice.

.9 Take all necessary means to prevent damage to property or injury to persons.

.10 Be responsible in providing traffic control, signage, delineators, barricades, and other miscellaneous warning devices as required to maintain vehicle and pedestrian flow and for emergency vehicle access. A traffic management plan will be provided as required.

.11 Be solely responsible for providing the necessary field surveys by a qualified surveyor to permit the layout and construction of the work. No additional payment will be made for this field survey, which is deemed to be included in contract.

.12 Engage a geotechnical consultant for recommendations regarding the subsurface conditions, site preparation, and the proposed road structure prior to the start of construction.

.13 Be held responsible for the repair of any damage caused to existing street or services by construction equipment and/or trucks hauling material to the site. This may include daily cleaning or sweeping existing roads of dirt and debris caused by construction activities.

.14 Use extreme caution when working near existing services and any services disturbed are to be replaced to the satisfaction of the City of New Westminster, the Authority or other approving agencies.

.15 Obtain written permission prior to the start of construction from adjacent property owners for a temporary encroachment on private property and a registered document for a permanent encroachment if required.

.4 When vehicles and/or machines (rubber tired backhoes, track backhoes, trucks etc.) are used in the construction of underground conduit systems and have a hydraulic oil capacity of ninety-one liters or more, an environmental spill kit will be required for each of these.

.5 All survey monuments, benchmarks, and legal pins must be protected and any damage caused by the negligence of the Design-Builder shall be repaired at the Design-Builder's expense.

.6 All existing improvements shall be restored to the satisfaction of the City of New Westminster and the Authority. In special cases, the City of New Westminster may require written acceptance by the affected property owners for restoration works performed by the Design-Builder.

.7 All pavement markings, line painting, directional lines/arrows etc. shall be restored to original condition or better to the satisfaction of the City of New Westminster standards and the Authority.

.8 In locations where underground construction is in landscaped areas, it is the responsibility of the Design-Builder to minimize damage and shall restore all damaged pavement, curbs, gutters, boulevards and landscaped areas to the satisfaction of the property owner, the City of New Westminster and the Authority.

.9 Junction boxes, valve covers, manhole frames & covers within the paved roadway to be left low at base level at the time of base lift asphalt and raised just prior to the final lift of paving.

.10 Notification and Coordination:

.1 The Design-Builder is to notify the Authority at the following stages of the construction schedule:

.1 Delivery of materials to site.
.2 Initial installation of works prior to backfilling.
.3 Grading of road surfaces prior to paving.

.2 The Design-Builder must contact the City of New Westminster Engineering Department prior to the start of construction and when making connections to the city's splice boxes. Design-Builder shall confirm with the City of New Westminster the process and timing associated with all notifications required prior to and during the construction period.

.3 Worksafe B.C. is to be notified prior to the start of construction.

2. Excavation, Backfill and Trench Restoration

.1 Excavation

.1 Excavation is to be coordinated with the City of New Westminster, other trades, and disciplines and with other Landscaping, Civil, Architectural, Mechanical, Plumbing and Electrical drawings, requirements and specifications associated with the Royal Columbian Redevelopment Project.

.2 Depth of excavation shall be such that the required one (1) meter bury depth (top of concrete encasement) is met. Prior to installation, the Authority shall approve any deviation from required depths.

.3 The Design-Builder shall:

.1 Saw cut the existing pavement.
.1 All asphalt cuts shall be straight with vertical clean edges so that the asphalt surface may break evenly and cleanly. The edge of pavement shall be saw cut and keyed to form a minimum 0.20-meter-wide x 40mm deep lap joint.
.2 Sidewalks, curbs and gutters shall be cut square and to regular panel lines. Pavement shall be cut with a concrete saw.
.2 Excavate and remove all loose and organic material from the roadway.
.3 Make all machine and hand excavations necessary for placing ducts, manholes, service vaults, service boxes and other above surface supporting structures as may be required.
.4 Keep all excavations to a minimum size and protect the pavement and other structures adjacent to the work location by appropriate means.
.5 Without extra charge, construct temporary drains or dewatering or well pointing as necessary to keep water away from the work operations.
.6 Maintain access to driveways opened by excavation by means of adequate and safe bridging.
.7 Without extra charge, provide and place shoring, as required by the Worksafe B.C. and as required to protect adjacent paving and structures and to prevent any sloughing in of material that is under adjacent sections of sidewalk or pavement.
.8 Protect existing underground utility trenches adjacent to the proposed underground utility installation from sloughing in order to prevent over-width excavation.
.9 Prove the trench grade far enough along the route so that any relocation or redesign necessitated by unforeseen obstacles may be carried out.
.10 Open entire length of trench and establish proper grades before beginning installation of any portion of connecting duct runs.

.2 Adjacent Structures

.1 Prior to excavation, the Design-Builder shall consult with owners of buildings, retaining walls, poles, lamp standards or any other structures, including gardens, shrubs and trees, which may be endangered.

.2 The Design-Builder shall provide or arrange at his own expense, adequate support or take other precautions as is necessary to protect the structure, garden or shrubs to the satisfaction of the owner.

.3 To avoid future dispute and or litigation, the Design-Builder shall establish with the owner the condition of the structure, garden or shrub prior to excavation.

.4 Under no circumstances shall the Design-Builder permit his forces, materials and or equipment to encroach on private properties adjacent to the work, without express permission of the property owners.

.3 Protection of Foreign Underground Utilities

.1 Design-Builder shall contact each agency and arrange for the support of wood, steel or concrete poles necessary to continue the excavation work. The cost of such work shall be included in the contract price and in no way shall the Authority be held liable for costs incurred by reason of delays caused by said agency.

.2 Protection of foreign utilities is the responsibility of the Design-Builder and any damage caused to structures of any kind shall be paid for by the Design-Builder

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.3 Design-Builder shall build around, under over pipes, culverts, sewers, catch basins, or other support structures encountered in the line of the work, and shall supply such materials and make such alterations, substitutions and repairs as may be required for such work.

.4 If the Design-Builder desires to temporarily remove, disconnect or relocate service pipes crossing the excavation, he shall make his own arrangements with the owners of the service pipes and shall bear all costs for such temporary work.

.4 Blasting

.1 In all cases of blasting, the Design-Builder shall take such measures that are necessary to prevent damage to property or injury to persons.

.2 The Design-Builder shall observe all Federal, Provincial, City and Municipal regulations relative to the use, storage, transportation and hauling

.3 If the AHJ or the Authority shall not permit rock to be blasted, or if blasting would create a hazard to property or persons, the Design-Builder shall employ other approved means to remove the rock at no additional cost to the Authority.

.5 Test Holes

.1 The depth of the buried utilities, determined by test holes, shall determine the final grade of the bottom of the trench.

.2 The Design-Builder shall dig all test holes by way of hydro vacuum in all sections of the project before commencing construction.

.3 Upon exposure by test hole, should any public utility pipes or other structures be at an elevation or offset that requires a revision to the proposed construction, the expense of any change shall be borne by the Design-Builder.

.4 Design-Builder shall have no charge against Authority by reason of delay, nor shall Authority be held responsible for any delay in completion of the work due solely to the above clause.

.5 Any duct or manhole installation constructed by Design-Builder which has to be relocated or redesigned because of a known obstacle which had not been exposed by a test hole prior to construction, shall be relocated or demolished and removed from the site by the Design-Builder at his own expense.

.6 Backfill

.1 No backfilling of manholes and or duct banks is to be performed until the Authority's Inspector has approved the phase of the project to be backfilled.

.2 In all locations, a 150mm layer of sand will be placed in the bottom of the trench.

.3 Sand shall be added and hand tamped for compaction to give a minimum 150mm cover over the conduit, backfilled to grade and compacted in accordance with and to the satisfaction of the Authority's specifications.

.4 Imported granular backfill shall be used for all trenches.

.5 Subgrade, granular subbase, and granular base materials shall be compacted to at least 95% of their modified proctor dry density unless noted otherwise.

.6 The crushed granular base course shall be tested in an approved manner prior to the placement of the proposed concrete curb and gutter and road pavement.

.7 Only hand tamping will be permitted between the trench bed and 150mm above the duct bank in maximum lifts of 150mm; the remainder of the trench will be backfilled in lifts not to exceed 450mm unless otherwise approved by the Authority.

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.8 Power tamping will not be permitted unless there is a minimum of 600mm of cover over the duct bank and or structure.

.7 Site Maintenance Prior to Permanent Repaving

.1 The Design-builder shall, at his own expense, maintain all backfilled excavations, including temporary patching in road or sidewalk areas until all settlement has ceased or permanent repaving/reconstruction has been completed.

.2 Maintenance is defined as the placing and compaction of whatever additional fill and/or temporary patch that may be required from time to time.

.3 The Design-Builder shall be fully responsible for any damage or accident to persons and/or property resulting from the condition of the backfilled excavation, until permanent restoration of pavement and/or sidewalk has been completed or until the Authority, in writing, relieves the Design-Builder of the responsibility.

.4 When in the opinion of the Authority any portion of the worksite constitutes a hazard to patients, staff, visitors or the general public, the Design-Builder shall immediately take whatever action is required to rectify the situation.

.8 Road Restoration

.1 The Design-Builder shall restore to the satisfaction of the Authority and the City of New Westminster the existing road pavement, sidewalks and driveways across all trench excavations to original condition or better.

.2 Open trench operations in existing pavement shall be vertical and replaced with hot mix asphaltic concrete after backfill and compaction within 48 hours of trench work. No trenches in existing roadway shall be left uncovered overnight without approval of the City of New Westminster and the Authority and fulfillment of any conditions of that approval.

.3 No pavement repairs, other than temporary repairs, will be done when the temperature is below zero degrees Celsius or the sub-grade is frozen.

.4 The road base shall extend a minimum of 0.3 meters beyond the sidewalk and/or curb and gutter, whichever is greater and filled to the level of the sidewalk or curb for support.

.5 Tie-in to existing pavement shall be made by cutting back the existing pavement to sound material as necessary to produce a neat vertical face with straight edge prior to placing hot mix asphaltic concrete, exposed pavement surfaces shall be painted with liquid asphalt and heated to 65 degrees Celsius. The finished pavement surface shall blend in smoothly with existing pavement.

.6 The restored pavement structure shall meet or exceed the following minimum standard:

.1 Keary Street:
Minimum 100mm thick – asphalt concrete
Minimum 100mm thick – 19mm minus crushed granular base course
Minimum 200mm thick – 75mm minus select granular subbase course
Approved fill material on approved subgrade

.2 East Columbia Street
Minimum 100mm thick – asphalt concrete
Minimum 100mm thick – 19mm minus crushed granular base course
Minimum 300mm thick – 75mm minus select granular subbase course
Approved fill material on approved subgrade

.3 Sherbrooke Street
Minimum 100mm thick – asphalt concrete
Minimum 100mm thick – 19mm minus crushed granular base course
Minimum 300mm thick – 75mm minus select granular subbase course
Approved fill material on approved subgrade

.4 Allen Street
Minimum 100mm thick – asphalt concrete
Minimum 100mm thick – 19mm minus crushed granular base course
Minimum 200mm thick – 75mm minus select granular subbase course
Approved fill material on approved subgrade

.5 Lane
Minimum 100mm thick – asphalt concrete
Minimum 100mm thick – 19mm minus crushed granular base course
Minimum 200mm thick – 100mm minus select granular subbase course
Approved fill material on approved subgrade

.7 All valve boxes, manholes, junction boxes, etc. within the road right of way shall be adjusted to finished grade unless noted otherwise.

.8 Catch basin rim elevations shall be set 30mm below the finished gutter line grades. The gutter and road surface area to be shaped to form a dish around the inlet.

.9 Driveway crossings shall be installed as per the mmcd standard drawing c7 unless noted otherwise.

.10 Changes in grade shall be formed with smooth curves.

3. **Duct Installation**

.1 General Duct Requirements

.1 The number, size, location and arrangement shall be as indicated on the CPPS drawings.

.2 Ducts are to be placed in a joint trench with City of New Westminster utilities with a minimum cover of 1.0m.

.3 The duct bank shall be bundled, when specified in a manner acceptable to the Authority.

.4 In all instances, the minimum separation from other utilities that must be maintained are as follows:

.1 CSA C22.3 No.7-94 underground systems, requires that the separation from a duct bank and other underground structures running parallel, be a minimum of 300mm. Crossing at 90 degrees cannot be less than 150mm, and when dealing with gas pipelines, the minimum crossing separation is also 300mm.

.2 Maintain minimum 50 mm (2”) separation from power ducts encased in concrete or 300 mm (12”) in well tamped earth.

.5 No section of duct shall have more than 180º of bends without a manhole installed for an access point.

.6 No mainway duct run shall extend more than 183 meters without a manhole installed as an access point.

.7 No 90° or elbow bends are permitted. All bends shall be sweeps with a minimum radius of 10 times the internal diameter of the duct.

.8 All ducts to lateral poles shall be terminated in a concrete pilaster as shown on the CPPS drawings. The concrete pilaster shall be formed with a TELUS approved fiberglass form. Single entrance ducts to be 5mm (1/4") from pole. Double and triple entrance ducts to be 20 mm (3/4") from pole. A separation between any two ducts must be 25 mm (1"). The entire manufactured bend must be encased in concrete to the top of the fibreglass form, 2 ply 4 mil. poly. shall be placed between pole and pilaster.

.9 Ducts shall enter and exit manholes in a straight line method for a minimum distance of 1 meter before being formed into the trench configuration. The remaining parallel walls of the manhole are to remain free of conduit entrances to allow for cable support and splicing operations.

.10 Duct spacers shall be placed between the ducts at 1.5m intervals. The saddles will maintain a horizontal and vertical separation of 25 mm between the ducts then polypropylene strapping shall then be placed over the point of the duct saddle support. The belled ends shall be staggered and each duct shall be in contact with adjacent ducts.

.11 All dirt, mud, sand, chips, etc., in the duct and on the areas to be joined, must be removed.

.12 It is mandatory that a primer be used on all PVC duct prior to placing the PVC cement.

.13 PVC cement will be placed on the bell end and spigot as per manufacturer’s instructions, pushed together and the duct twisted a quarter turn to ensure that the cement has even distribution around the joint and that all air pockets are removed.

.14 Design-Builder shall ensure the duct bank is water tight.

.15 The duct terminator diaphragm will only be removed if duct is to be placed in the terminator.

.16 The duct terminator diaphragm shall be removed and the rough edges of the terminator made smooth before cementing the duct in place.

.17 Mandrelling

.1 After the manholes/structures at each end of the section of duct is completed and the concrete is thoroughly set, a test mandrel sized not less than 6.35mm of the

inside diameter of the duct shall be drawn through each conduit in the presence of the Authority's Inspector.

.2 Design-Builder shall correct any discrepancies in the duct configuration between manholes and lateral poles or building entrances at their own expense.

.18 Ducts shall be clean and free from any obstructions or debris.

.19 Place a mule tape in all ducts. Mule tape will be Greenlee 4435 or approved equal.

.20 A 152mm wide yellow warning marker tape shall be placed in the trench on centerline of duct bank approximately 300mm below final grade.

.21 Where possible, the ends of all main way and service ducts should be marked with a 50mm x 100mm x 1.5m post, painted orange and placed vertically against the capped conduit.

.2 Concrete Encasement

.1 All ducts shall be concrete encased.

.2 For concrete encased duct banks, under wet conditions, the grade shall be established by placing a minimum of 75mm of 20mm clear drain gravel.

.3 All concrete encased duct banks shall be properly formed to facilitate a minimum 50mm envelope, with all forms removed prior to backfilling.

.4 All concrete encased duct banks shall be reinforced with rebar. Longitudinal rebar will be tied to the spacers so as to provide as much space between the duct and the rebar as possible. Transverse rebar will be tied to the longitudinal steel on centers.

.5 Concrete encased conduit which will be extended in the future shall have each row staggered and shall extend a minimum of 300mm beyond the end of the concrete and the open end of the conduit shall be capped and cemented with and approved plastic cap.

.3 Service Entrance Facilities

.1 The Design-Builder is to refer to the Schedule 1, Statement of Requirements, and Appendix 1B(II) [Campus Communications Hub Technical Specifications] for the Service Entrance Facility requirements for the new Facility.

.2 The Design-Builder is to provide two diverse Service Entrance Facilities into the Healthcare Centre from two different Campus Perimeter Pathway System manholes.

.3 The Design-Builder is to provide two diverse Service Entrance Facilities into the Columbia Tower from two different Campus Perimeter Pathway System manholes.

.4 Specifications for service entrance facilities shall accommodate the applicable seismic zone requirements.

.5 Where diverse Service Entrance Facilities are specified, the entrance points into a building will be distant from each other and enter from two different streets or opposite sides of the building and connect to two different manholes. Minimum distance between Service Entrance pathways into a building will be 20m and this minimum separation shall be maintained at all points along the route between the manholes and the Communications Rooms where the diverse Service Entrance Facilities terminate.

.6 The Design-Builder shall provide to the Healthcare Centre and Columbia Tower a minimum of three (3) Type DB2 PVC orange 103mm ducts per Service Entrance Facility.

.7 Each Service Entrance Facility will:

.1 Not have more than two 90-degree sweeping bends.
.2 Be concrete encased. Coordinate the duct bank with the structural design of the building to support the duct bank at the wall without reducing structural or the watertight integrity of the building wall.
.3 Be properly drained in accordance with building and electrical codes.
.4 Be reamed and bushed and have a smooth bell-shaped finish.
.5 Be equipped with watertight expandable duct plugs that seal the duct against water, gas, litter and vermin. Watertight expandable duct plugs shall be installed at both ends of every Service Entrance Facility duct.
.6 Terminate in pullboxes once they enter the building. Pullbox will be 1219 mm x 1219 mm x 610mm in size, accessible, lockable and equipped with hinged lids.

.8 The maximum pulling lengths will not exceed 100m on any Service Entrance Facility duct or 60m if there are 2 - 90-degree bends.

4. **Pre-Cast Manholes**

.1 General

.1 The number and approximate location of precast manholes are identified on the CPPS drawings.

.2 The Design-Builder shall not place a manhole until the sections of the route to all adjacent manholes have been proven feasible by digging test holes.

.3 When determining manhole locations, the Design-Builder shall consider ground topography, soil conditions, location of manholes relative to surrounding structures, personnel access, pedestrian risk and the difficulty in using the manhole for placing and splicing cable.

.1 Manholes shall be placed in locations that allow for safe access and that are at least 1.0 m clear of any structure or impediment that will compromise work space around the manhole.
.2 Manholes will not be placed in the travelled portion of a roadway or lane or in driveways or in the street in front of or immediately adjacent to a driveway.
.3 If in the non –travelled portion of the roadway, manholes will not be placed within 15.2 m (50 ft.) of the curb radius or right of way line of the intersecting road.

.4 Telecommunications manholes shall not be shared with electrical installations.

.5 The top of the manhole casting will be set by the Design-Builder to conform to the finished grade of the pavement or ground surface.

.6 There will be a collar of precast concrete rings complete with a sand and cement render inside and out, extending from the manhole roof to the underside of the cast iron ring to provide a water tight neck.

.7 The base preparation will have a minimum of 150mm of 20mm crushed aggregate with screeds set level to within 10mm and compacted to 95% modified proctor density and struck off to grade.

.8 Under wet conditions the manhole will be placed on a minimum of 150mm thick bed of 20mm clear drain gravel.

.9 Precast manholes being set where the terrain slopes will have the sump end of the manhole located with the direction of the slope while being set level in the excavation.

.10 Manhole sections will be placed in order to avoid damage to the concrete edges of the bottom section by using the four 112mm pulling eyes as lifting points.

.11 Manhole sections will be placed so that the male and female joints are properly engaged and sealed with a grout or other Company approved material to obtain a water-proof seal.

.12 The inside of the manhole shall be free of all debris accumulated during the construction process and swept clean.

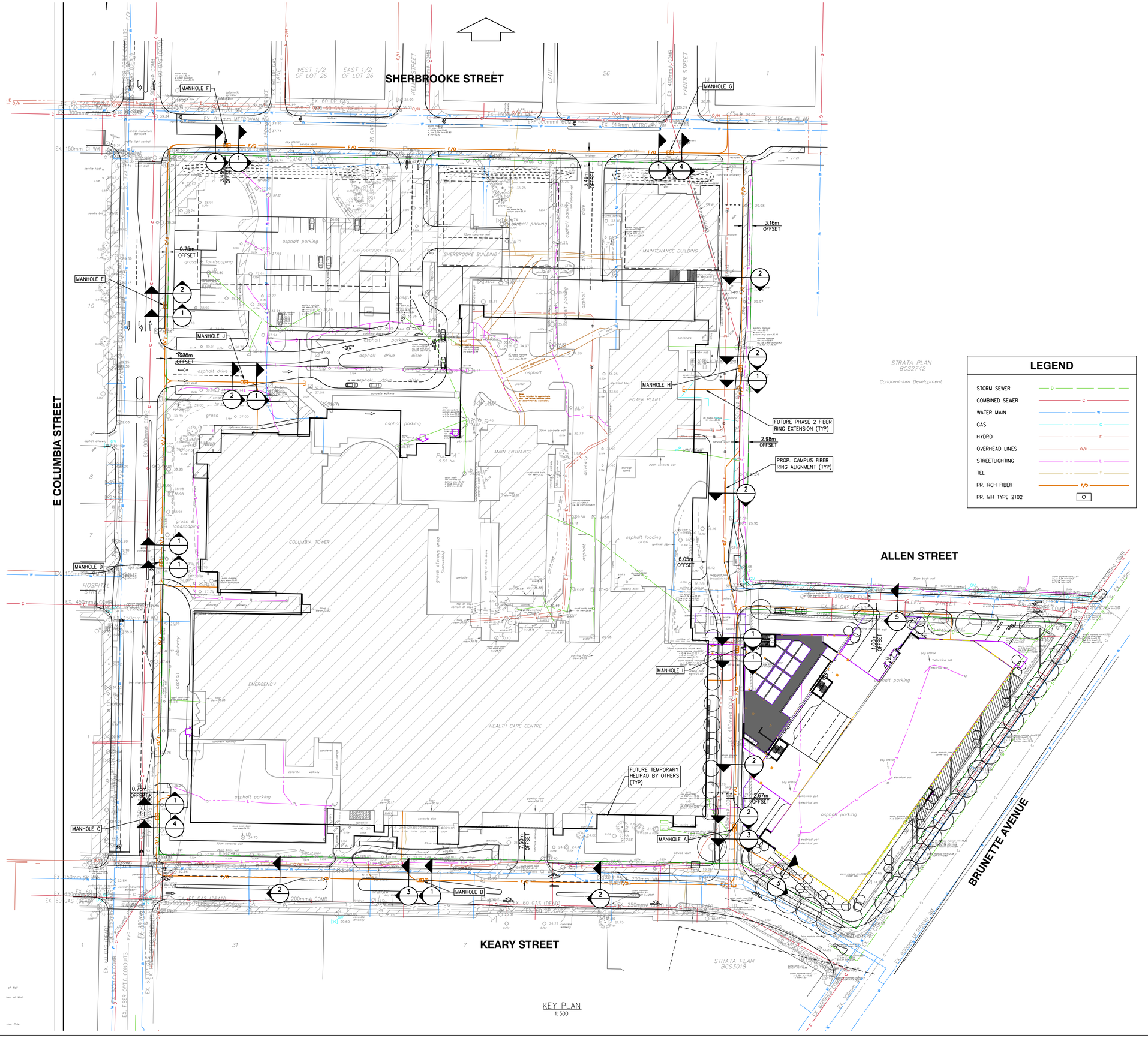
.2 Drainage

.1 Drain pipe shall be PVC, SDR 28 or better. All joints shall be caulked and/or cemented or use an “O” ring seal.

.2 The Design-Builder shall provide a sump, backwater valve and “P” trap in manholes and service vaults as specified on the plans.

.3 Gravity connections of drains to storm sewers will be as specified on the plans.

.4 The location and elevation of the storm drain will be proven, by means of a test hole, before placing a precast manhole.



KEY PLAN
1:500

STRATA PLAN
BCS2742
Condominium Development

LEGEND

STORM SEWER	D
COMBINED SEWER	C
WATER MAIN	W
GAS	G
HYDRO	E
OVERHEAD LINES	O/H
STREETLIGHTING	L
TEL	T
PR. RCH FIBER	F/O
PR. MH TYPE 2102	

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CANNONDESIGN

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No.	Description	Date
5.	ISSUED FOR ADDENDUM	AUGUST 2016
4.	ISSUED TO CANNON	MAY 2016
3.	ISSUED TO CANNON	04/15/2016
2.	ISSUED TO CANNON	04/08/2016
1.	ISSUED FOR COSTING	11/27/2015

ROYAL COLUMBIAN HOSPITAL

CAMPUS PERIMETER PATHWAY SYSTEM

Drawing Title:

KEY PLAN

Project No.: 041927.00 Checked by: Checker

15-0575-KP

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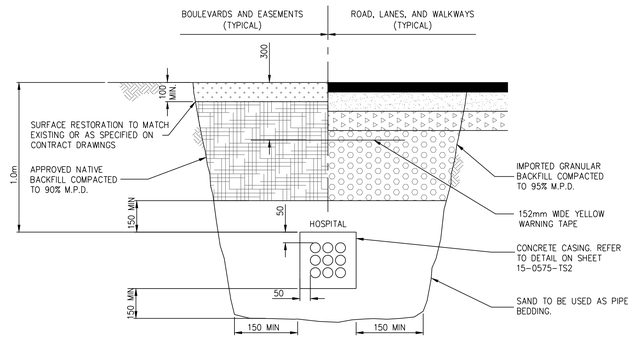

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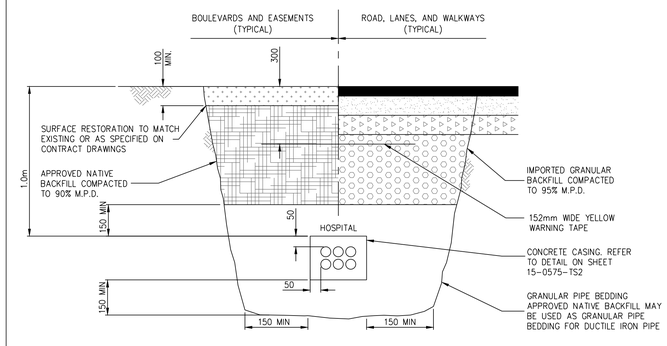

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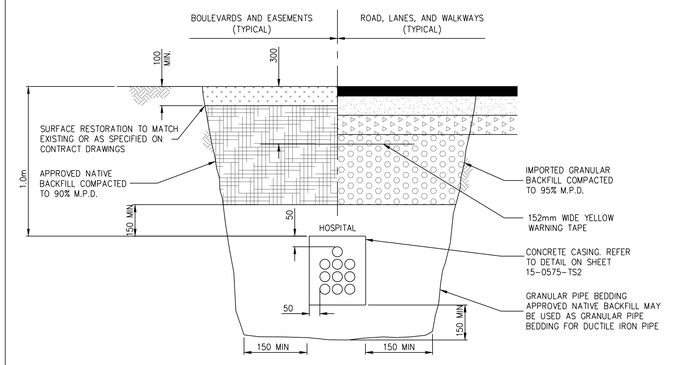

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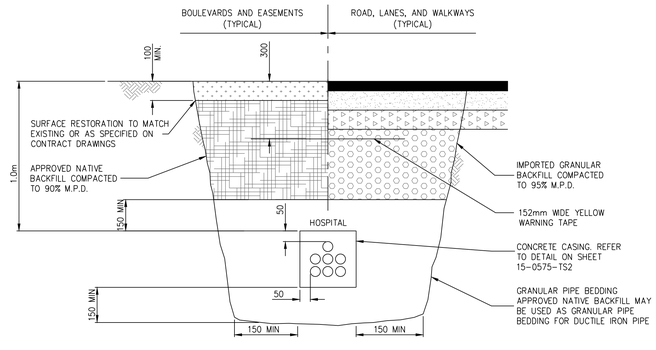

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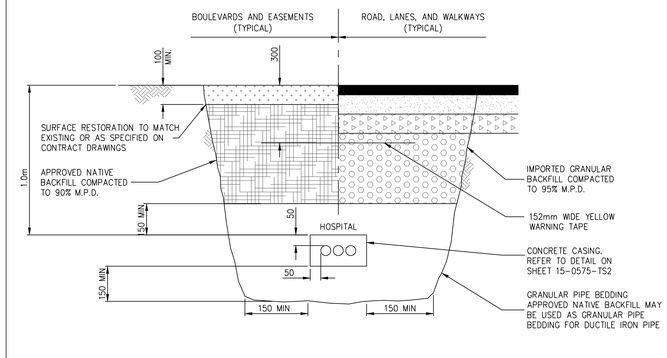

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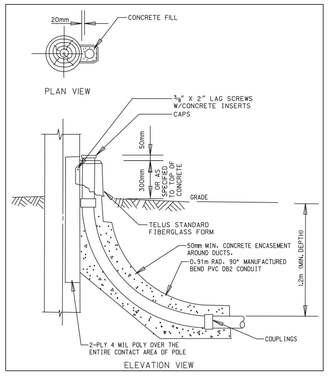

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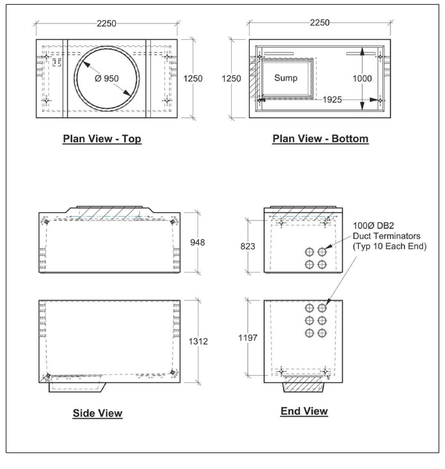

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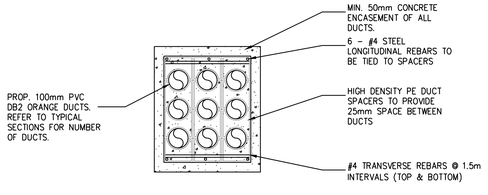

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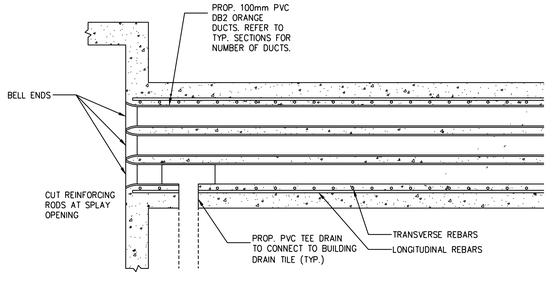

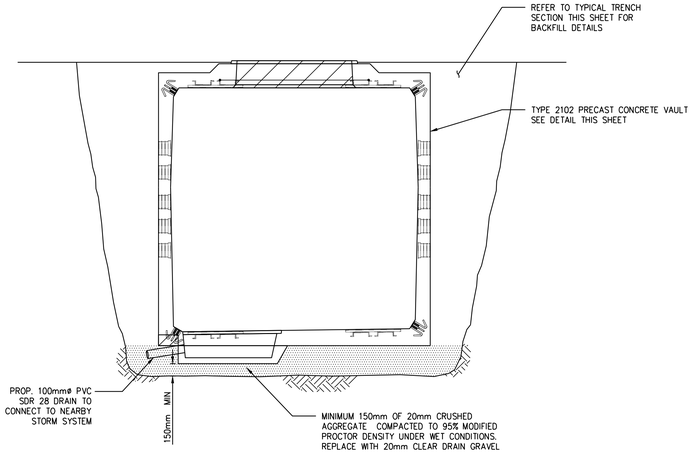

TYPICAL MANHOLE INSTALLATION DETAIL
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9/29/2015 2:33:32 PM

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CANNONDESIGN
1500 West Georgia Street, Suite 710
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1.	ISSUED FOR COSTING	11/27/2015

ROYAL COLUMBIAN HOSPITAL

CAMPUS PERIMETER PATHWAY SYSTEM

Drawing Title:

TYPICAL SECTIONS

Project No.: 041927.00 Checked by: Checker

15-0575-TS1

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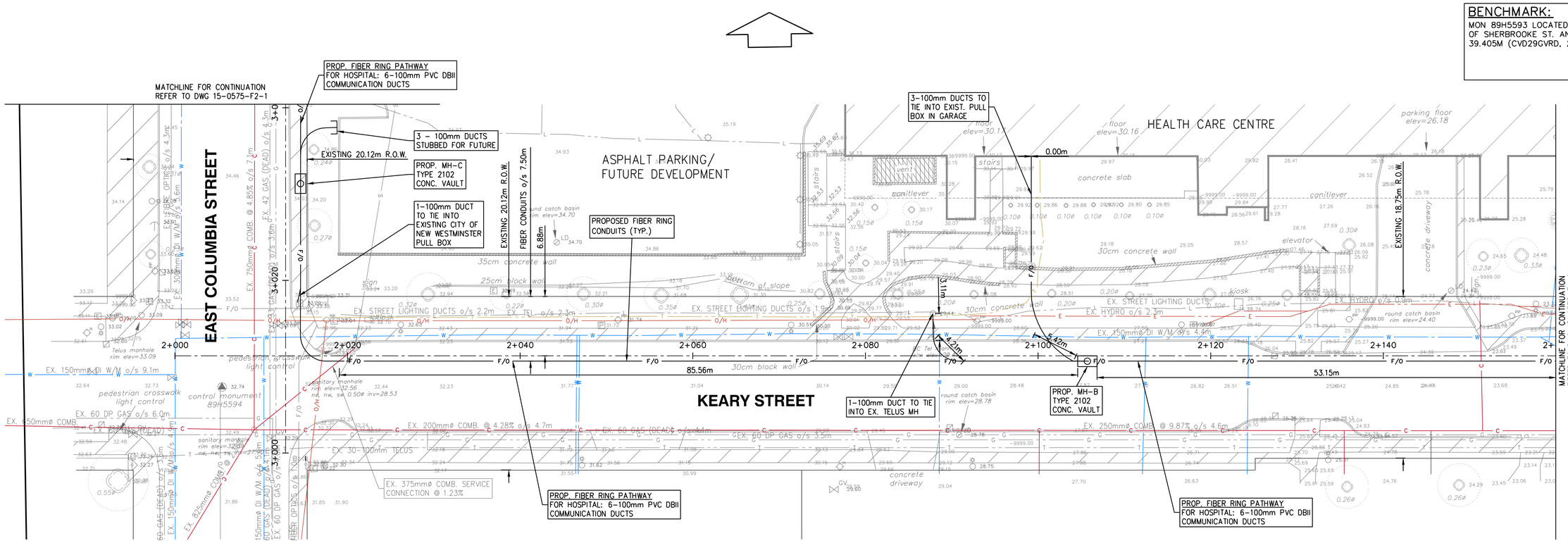

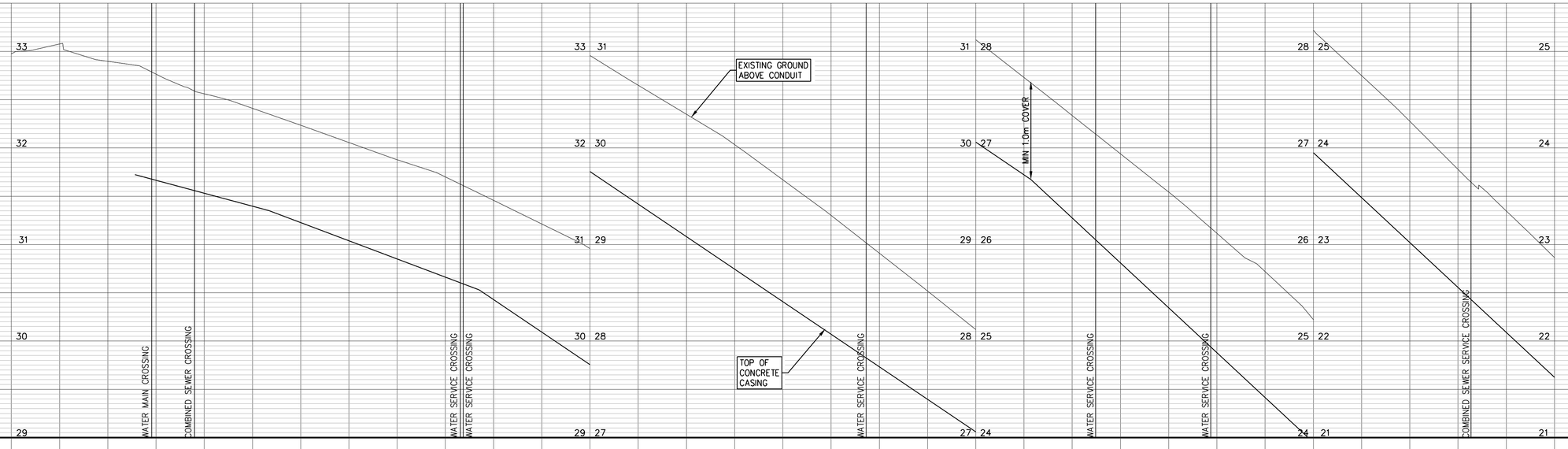

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No.	DATE	REVISION	BY
4	MAY 2016	ISSUED TO CANNON	GL
3	04/15/2016	ISSUED TO CANNON	GL
2	04/08/2016	ISSUED TO CANNON	GL
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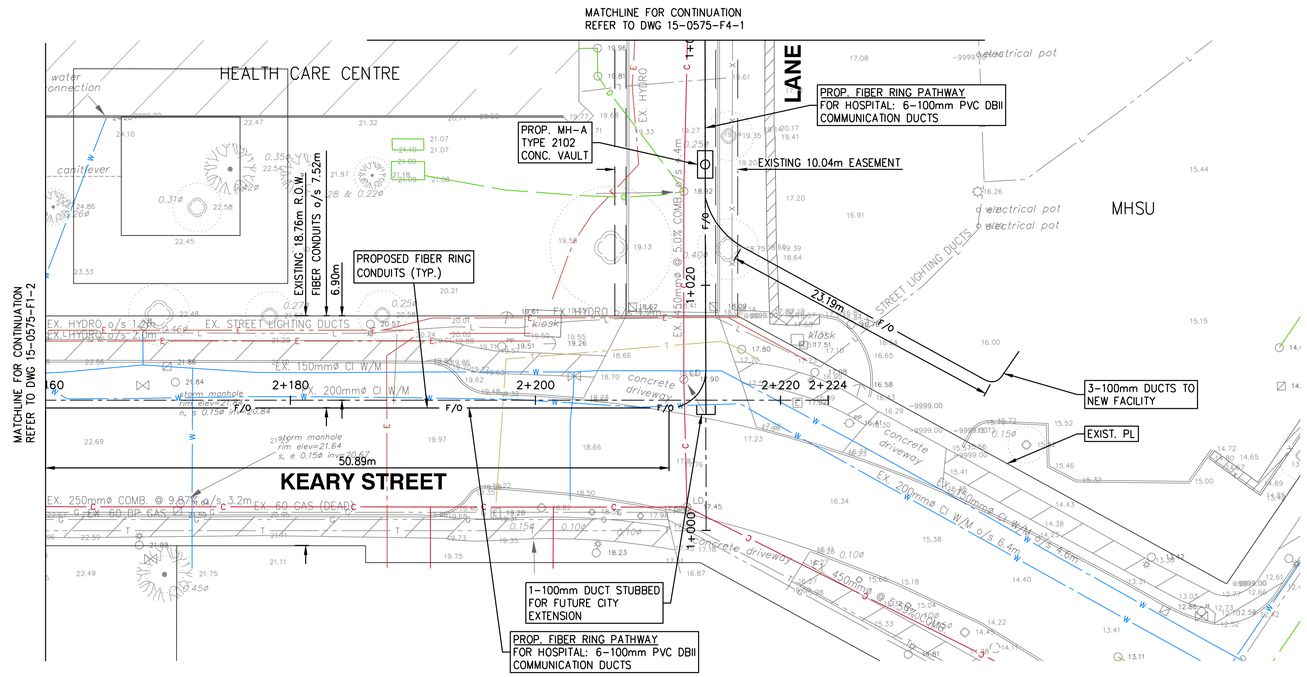
DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
KEARY STREET - WEST

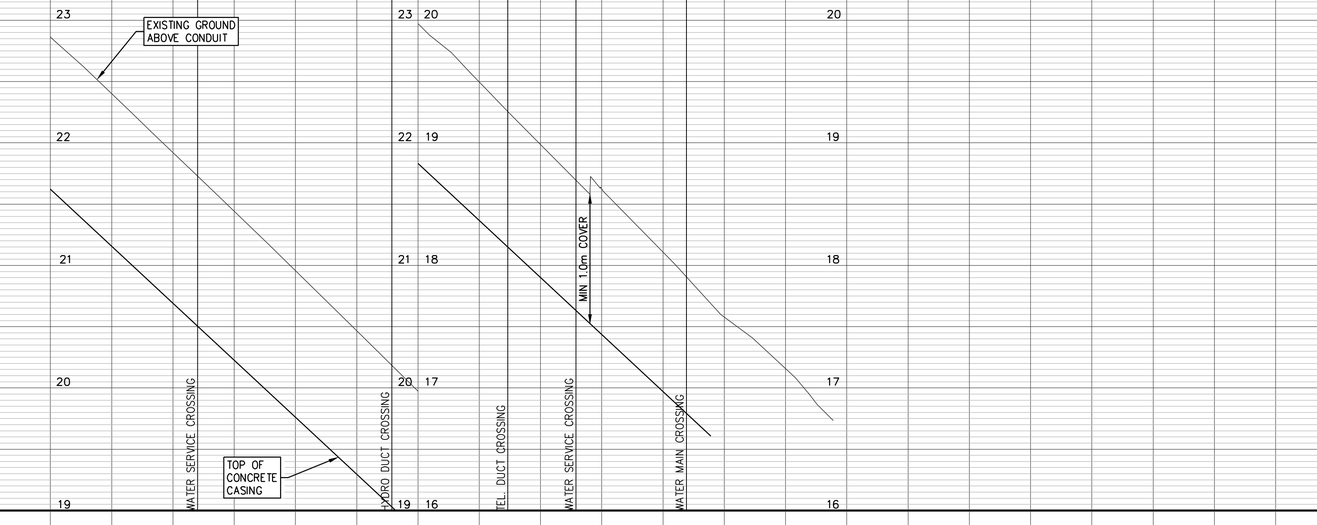
SURVEYED BY
DRAWN BY CW/GL
DESIGNED BY GL
CHECKED BY KF

SCALES
0 1:250 10m

DATE August 29, 2016
DRAWING No.
15-0575-F1-1
SHEET 1 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

BENCHMARK:
MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST.
39.405M (CVD29GVRD, 2005 DATUM)





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STATION	2+160		2+180		2+200		2+220

2+225

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No.	DATE	REVISION	BY
4	MAY 2016	ISSUED TO CANNON	GL
3	04/15/2016	ISSUED TO CANNON	GL
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DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
KEARY STREET - EAST

SURVEYED BY
DRAWN BY CW/GL
DESIGNED BY GL
CHECKED BY KF

SCALES
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DATE August 29, 2016
DRAWING No.
15-0575-F1-2
SHEET 2 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

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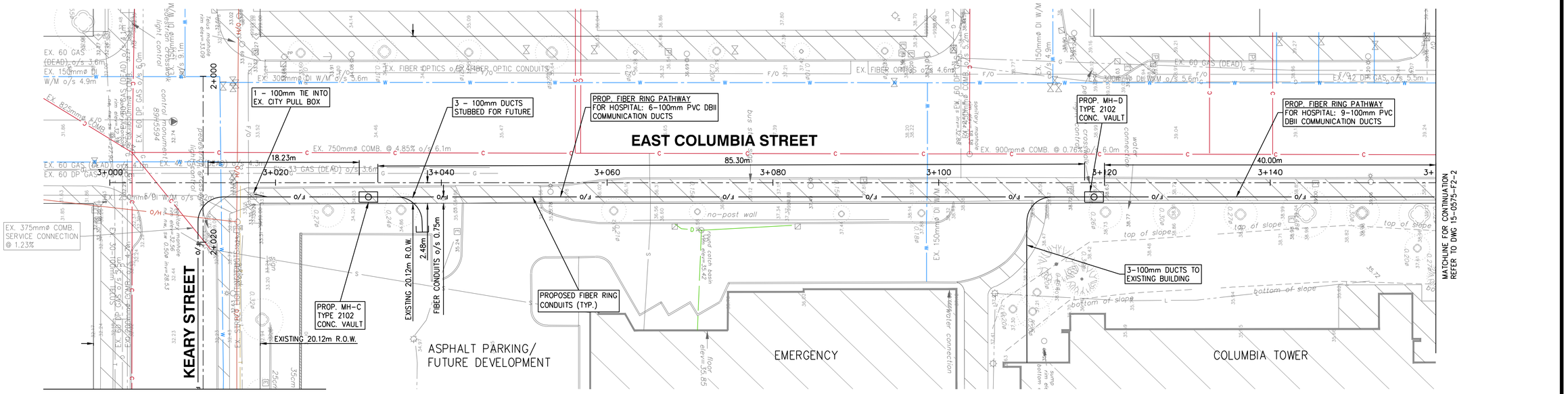

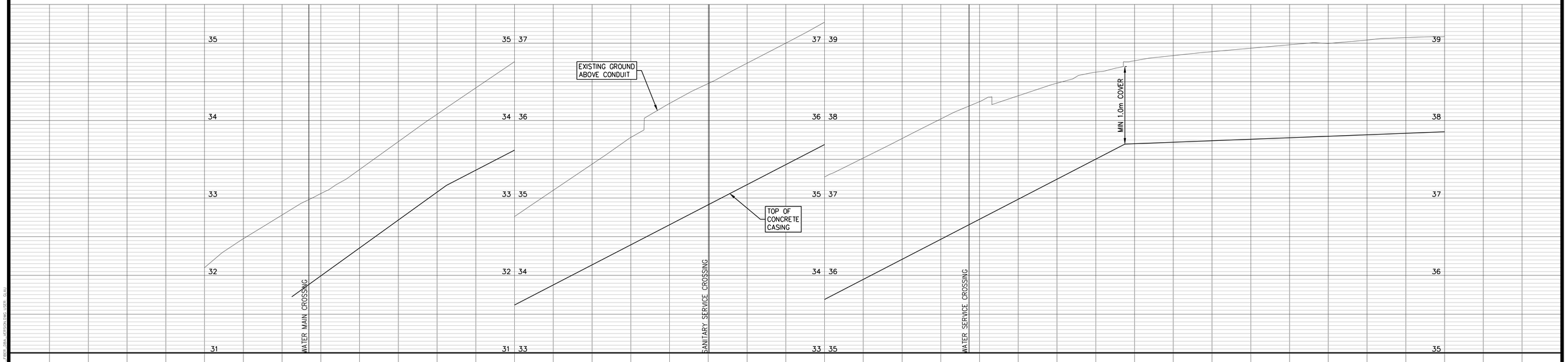

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2	04/08/2016	ISSUED TO CANNON	GL
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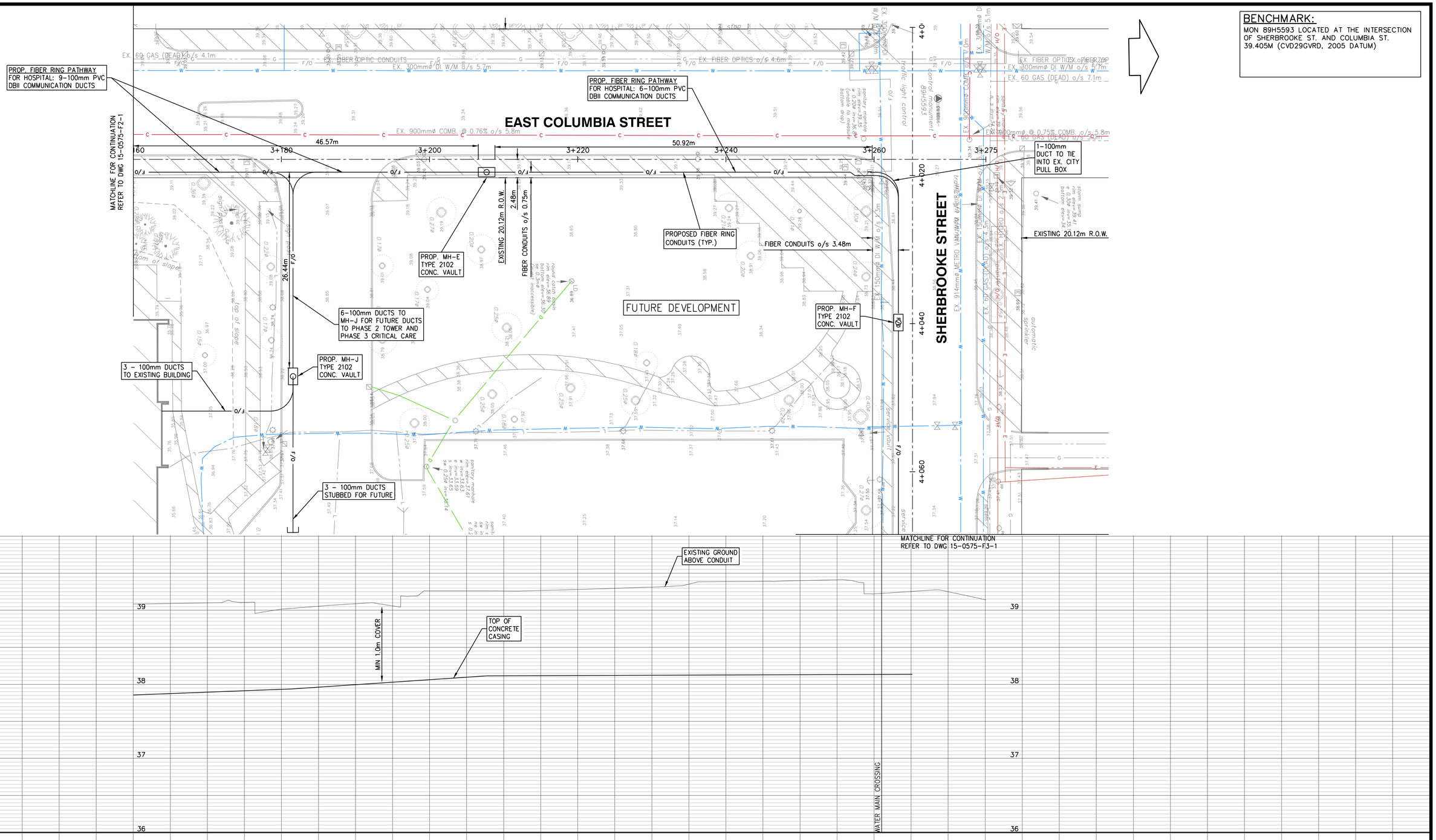
DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
EAST COLUMBIA STREET - SOUTH

SURVEYED BY
DRAWN BY CW/GL
DESIGNED BY GL
CHECKED BY KF

SCALES
0 1:250 10m

DATE August 29, 2016
DRAWING No. 15-0575-F2-1
SHEET 3 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.



BENCHMARK:

MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST.
39.405M (CVD29GVRD, 2005 DATUM)

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DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
EAST COLUMBIA STREET - NORTH

SURVEYED BY
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DESIGNED BY GL
CHECKED BY KF

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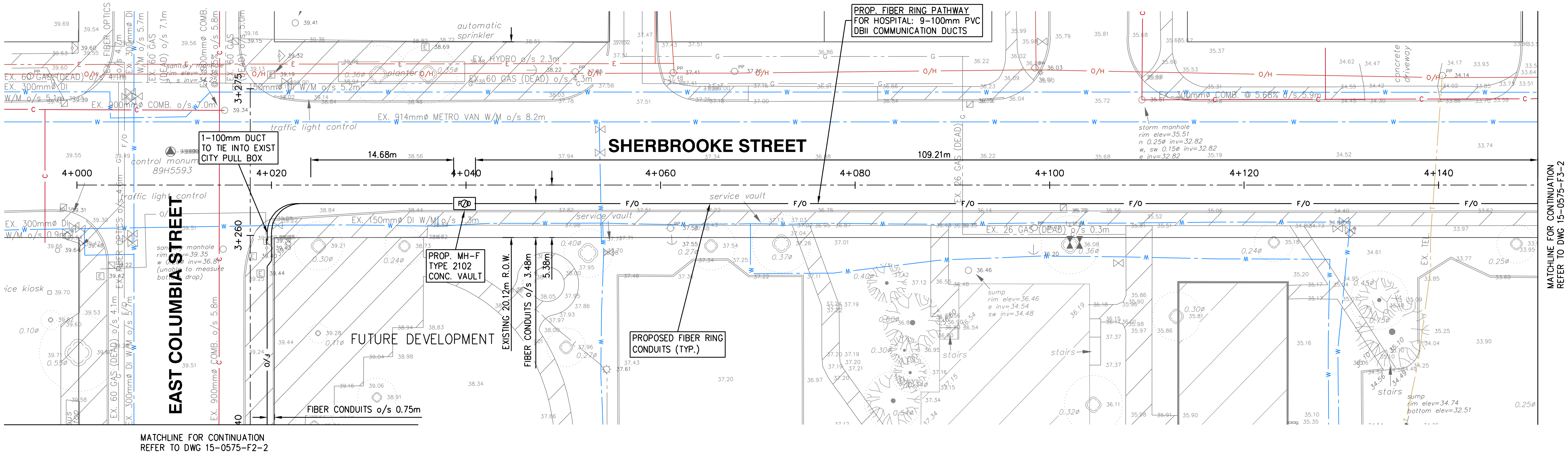
DATE August 29, 2016
DRAWING No. 15-0575-F2-2
SHEET 4 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

BENCHMARK:
MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST. 39.405M (CVD29GVRD, 2005 DATUM)



EXIST ROAD ELEV	39.405	39.469	39.121	38.649	38.234	37.838	37.441	37.037	36.649	36.262	35.824	35.393	34.904	34.392	33.860	33.293
STATION	4+000		4+020		4+040		4+060		4+080		4+100		4+120		4+140	4+150

DRAFT

No.	DATE	REVISION	BY
4	MAY 2016	ISSUED TO CANNON	GL
3	04/15/2016	ISSUED TO CANNON	GL
2	04/08/2016	ISSUED TO CANNON	GL
5	AUGUST 2016	ISSUED FOR ADDENDUM	GL

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CLIENT
FRASER HEALTH AUTHORITY
13730 94A AVE, SURREY, BC V3V 1N1

DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
SHERBROOK STREET - WEST

SURVEYED BY
DRAWN BY CW/GL
DESIGNED BY GL
CHECKED BY KF

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DATE August 29, 2016
DRAWING No. 15-0575-F3-1
SHEET 5 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

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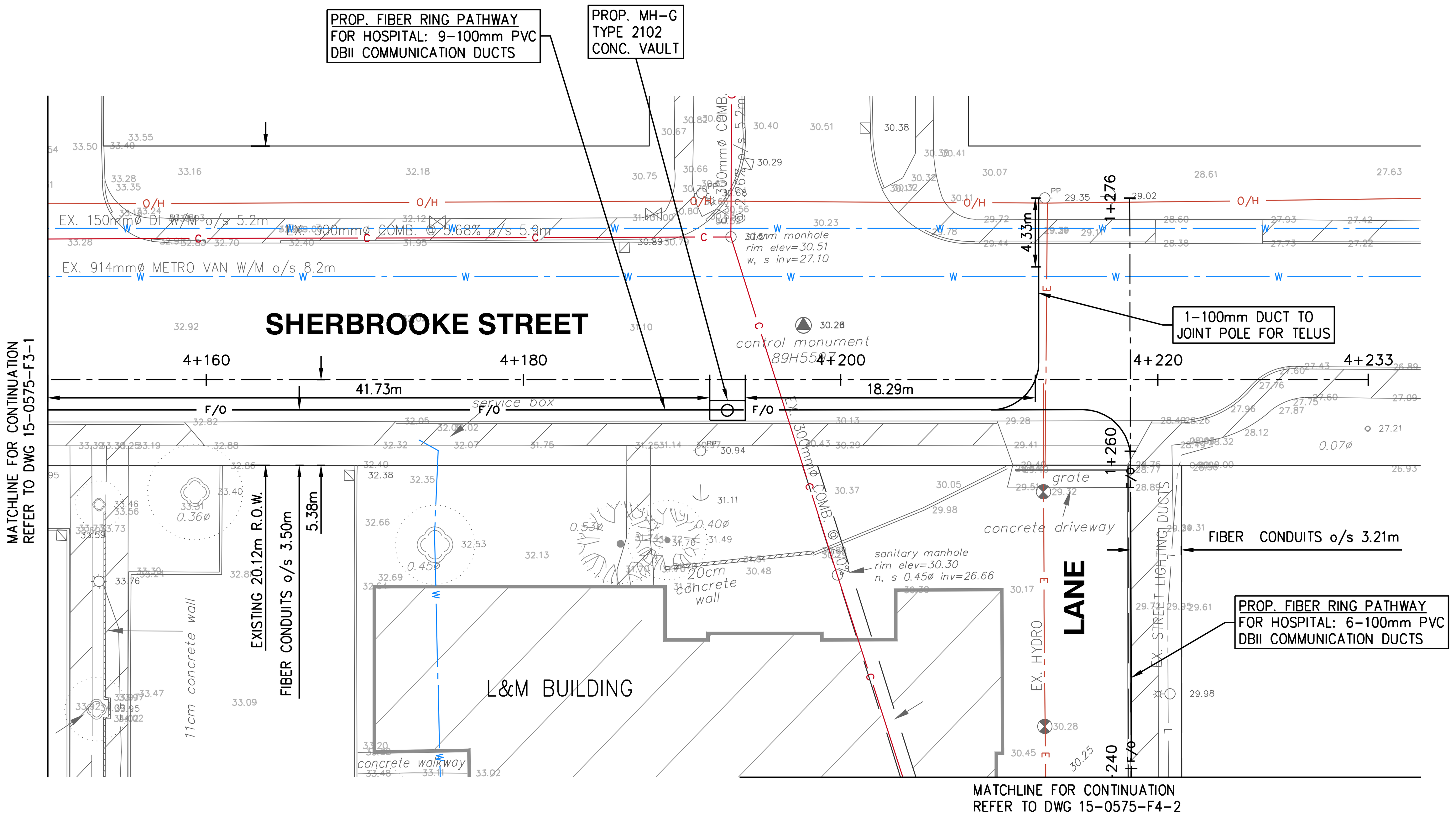
BENCHMARK:
MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST. 39.405M (CVD29GVRD, 2005 DATUM)



EXIST ROAD ELEV	33.29	32.75	32.15	31.51	30.80	30.08	29.28	28.36	27.48	
STATION	4+150	4+160		4+180		4+200		4+220		4+235

DRAFT

No.	DATE	REVISION	BY
4	MAY 2016	ISSUED TO CANNON	GL
3	04/15/2016	ISSUED TO CANNON	GL
2	04/08/2016	ISSUED TO CANNON	GL
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DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
SHERBROOK STREET - EAST

SURVEYED BY
DRAWN BY CW/GL
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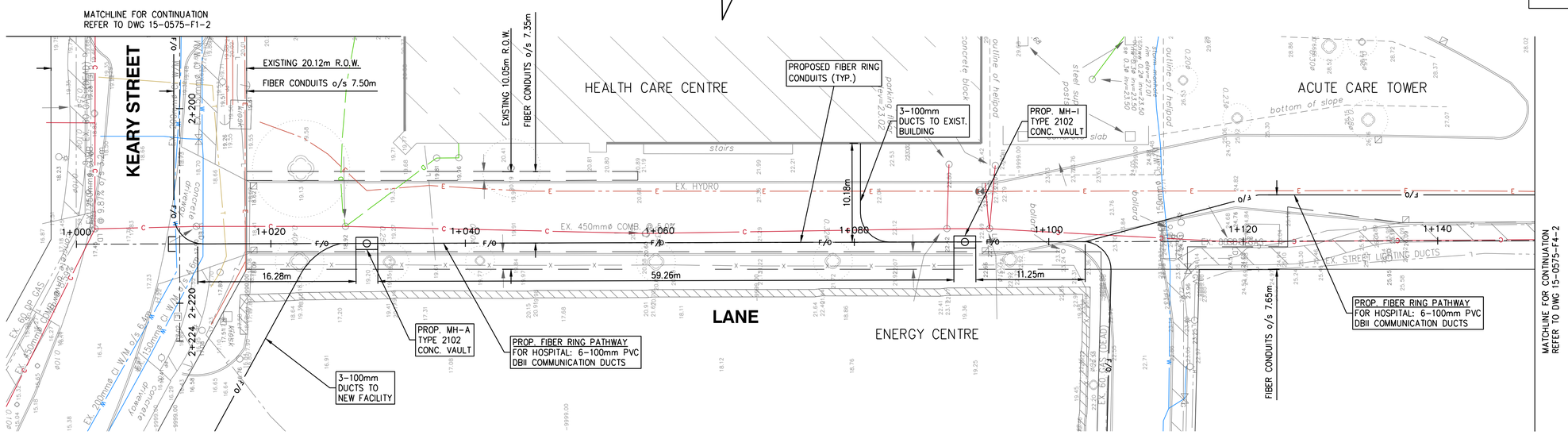
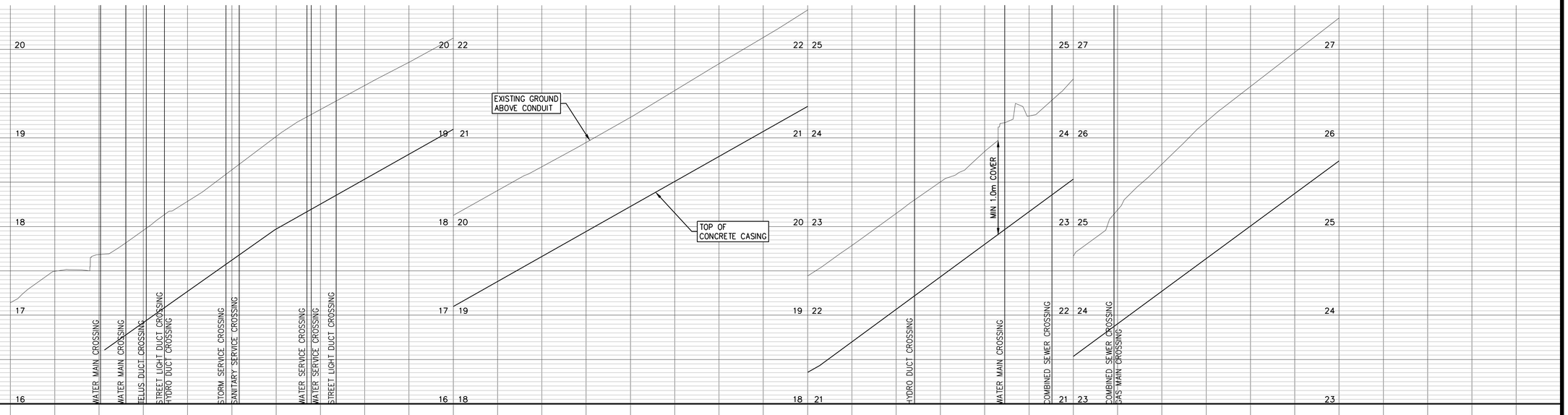
DATE August 29, 2016
DRAWING No. 15-0575-F3-2
SHEET 6 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

BENCHMARK:
MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST.
39.405M (CVD29GVRD, 2005 DATUM)





STATION	1+000		1+020		1+040	1+060	1+080	1+100		1+120		1+140	1+150
EXIST ROAD ELEV	17.141	17.684	18.284	19.016	19.591	20.127	20.674	21.232	21.837	22.443	23.149	23.848	24.665	25.705	26.579	27.353

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No.	DATE	REVISION	BY
4	MAY 2016	ISSUED TO CANNON	GL
3	04/15/2016	ISSUED TO CANNON	GL
2	04/08/2016	ISSUED TO CANNON	GL
5	AUGUST 2016	ISSUED FOR ADDENDUM	GL

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FRASER HEALTH AUTHORITY
13730 94A AVE, SURREY, BC V3V 1N1

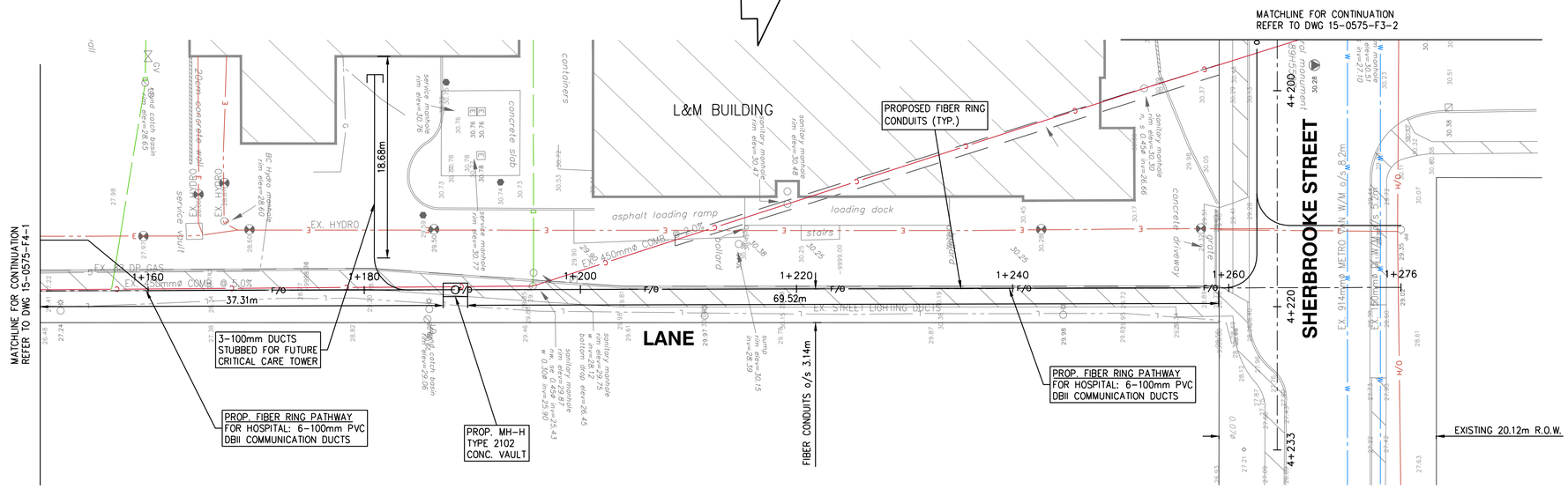
DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
LANE - SOUTH

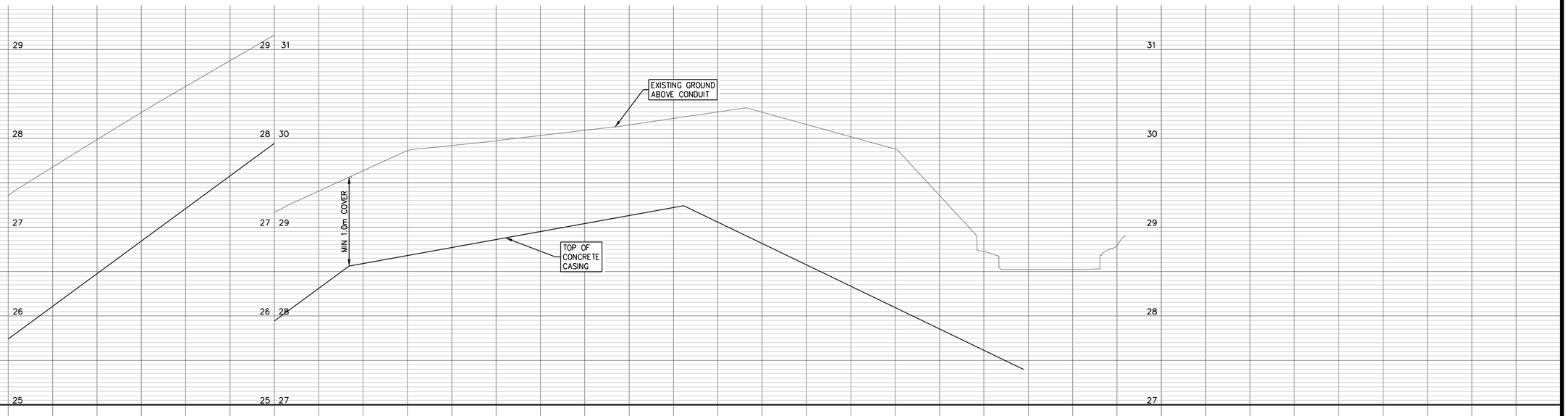
SURVEYED BY
DRAWN BY CW/GL
DESIGNED BY GL
CHECKED BY KF

SCALES
0 1:250 10m

DATE August 29, 2016
DRAWING No.
15-0575-F4-1
SHEET 7 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

BENCHMARK:
MON 89H5593 LOCATED AT THE INTERSECTION OF SHERBROOKE ST. AND COLUMBIA ST. 39.405M (CVD29GVRD, 2005 DATUM)





STATION	1+150	1+160		1+180		1+200		1+220		1+240		1+260		1+280
EXIST ROAD ELEV	27.35	27.98	28.58	29.16	29.63	29.92	30.03	30.15	30.30	30.16	29.88	28.72	28.52	

DRAFT

No.	DATE	REVISION	BY
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3	04/15/2016	ISSUED TO CANNON	GL
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DRAWING DESCRIPTION
ROYAL COLUMBIAN HOSPITAL
CAMPUS PERIMETER PATHWAY SYSTEM
LANE - NORTH

SURVEYED BY
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DATE August 29, 2016
DRAWING No.
15-0575-F4-2
SHEET 8 OF 8
REV. 5
DESTROY ALL PRINTS BEARING PREVIOUS No.

ATTACHMENT TO APPENDIX 1A: STAFFING MODEL

STAFFING MODEL

Staffing Proposals April 2016 (Confirm with Finance)

(assuming 2.5 FTE required for each 12 hour shift, 7 days a week, including vacation relief)

Unit/ Hours	Designation	Positions	Total FTE		
Shared	**Designation**	**Positions**	**Total FTE**		
	CNE	1 x 1.0	1.0		
	OT	2 x 1.0	2.0		
	RT	2 x 1.0	2.0		
	Psychologist	1 x 1.0	1.0		
IPU x 3 15 beds	**Designation**	**Positions**	**Total FTE**		
24 hrs x 7 days	RN	3 x 3	45.0		
16 hrs x 7 days	MHCW	1 x 3	10.0		
7.5 hrs x 5 days	PCC	3 Plus one PCC, Sat And Sun	3.4		
7.5 hrs x 5 days	Unit Clerk	3 Plus one PCC, Sat And Sun	3.4		
7.5 hrs x 5 5 days	SW	3	3.0		
RN Relief Lines			4.0		
PHAU 10 beds	**Designation**	**Positions**	**Total FTE**		
24 hrs x 7 days	RN x 3	3 x 1.0	15		
16 hrs x 7 days	MHCW x 1	1 x 1.0	3.3		
7.5 hrs x 5 days	Unit Clerk	1 x 1.0	1.0		
	PCC	1 x 1.0	1.0		
	SW (to share between PHAU and Psych ER)	1 x 1.0	1.0		
RN Relief line			1.0		

STAFFING MODEL

Older Adult 20 beds	**Designation**	**Positions**	**Total FTE**		
Days (11 hrs) x 7 days	RN	5 x 7 days	12.5		
Relief line x 1					
24 hrs	MHCW x2		10.0		
7.5 x 5 days	PCC	1	1.0		
	Unit Clerk	1	1.0		
	SW	1	1.0		
	Psychologist	1	1.0		
	OT	1	1.0		
	RT	1	1.0		
	CNE	1	1.0		
Nights (11 hrs) x 7 days	RN x 2	2 x 7 days	10.0		
Neurostimulation	**Designation**	**Positions**	**Total FTE**		
M, W, F 07.00 – 12.00 (assuming operating 3 days a week) (2 -3 pts per hour) (10-12 pts per day)	RN	4 x 0.4 1 x 1.0	2.6		
	Admitting Clerk	1 x 0.4	0.4		
Out Patients	**Designation**	**Positions**	**Total FTE**		
5 days 08.00-17.00	Admitting Clerk	2 x 1.0	2.0		
	DC1 (Consult Liaison, including PURC triage)	1 x 1.0	1.0		
	Repro Counsellor	1 x 10	1.0		
	Admitting Clerk Supervisor	1 x 1.0	1.0		
	Neurospsychologist	2 x 1.0	2.0		

All programmes	**Designation**	**Positions**	**Total FTE**		
	Physiotherapist	1 x 1.0	1.0		
	Dietician	1 x 0.8	0.8		
	Manager	2 x 1.0	2.0		
Other	**Designation**	**Positions**	**Total FTE**		
	Academic Psych	1 x 1.0	1.0		
	Security	1 x 24 hrs	4.48		

APPENDIX 1C

STANDARDS

ANSI/TIA

TIA-526-7, Measurement of Optical Power Loss of Installed Singlemode Fiber Cable Plant—OFSTP-7

TIA-526-14, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant—OFSTP-14

ANSI/TIA-568-C.0-2009, Generic Telecommunications Cabling for Customer Premises.

ANSI/TIA-568-C.0-1-2010, Generic Telecommunications Cabling for Customer Premises – Addendum 1, Updated References for Balanced Twisted-Pair

ANSI/TIA-568-C.0-2-2012, Generic Telecommunications Cabling for Customer Premises – Addendum 2, General Updates

ANSI/TIA-568-C.1-2009, Commercial Building Telecommunications Cabling Standard.

ANSI/TIA-568-C.1-1-2012, Commercial Building Telecommunications Cabling Standard (Addendum 1 – Pathways and Spaces).

ANSI/TIA-568-C.1-2-2011, Commercial Building Telecommunications Cabling Standard - Addendum 2 – General Updates.

ANSI/TIA-568-C.2-2009, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

ANSI/TIA-568-C.2-2-2014, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2: Alternative Test Methodology for Category 6A Patch Cords.

ANSI/TIA-568-C.3-2008, Optical Fiber Cabling Components Standard.

ANSI/TIA-568-C.3-1-2011, Optical Fiber Cabling Components Standard – Addendum 1, Addition of OM4 Cabled Optical Fiber and Array Connectivity.

ANSI/TIA-568-C.4-2011, Broadband Coaxial Cabling and Components Standard.

ANSI/TIA-568.0-D-2015, Generic Telecommunications Cabling for Customer Premises.

ANSI/TIA-568.1-D, Commercial Building Telecommunications Infrastructure Standard.

ANSI/TIA-569-D-2015, Telecommunications Pathways and Spaces.

ANSI/TIA-606-B-2012, Administration Standard for Telecommunications Infrastructure.

ANSI/TIA-607-B-2011, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.

ANSI/TIA-607-B-1-2013, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, Addendum 1 – External Grounding.

ANSI/TIA-607-B-2-2013, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, Addendum 2 – Structural Metal.

ANSI/TIA-570-C-2012, Residential Telecommunications Cabling Standard.

ANSI/TIA-758-B-2012 Customer-Owned Outside Plant Telecommunications Infrastructure Standard.

ANSI/TIA-942-A-2012, Telecommunications Infrastructure Standard for Data Centers.

ANSI/TIA-942-A-1-2013, Telecommunications Infrastructure Standard for Data Centers,

Addendum 1 – Cabling Guidelines for Data Center Fabrics.

ANSI/TIA-1179-2010, Healthcare Facility Telecommunications Infrastructure Standard.

ANSI/TIA-4966-2014 Telecommunications Infrastructure Standards for Educational Facilities.

ANSI/TIA-TSB-162-A Telecommunications Cabling Guidelines for Wireless Access Points.

BICSI

ANSI/BICSI 002-2014, Data Centers Design and Implementation Best Practices.

ANSI/BICSI 003-2014, Building Information Modeling (BIM) Practices for Information Technology Systems

ANSI/BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities

ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design and Implementation Best Practices

ANSI/BICSI 006-2015, Distributed Antenna System (DAS) Design and Implementation Best Practices.

ANSI/NECA/BICSI, 568-2006, Standard for Installing Commercial Building Telecommunications Cabling

NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

Information Technology Systems Installation Methods Manual, Sixth Edition

Network Systems and Commissioning (NSC) reference

Outside Plant Design Reference Manual, Fifth Edition.

Telecommunications Distribution Methods Manual, Thirteenth Edition (Volume 1 and 2)

Electronic Safety and Security Design Reference Manual, Fourth Edition

ANSI / IESNA

ANSI / IESNA RP 29 Lighting for Hospitals and Health Care Facilities;

ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers)

Handbooks (current): Fundamentals, Refrigeration, HVAC Systems and Equipment, HVAC Applications;

Design of Smoke Control Systems;

ASHRAE Guideline 12 Minimizing the Risk of Legionaellosis Associated with Building Water Systems;

52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

55: Thermal Environmental Conditions for Human Occupancy;

62.1: Ventilation for Acceptable Air Quality;

90.1: Energy Efficient Design for New Buildings;

111: Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC systems;

129: Measuring Air Change Effectiveness; and

135: Data Communication Protocol for Building Automation and Control Network;

170: Ventilation for Health Care Facilities

189.1 – Standard for the Design of High Performance Green Buildings

Guideline 0: The HVAC Commissioning process;

Guideline 1.1: HVAC&R Technical requirements for the commissioning process;

Structural and Vibration Guidelines for Datacom Equipment Centers (ASHRAE Datacom Series)

Thermal Guidelines for Data Processing Environment, Fourth Edition (ASHRAE Datacom Series)

ANSI / ASME (American National Standards Institute / American Society of Mechanical Engineers)

A13.1 Visibility Standard (Pipe Labeling);

B16 Piping Component Standards;

B31 Pressure Piping Code;

B36 Piping Standards;

Z358.1: Emergency Eyewash and Shower Equipment;

Section IX: Welding Qualifications; and

Unfired Pressure Vessels;

ASPE (American Society of Plumbing Engineers)

Plumbing Engineering Design Handbook, Volumes 1 – 4;

ASTM (American Society for Testing and Materials)

A185 - Standard Specification for Steel Welded Wire Fabric;

A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;

ASTM C568 - Standard Specification for Limestone Dimension Stone;

ASTM C615 - Standard Specification for Granite Dimension Stone;

ASTM C503- Standard Specification for Marble Dimension Stone;

ASTM C616- Standard Specification for Quartz-Based Dimension Stone;

ASTM E917.24401-1 Life Cycle Cost Assessment Methodology; and

B88: Copper Piping;

CAN ULC

S524 Standards for the Installation of Fire Alarm Systems; and

S537 Standards for Verification of Fire Alarm Systems;

CSA (Canadian Standards Association)

A23.3- (R2010) – Design of Concrete Structures;

B651-: Barrier Free Design;

C9- Dry Type Transformers;

C22.1 & C22.2 Canadian Electrical Code;

C22.3 Canadian Electrical Code Outside Wiring;

C282 Emergency Electrical Power Supply for Buildings;

Z32.09 Electrical Safety and Essential Electrical System in Health Care Facilities;

Z317.5 Illumination Systems in Health Care Facilities;

Z318.5 Commissioning of Electrical Equipment and Systems in Health Care Facilities;

Z8000: Commissioning of Health Care Facilities;

Z462 - Workplace Electrical Safety;

A-22.4, Precast Concrete Materials and Construction Standard

A23.4-Precast Concrete – Materials and Construction;

W186-M1990 - Welding of Reinforcing Bars in Reinforced Concrete Construction;

A370 - Connectors for Masonry;

A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete;

A23.3 The Design of Plain or Reinforced Concrete Structures

S832– Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings);

S478Guideline on Durability of Buildings;

S413 - Parking Structures;

S16- Design of Steel Structures;

S136- Design of Cold Formed Steel Members;

S157– Strength Design in Aluminum;

S304.1- Masonry Design for Buildings;

Z317.1- Special requirements for plumbing installations in Health Care facilities;

Z314.7 Steam sterilizers for Health Care Facilities;

Z317.11Area requirements for Health Care Facilities;

Z317-10.09 Handling of waste materials in Health Care Facilities and Veterinary Health Care Facilities

Z317.13 “Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities”;

CSA S832Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings;

B45 Series: Plumbing Fixtures;

B51: Boiler, Pressure Vessel and Pressure Piping Code

B52HB: Mechanical Refrigeration Code;

B64: Series 94: Backflow Preventers and Vacuum Breakers

B125: Plumbing Fittings;

B139: Installation Code for Oil-Burning Equipment;

B149.1: Natural Gas and Propane Installation Code;

CAN/CSA B651-04 Accessible Design for the Built Environment;

CSA Z7396.1, Pipelines for medical gases, medical vacuum, medical support gases

CSA Z7396.2: Anaesthetic Gas Scavenging Disposal Systems

Z317-2: Special Requirements for Heating, Ventilation and Air-conditioning (HVAC) Systems in Health Care Facilities

CSA 2318.7-95 Commissioning of Communications Systems in Health Care Facilities.

NEMA (National Electrical Manufacturers Association)

NEMA 410 Performance Testing for lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts

NFPA (National Fire Protection Association)

10: Standard for Portable Fire Extinguishers;

13: Standard for Installation of Sprinkler Systems;

14: Standard for Installation of Standpipe and Hose Systems;

17: Standard for Dry-Chemical Extinguishing Systems;

20: Standard for the Installation of Stationary Pumps for Fire Protection;

54: National Fuel Gas Code

58: Liquefied Petroleum Gas Code

55: Compressed Gases and Cryogenic Fluids Code;

56: Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems

70B: Recommended Practice for Electrical Equipment Maintenance;

80: Standard for Fire Doors and Oter Opening Protection

90A: Standard for Installation of Air Conditioning and Ventilation Systems;

92A: Standard for Smoke Control Systems Utilizing Barriers and Pressure Differences;

96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations;

99: Health Care Facilities Code

101: Life Safety Code;

214: Water Cooling Towers;

252: Fire Tests of Door Assemblies

664: Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities; and

701: Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

NSF/ANSI

NSF/ANSI 2 Food Equipment

USP Chapter <797> Pharmaceutical Compounding – Sterile Preparations;

Canadian Society of Hospital Pharmacists Guideline –Sterile Preparation of Medicines: Guidelines for Pharmacies;

Model National Energy Code for Buildings;

TIAC

The TIAC Best Practices Guide

IEEE

802.1 series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging;

802.3 series of Ethernet Standards;

802.11 series of Wireless Standards;

802.15 series of Wireless Standards

ISO 8802-3 series of Standards.

IEEE 519: Recommended Practice and Requirements for Harmonic Control in Electric Power Systems;

IESNA

IESNA DG-17: Fundamentals of lighting for videoconferencing

NETA

ATS International Electrical Testing Association (Acceptance Testing Specifications); and

MTS Standards for Maintenance Testing;

UL 1069 Hospital Signaling and Nurse Call Equipment;

Other

ECABC Seismic Restraint Standards Manual;

Canadian Government ‘Canadian Poisonous Plants Information System’;

Canadian Standards for Nursery Stock;

British Columbia Standard Specification for Highway Construction;

TAC Geometric Design Guide;

Guidelines for Design and Construction of Health Care Facilities;

ICAO / Annex 14, Volume II;

American Conference of Governmental Industrial Hygienists;

BC Weed Control Act;

Invasive Species Council of British Columbia;

Door and Hardware Federations Technical Specifications DHF-TS-001: Door mounted anti-ligature devices for safety and security purposes: November 05.

British Columbia Ministry of Health Standards for Hospital-Based Psychiatric Emergency Services: Observation Units;

New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines;

Lower Mainland Facilities Management Technical Guidelines Division 14 – Vertical Transportation;

Best Practices for Hand Hygiene Facilities & Infrastructure in Healthcare Settings;

Fraser Health Ergonomic Standards for Sitting and Standing Workstations;

Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks;

Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act;

WorkSafe BC Occupational Health and Safety Regulation;

BC Hydro New Construction Energy Modeling Guidelines;

Fraser Health Bariatric Patient Room Design Guidelines;

Fraser Health Patient Handling Equipment Including Ceiling Lift Coverage Requirements – Safe Patient Handling Program: FHA Standard for Facility Design and Equipment Procurement;

Department of Veteran Affairs, Mental Health Facilities Design Guide;

National Association of Psychiatric Health Systems, Design Guide for the Built Environment of Behavioural Health Facilities;

FCI Guidelines for Design and Construction of Healthcare Facilities;

IAHHS Security Design Guidelines for Healthcare Facilities.

American National Standard Practice for Roadway Lighting.

Fraser Health Building Information Management Requirements Overview

Fraser Health Graphic Standards.

Fraser Health Corporate Identity and Brand Standards Manual.

EES Design Guidelines for New Construction and Major Renovations.

Master Municipal Contract Documents, Platinum Edition

City of New Westminster Bylaw No. 7142, 2007.

City of New Westminster Design Criteria.

City of New Westminster Specifications for Underground Electric Distribution Structures.

APPENDIX 1D

SOUND TRANSMISSION RATINGS

1. DEFINITIONS

In this Appendix, in addition to the definitions set out in Schedule 1 of this Agreement:

"**NC**" stands for "noise criteria" and is a single measured noise level that takes into account the frequency content of noise, generally the background noise in a room, as created by building HVAC and other continuously operating systems. NC objectives depend on the use and acoustical sensitivity of the space and typically range from 30 to 40 for sleeping rooms and private offices to 45 to 55 for general offices and commercial spaces;

"**STC**" stands for "sound transmission class" and is a single number rating indicative of a partition's ability to block the transmission of sound directly through it. This sound may be created by speech, building systems and other sources. The higher the STC, the greater the overall reduction in sound levels in passing through a wall or floor. For example, loud speech can be understood fairly well through an STC 30 wall but should not be audible through a STC 60 wall. STC is a laboratory test-based rating of sound insulation that is intended to assess only sound that passes directly through the test partition. When walls are tested in the field they tend to achieve lower ratings due to the "flanking transmission" of sound around the primary barrier via the floor, ceiling and side walls and/or by air gaps and cracks (i.e. sound leakage). In concrete buildings such as hospitals, the field test results, referred to as "Apparent STC", or ASTC, generally tend to be 3 to 5 dB lower than the lab-rated STC; and

"**NIC**" stands for "noise isolation class" and means the measured difference between the spatially-averaged noise levels on the source room side and the receiver room side of a wall or partition. The NIC is therefore more relevant than STC or ASTC in terms of specifying the amount of actual sound insulation that is required between adjacent spaces with particular functions and privacy concerns. Value can be up to 6 dB lower than STC rating NIC then directly indicates the degree of sound insulation that exists between two adjacent rooms and is more straight forward to measure in the field than ASTC.

2. NOISE TRANSMISSION RATINGS

The Design-Builder will:

(a) provide wall and floor assemblies with STC and NIC ratings in accordance with Table 1 below. More specifically, it will be required that when partitions are tested in the field during the commissioning phase, they will achieve the minimum NIC ratings prescribed in Table 1. STC ratings and assemblies for the various partitions should then be selected to assure that the required NIC ratings will be achieved in the field. The necessary STC will generally fall within the range shown in Table 1 but the Design-Builder is responsible for selecting appropriate STC's (and overall room assembles) to achieve the NIC objectives.

(b) where possible, provide buffer zones (e.g. corridors) between noise sensitive areas (e.g. Patient rooms, video-conferencing rooms, meeting rooms and offices) and noise generating areas (e.g. service areas and lounges);

(c) where possible, avoid vertical and horizontal adjacencies between noise generating and noise sensitive areas;

(d) in order to achieve the required level of speech privacy (speech privacy for confidentiality is critical), extend the STC rated assembly full-height from floor to the underside of structure above for all walls and partitions listed in Table 1. If such a wall or partition cannot extend full height, provide an alternate system and provide an acoustic consultant's report verifying that the required NIC rating will be achieved with the proposed design;

(e) for doors and glazing located in walls required to have a specified STC rating refer to Schedule 1 [Statement of Requirements], Section 5.3.7 Acoustic Treatment. For doors in the Large Multipurpose room refer to Appendix 1J(I) [RCH MSHU Large Multipurpose Room Specifications]. For doors in rooms in the Mental Health and Substance Use Clinical Education and Applied Research Program refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications].;

(f) provide horizontally folding partitions where identified in Appendix 1A [Clinical Specifications] that will provide STC 40 at minimum. These folding partitions will not be subject to NIC field testing. For vertically folding partitions refer to Section 6.9.12 of Schedule 1 [Statement of Requirements].

Table 1 – STC Ratings and NIC Ratings of Demising Walls and Floors

Adjacency combination		**STC / NIC- Walls**	**STC/ NIC - Floors**
Patient Bedroom	Patient Bedroom	(43-49)/42	(48-54)/47
Patient Bedroom	Corridor	(43-49/42	(48-54)/47
Patient Bedrooms	Any other space	(48-54)/47	(48-54)/47
Secure room	Any space	(53-59)/52 (e)	(48-54)/47
Exam/Treatment room	Corridor	(43-49)/42	(48-54)/47
Exam/Treatment room	Public Space, Administrative Space, Meeting rooms, Service spaces	(48-54)/47 (e)	(48-54)/47
Exam/Treatment room	Staff Lounges	(53-59)/52 (e)	(48-54)/47
Consultation/Therapy rooms	Corridor	(43-49)/42	(48-54)/47
Consultation/Therapy rooms	Public Space, Administrative Space, Meeting rooms, Service spaces	(48-54)/47 (e)	(48-54)/47
Consultation/Therapy rooms	Staff Lounges	(53-59)/52 (e)	(48-54)/47
Meeting Room	Corridor	(43-49)/42	(48-54)/47
Meeting room	Any other space	(48-54)/47 (e)	(48-54)/47
Consult Therapy rooms	Any space	(48-54)/47 (e)	(48-54)/47
Life Skills Assessment room	Corridor	(43-49)/42	(48-54)/47
Life Skills Assessment room	Any other space	(48-54)/47	(48-54)/47

Adjacency combination		STC / NIC- Walls	STC/ NIC - Floors
Washroom	Any Space	(43-49)/42	(48-54)/47
Office	Any space	(43-49)/42	(48-54)/47
Staff Lounges	Corridor and public spaces	(43-49)/42	(48-54)/47
Staff Lounges	Any other space	(48-54)/47	(48-54)/47
Locker Rooms	Any space	(43-49)/42	(48-54)/47
Conference room	Any space	(48-54)/47 (e)	(48-54)/47
Lounge (quite)	Any Space	(53-59)/52	(48-54)/47
Comfort room	Any space	(53-59)/52	(48-54)/47
Service Rooms	Any Occupied Space	(53-59)/52	(48-54)/47
Exercise/Wellness room	Any Occupied Space	(48-54)/47	(48-54)/47

Table 1 - Notes:

(a) "Public Space" includes lobbies, waiting rooms, reception areas, and similar spaces.

(b) "Service Areas" include, elevators, elevator machine rooms, laundries, garages, maintenance rooms, mechanical and boiler rooms and similar spaces.

(c) The airborne sound insulation requirements for walls and floors have been specified in terms of both their indicative STC ratings (lab-test based) and the NIC ratings that are required to be achieved should the wall be subjected to a post-construction field test. The Design-Builder may decide to select somewhat higher STC ratings in order to provide greater certainty that NIC objectives will be achieved in the field.

(d) As not all possible adjacency combinations are listed in Table 1, the Design-Builder will, based on similar adjacency combinations, room type, functionality, intent and purpose of the room, proposed the corresponding STC for the assemblies in such new adjacency combination

(e) Rooms/adjacencies where a high level of speech privacy is required.

(f) For STC and NIC ratings of demising walls and floors of spaces and rooms listed in Table 1 that may have same or similar room names or functionality but belong to the Mental Health and Substance Use Clinical Education and Applied Research Program refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications].

3. NOISE CRITERIA WITHIN VARIOUS SPACES

The Design-Builder will:

(a) in undertaking the design of the Facility, evaluate the expected noise from all mechanical systems in the Facility using the NC rating system; and

(b) design and construct the Facility so that spaces are designed to have building systems noise levels which fall within the NC ranges shown in Table 2 below. Further, building system noise shall not feature any rattles or noticeable tonal characteristics.

Table 2 - Noise Criteria - Rating Within Various Spaces

Room Type	NC
Exam/Treatment Room	30-35
Multiple occupant Patient care areas	35-40
Corridors and public spaces	35-40
Therapy rooms	30-35
Offices	30-35
Conference/meeting rooms	30-35
Multimedia rooms	25 (max)
Patient Bedrooms	35-40
Secure rooms	35-40
Consultation rooms	35-40
Exercise Rooms	40-45
Sally Port and Sally Port Secure Vestibule	35-40

Table 2 - Notes:

(a) As not all type of spaces may be covered in Table 2, the Design-Builder will, based on similar type of space, its functionality, intent, and purpose, proposed the corresponding NC in such space.

(b) For NC ratings of spaces and rooms listed in Table 2 that may have the same or similar room names or functionality but belong to the Mental Health and Substance Use Clinical Education and Applied Research Program refer to Appendix 1J(II) [Clinical Education and Applied Research Space Infrastructure Specifications].

4. SOUND ABSORPTIVE SURFACES – REVERBERATION TIMES COEFFICIENTS

The Design-Builder will:

(a) All normally occupied spaces will incorporate acoustic (sound absorptive) surfaces so as to achieve the Reverberation Times (RT's) indicated in Table 3 when measured in a field test during the commissioning phase. RT is the time taken for sound levels in a room to decrease by 60 decibels after the sound source is abruptly shut off. It is the most widely used measure of the acoustical "liveliness" of a space and hence its capacity to amplify or supress noise created in the space.

Table 3 – Maximum Room Reverberation Times

Space		**Reverberation Time (Seconds)**
Patient Bedroom		0.8
Corridor		0.8
Medication room		0.6
Offices		0.8
Consultation rooms		0.6
Therapy rooms		0.5
Multiple occupant Patient care areas		0.5
Multimedia rooms		0.5
Atrium /Lobby		1.0
Waiting area /reception		0.7
Meeting rooms		0.5
Dining rooms		0.8
Exercise rooms		0.8

Table 3 - Notes:

(a) As not all type of spaces may be covered in Table 3, the Design-Builder will, based on similar type of space, its functionality, intent, and purpose, proposed the corresponding Minimum Room Reverberation Time in such space.

(b) The maximum Reverberation Time can be exceeded in rooms/spaces if it can be shown that it is not possible to satisfy the maximum Reverberation Time due to safety/security restrictions on surface finishes. However, Reverberation Times will still be reduced to the extent possible in these spaces.

Appendix 1E Door Operations Matrix

	Room or Area Type	Secure	Emergency Power: Fail Safe	Emergency Power: Fail Secure	Door Operator	Card Reader: Access Control	Card Reader: Access Control Reader Placement	Latch: Concealed Panic Hardware	Latch: Panic Hardware - Delayed Egress	Latch: Lever Set	Latch: Classroom Lock	Latch: Privacy Set w/ Indicator	Latch: Privacy Set	Closer: Concealed Closer	Closer: Delayed Closer	Door: Swing	Door: Slide	Hold Open: Electric Hold Open	Hold Open: Mechanical Hold Open Device	Door Positioning Switch	Remote Lock & Release	Request to Exit (Pushbutton)	Automatic operator - motion sensor	For ESS functionality refer to 7.10.
Corridors & Departments	Exterior Perimeter - Main Entry Points	■	■		■	■	A							■			■			■	X		■	Door unlocked during regular business hours. After hours Main Entry will door will be controlled by each Unit and the Security Station
	Exterior Perimeter - Non Public Entry	■		■		■	A	■						■		■				■				Door secured at all times; no public entry
	Interior Department Perimeter	■		■		■	C	■						■		■				■		■		Secured at all times, with Staff override.
	Exterior Perimeter - Access to Secure Patient Outdoor Spaces	■		■	■	■	B/C	■		■				■		■				■	■			Access Control from Corridor, Dining Room Lounge will be on the inside only (B); access to exit will be unlocked at all times. Access Control at large Group Therapy will be on both sides (C).
	Double Egress - Public Areas - Corridors	■		■	■	■	C	■						■		■				■	■			Provide door operator with motion sensor if doors need to remain in closed position.
	Double Egress - Staff/Patient Areas - Corridors	■	■		■	■	C	■						■		■				■				Door secured at all times
	Interior Exit Stair Doors - Public Areas	■	■			■	B		■					■		■				■	■			
	Interior Exit Stair Doors - Staff/Patient Areas (Departments) - Corridors	■	■			■	C	■						■		■				■				
	Exterior Exit Stair Doors	■		■		■	C	■						■		■				■				
	Secure Vestibule - Inpatient Units	■		■		■	C			■				■		■				■	X			Elevator Vestibule will have Remote Release control by the Care Team Base and the Reception Desk. Doors secured at all times. Interlocked with Elevator Lobby doors
	Elevator Vestibule - Inpatient Units	■		■		■	C			■				■		■				■	X			Elevator Vestibule will have Remote Release control by the Care Team Base and the Reception Desk. Doors secured at all times. Interlocked with Secure Vestibule doors
	Sallyport	■		■		■	A							■						■	X			Overhead rolling door & man-door.Sallyport to have phone/intercom with camera. Door opening controlled by each Unit.

Appendix 1E Door Operations Matrix

	Room or Area Type	Secure	Emergency Power: Fail Safe	Emergency Power: Fail Secure	Door Operator	Card Reader: Access Control	Card Reader: Access Control Reader Placement	Latch: Concealed Panic Hardware	Latch: Panic Hardware - Delayed Egress	Latch: Lever Set	Latch: Classroom Lock	Latch: Privacy Set w/ Indicator	Latch: Privacy Set	Closer: Concealed Closer	Closer: Delayed Closer	Door: Swing	Door: Slide	Hold Open: Electric Hold Open	Hold Open: Mechanical Hold Open Device	Door Positioning Switch	Remote Lock & Release	Request to Exit (Pushbutton)	Automatic operator - motion sensor	For ESS functionality refer to 7.10.
Inpatient Areas - Inpatient Bedrooms and Patient Support/Therapy Zone	Patient Bedroom	■	■			■	A			■			■			■								Patients able to mechanically lock doors from inside room. Staff able to override lock from Patient Corridor; Door override function to allow access should door be blocked on inswing side. Door capable of remaining in an open position.
	Patient Bedroom PHAU									■						■								Door not lockable by Patients.Door capable of remaining in an open position.
	Ensuite									■	■					■								Capable of remaining in an open position. Staff able to lock to restrict priviliges to bathroom access.
	Patient Bedroom Bariatric Contact Isolation	■	■			■	A			■			■			■								Patients able to mechanically lock doors from inside room with exception of PHA Unit. Staff able to override lock from Patient Corridor; Door override function to allow access should door be blocked on inswing side. Door capable of remaining in an open position.
	Patient Bedroom Bariatric Contact Isolation Ensuite									■	■					■								
	Care Team Base (Closed Portion)	■		■		■	C			■				■		■				■	■			
	Care Team Base (Open Portion)	■		■		■	C			■				■		■				■	■			
	Secure Room	■		■		■	A									■				■	■			Door locked immediately upon closing to prevent Patients from pushing the door open. Electric doors with 3 points of contact. No Latching in the floor.
	Secure Room Ante Room	■		■		■	B									■				■				Recessed handles, man trap function; Intercom and CCTV monitor to be located on non hinge side of the door.
	Individual Consult Therapy Room									■						■								Door lockable from inside (office function).
	Large Consult Therapy Room									■						■								Door lockable from inside (office function).
	Large Group Therapy Room									■						■								Door lockable from inside (office function).
	Life Skills Assessment Room									■						■								Door lockable from inside (office function).
	Allied Health Room									■						■								Door lockable from inside (office function).
	Lounge (Quiet)									■	■					■								
	Social Work Office	■		■		■	A			■						■				■				
	Nursing Leader Office (PCC, CNE)	■		■		■	A			■						■				■				
	Exercise/Wellness Room									■	■					■								
	Comfort Room									■	■					■				■				
	Tub Room	■		■		■	A				■					■				■				
	Exam/Treatment Room									■	■					■								
	Patient/Public Washroom		■							■		■	■			■				■				
	Laundry Facility									■	■					■								
	Visitor Lounge									■	■					■								

Appendix 1E Door Operations Matrix

	Room or Area Type	Secure	Emergency Power: Fail Safe	Emergency Power: Fail Secure	Door Operator	Card Reader: Access Control	Card Reader: Access Control Reader Placement	Latch: Concealed Panic Hardware	Latch: Panic Hardware - Delayed Egress	Latch: Lever Set	Latch: Classroom Lock	Latch: Privacy Set w/ Indicator	Latch: Privacy Set	Closer: Concealed Closer	Closer: Delayed Closer	Door: Swing	Door: Slide	Hold Open: Electric Hold Open	Hold Open: Mechanical Hold Open Device	Door Positioning Switch	Remote Lock & Release	Request to Exit (Pushbutton)	Automatic operator - motion sensor	For ESS functionality refer to 7.10.
Staff and Clinical Support Areas	Medication Room	■		■	■	■	A			■				■		■				■			■	Restricted access, hands free door operation. Dual authentication access.
	Reception	■		■		■	C			■				■		■				■	X			
	Staff Conference Room	■		■		■	A			■				■		■				■				
	Staff Lounge	■		■		■	A			■				■		■				■				
	Staff Washroom	■	■			■	A			■		■				■				■				
	Physician Lead Office	■		■		■	A			■						■				■				
	Work Room	■		■		■	A			■				■	■	■				■				Note: part of Care Team Base, same requirements apply.
	Central Storage Room	■		■		■	A			■				■	■	■				■				
	Clean Supply Room	■		■		■	A			■				■	■	■				■				
	Soiled Utility	■		■		■	A			■				■	■	■				■				
	Soiled Holding	■		■		■	A			■				■	■	■				■				
	Housekeeping Closet	■		■		■	A			■				■	■	■				■				

Appendix 1E Door Operations Matrix

	Room or Area Type	Secure	Emergency Power: Fail Safe	Emergency Power: Fail Secure	Door Operator	Card Reader: Access Control	Card Reader: Access Control Reader Placement	Latch: Concealed Panic Hardware	Latch: Panic Hardware - Delayed Egress	Latch: Lever Set	Latch: Classroom Lock	Latch: Privacy Set w/ Indicator	Latch: Privacy Set	Closer: Concealed Closer	Closer: Delayed Closer	Door: Swing	Door: Slide	Hold Open: Electric Hold Open	Hold Open: Mechanical Hold Open Device	Door Positioning Switch	Remote Lock & Release	Request to Exit (Pushbutton)	Automatic operator - motion sensor	For ESS functionality refer to 7.10.
Outpatient Areas, Mental Health and Substance Use Clinical Education and Applied Research	Security Office	■		■		■	A			■				■		■				■				Refer to notes Exterior Perimeter/ Main Entry Points.
	Reception/Registration Desk	■		■		■	A			■				■		■				■	X			Entry Doors to Outpatient Waiting Area are unlocked; free access. Doors locked at all times.
	ECT Patient Change Room									■			■			■								
	ECT Treatment Room				■					■	■						■							As part of the Neurostimulation Clinic this room will have controlled access at the perimeter of the Clinic area only.
	ECT Post Recovery Room									■	■					■								As part of the Neurostimulation Clinic this room will have controlled access at the perimeter of the Clinic area only.
	ECT Recovery Room									■	■					■								As part of the Neurostimulation Clinic this room will have controlled access at the perimeter of the Clinic area only.
	TMS Room				■					■	■					■								As part of the Neurostimulation Clinic this room will have controlled access at the perimeter of the Clinic area only.
	Consultation / Therapy Room High Risk									■	■					■								Door lockable from inside (office function).
	Consultation / Therapy Room									■	■					■								Door lockable from inside (office function).
	Large Consultation / Therapy Room									■	■					■								Door lockable from inside (office function).
	Exam / Treatment Room									■	■					■								Inlcudes Exam rooms in Outpatient Area, PTOP Clinic and ECT/TMS.
	Large Group Therapy Room									■	■					■								Door lockable from inside (office function).
	Observation Room									■	■					■								Door lockable from inside (office function).
	Patient Observation Lounge (PTOP)	■		■		■	A			■				■		■				■	■			
	Department Head	■	■			■	A			■						■				■				
	Video Conference Room	■	■			■	A			■					■	■			■	■				
	Multipurpose Room	■	■			■	A			■				■		■				■				
	Seminar/Small Group Therapy	■	■			■	A			■				■		■				■				
	Learners' Lounge	■	■			■	A			■				■		■				■				
	File Storage	■				■	A			■				■		■				■				
	Testing Rooms (Clinical Skills)	■				■	C			■				■		■				■				
	Large Multipurpose Room 120 seats	■	■			■	A			■				■		■		■		■				
	Staging/Preparation Room	■		■		■	A			■				■		■				■				
	Patient/Public Washroom (Male)		■							■		■				■				■				
	Patient/Public Washroom (Female)		■							■		■				■				■				
	Patient/Public Washrooms (multi-stall)									■						■								Deadbolt required
	Patient Washroom		■							■		■				■				■				
	Projection Room	■		■		■	A			■				■		■				■				
	Communication Room	■		■		■	A			■				■	■	■				■				Requirements applicable to all Communication rooms in the Facility
	Electrical/Mechanical Room	■		■		■	A			■				■		■				■				Requirements applicable to all Electrical/Mechanical rooms in the Facility

Appendix 1E Door Operations Matrix

	Room or Area Type	Secure	Emergency Power: Fail Safe	Emergency Power: Fail Secure	Door Operator	Card Reader: Access Control	Card Reader: Access Control Reader Placement	Latch: Concealed Panic Hardware	Latch: Panic Hardware - Delayed Egress	Latch: Lever Set	Latch: Classroom Lock	Latch: Privacy Set w/ Indicator	Latch: Privacy Set	Closer: Concealed Closer	Closer: Delayed Closer	Door: Swing	Door: Slide	Hold Open: Electric Hold Open	Hold Open: Mechanical Hold Open Device	Door Positioning Switch	Remote Lock & Release	Request to Exit (Pushbutton)	Automatic operator - motion sensor	For ESS functionality refer to 7.10.
Energy Centre	Main Exterior Entry	■		■	■	■	A	■						■		■				■	■		■	Key controlled hold open on operator. No motion sensor.
	Misc. Exterior Entries	■		■		■	A	■						■		■				■				
	Exit Stairs	■		■		■	B	■						■		■				■				no manual re-entry at stairwells. Access Control at stairwell entry points to Energy Centre-typ
	Exit Stair Vestibules							■						■		■								
	Chiller Rm Vestibule Entry	■		■		■	A	■						■		■				■				Access Control at all Vestibule entries from Parkade
	Secondary Water Intake Rm										■			■		■								
	DES Entry Rm	■		■		■	A				■			■		■				■				
	Heating Plant																							
	Fuel Tank Rms											■				■				■				
	Chiller Plant							■			■			■		■								
	Chiller Plant Vestibule Entry	■		■		■	A	■						■		■				■				Access Control at all Vestibule entries from Parkade
	Electrical Rms	■				■	A	■						■		■								
	Control Room	■	■			■	A	■						■		■				■				
	Workshop									■				■		■								
	Workshop Offices										■					■								
	Staff Room/Kitchenette/Locker Area	■		■			A			■				■		■				■				
	Female Staff Washrm/Shower/Change Rm													■	■	■								
	Male Staff Washrm/Shower/Change Rm													■	■	■								
	Stack Rm/Storage Rm/Misc Rm									■				■		■								
	Generator Rms/Generator Silencer Rm							■			■			■		■								
	Communications Rm	■		■		■	A			■				■		■				■				
	Service Corridor Link	■	■			■	C								■	■		■						
	Bridge/Corridor Link	■	■			■	C								■	■		■						
	Cooling Towers	■		■		■	A			■						■				■				
	Elevator Machine Rm	■		■		■	A			■				■		■				■				

Notes

1. Matrix identifies representative door operations.
2. All door hardware to be ligature resistant and tamper proof fasteners typical.
3. Secure = Door is capable of being locked with an electronic door lock device
4. Emergency Power - Fail Safe = Door moves to unlocked position in event of power failure
   Emergency Power - Fail Secure = Door moves to locked position in event of power failure
   If Emergency power requirements are in conflict with any regulatory requirements, the regulatory requirements will govern (TBC).
5. Door Operator = Powered automatic door operator
6. Access Control Reader Placement
   A = Single Card Reader on the outside of room/space side of door
   B = Single Card Reader on the inside of room/space side of door
   C = Dual Card Readers on both sides of door
7. Electric Hold Open = Hold open tied to Fire Alarm and releases door on Fire Alarm.
8. Remote Release = Door can be unlocked from the Care Team Base.
9. Cells shaded in grey indicate that the applicable item is required for that room or zone type
10. Some specific doors can be unlocked remotely by both the Security Station and another post in the Campus (see rooms marked with "X" and green shaded in "Remote Lock & Release" column above)
11. Notwithstading any requirements indicated in this matrix, the Design -Builder will comply with all code requirements as applicable.
13. For audible alarm (local sounder) requirements refer to Section 7.10.4 Access Control in Schedule 1 [Statement of Requirements].
13. For audible alarm (local sounder) requirements refer to Section 7.10.4 Access Control in Schedule 1 [Statement of Requirements].

Time Schedule – Baseline 0.1

The Time Schedule – Baseline 0.1 shall become the Time Schedule under the Agreement with approval of the Authority.

Schedule Status Report

The Schedule Status Report shall meet the following criteria:

i. Section Time Schedules;
ii. Format of the Time Schedule Status Report – Baseline 1.0/2.0;
iii. Include a Draft Monthly Time Schedule Status Report that meets the following criteria:
    a. Section Time Schedules;
    b. Format of the Monthly Time Schedule Status Report;

2-Week Look-Ahead Schedule Design

The 2-Week Look-ahead Schedule Design shall meet the following criteria:

i. Section Time Schedules;
ii. Format of the 2-Week Look-ahead Schedule;
iii. Be based on the Time Schedule – Baseline 0.1;
iv. Include sufficient exemplary design stage data to satisfy the requirements of the Draft 2-Week Look-ahead Status Report.

2-Week Look-Ahead Schedule Implementation

The 2-Week Look-ahead Schedule Implementation shall meet the following criteria:

i. Section Time Schedules;
ii. Format of the 2-Week Look-ahead Schedule;
iii. Be based on the Time Schedule – Baseline 0.1
iv. Include sufficient exemplary construction stage data to satisfy the requirements of the Draft 2-Week Look-ahead Status Report.

2-Week Look-Ahead Status Report

The 2-Week Look-ahead Status Report shall meet the following criteria:

i. Section Time Schedules;
ii. Format of the 2-Week Look-ahead Status Report;
iii. Be based on the Draft 2-Week Look-ahead Schedule Design and the Draft 2-Week Look-ahead Schedule Construction;
iv. and
v. Six (6) exemplary data entries for each log the report shall include, i.e. three (3) for the design stage and three (3) for the construction stage.

Time Schedule – Baseline 0.2

The Time Schedule – Baseline 0.2 shall meet the following criteria:

i. Section Time Schedules;
ii. Named according to Section Time Schedules;
iii. Format of the Time Schedule Status Report – Baseline 1.0/2.0; and

The Time Schedule – Baseline 0.2 shall become the Time Schedule under the Agreement with approval of the Authority.

Schedule Status Report

The previously submitted Schedule Status Report shall be updated with, changes shall be highlighted, and the report submitted to the Authority for review and approval.

Time Schedules

1. Definitions

"Time Schedule"	Upon approval by the Authority, the approved and baselined version of the Design-Builder's Time Schedule – Baseline 1.0/2.0 or Monthly Time Schedule Update becomes the schedule with which all parties plan and schedule their work and against which progress is monitored and reported, the Time Schedule under the Agreement.
"Schedule Information"	Time Schedules, Schedule Status Reports and other schedule related information owed by the Design-Builder under the Agreement.
"Time Schedule"	All schedules developed by the Design-Builder including but not limited to the Time Schedule – Baseline 1.0/2.0, the Monthly Time Schedule Update, the 2-Weekly Look-ahead Time Schedule, and the As-built Time Schedule.
"Schedule Status Report"	All schedule related reports developed by the Design-Builder including but not limited to the Time Schedule Status Report – Baseline 1.0/2.0, the Monthly Time Schedule Status Report and the 2-Week Look-ahead Status Report.

2. General

The Design-Builder shall prepare all Schedule Information as specified herein. The Work under the Agreement shall be planned, scheduled, executed, and reported by the Design-Builder. The Design-Builder shall show the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities in the Time Schedule. Design-Builder personnel must actively participate in the development of all Schedule Information. Subcontractor and Design-Builder's Consultant must also contribute to the development and maintenance of accurate Schedule Information. The Design-Builder shall prepare Schedule Information that is a forward planning as well as a monitoring tool.

3. Scheduler Qualifications

The Design-Builder shall designate a Design-Build Scheduler The Design-Build Scheduler shall have at least three (3) years of verifiable experience in successfully preparing and maintaining CPM schedules on large scale projects of similar type and complexity. The Design-Build Scheduler shall be primarily responsible for the development and maintenance of the Design-Builder's Schedule Information and shall represent the Design-Builder in all scheduling meetings on discussions or major issues concerning the Schedule Information.

4. Methodology

The Design-Builder shall deploy the Critical Path Method (CPM) when developing and maintaining the Time Schedule. The CPM is a scheduling technique that utilizes activity durations and network logic to calculate the schedule for an entire project. A CPM schedule is a network-based schedule that graphically depicts the timing of activities, interrelationships between the activities, and the critical path. Furthermore, a CPM schedule:

i. Is based on the Precedence Network Diagram Method (PDM), which is used to link related activities in order of precedence to create the project network logic.
ii. Calculates the earliest and latest possible dates within which an activity can be performed based on its position within the network.
iii. Defines the inter-relationships between the activities; therefore, the project network logic and critical path critical path (the Longest Path for this project) are defined. Any delay to an activity on the critical path will delay completion of a related interim milestone or the project, as applicable.
iv. Can be used to depict activities in either a time-scaled bar-chart format or network logic diagram with connecting lines depicting the inter-relationships between the activities.

5. Settings

The following settings are default settings for the Design-Builder to develop the Time Schedule.

5.1 Project Identification

The Design-Builder shall apply the following settings:

i. The Project ID must be unique for each submission and shall be comprised of the identifier "MHSU" (Mental Health and Substance Use Unit);
ii. The Project Name shall be comprised of the following:
    a. Project ID;
    b. Two digit, numerical descriptor for the approved baseline the schedule is built upon preceded by a capital "B" and separated by an underscore;
    c. Numerical descriptor for version control preceded by a capital "V" and separated by an underscore;
    d. The Data Date in the format day month year (i.e. 31122015 for December 31st, 2015) underscore preceded by a capital "DD" and separated by an underscore.
iii. The following is example of a Project Names for a Time Schedule with the Project ID "MHSU", with the approved Baseline 0.1, schedule Version 1 and a Data Date of December 31st, 2015: MHSU_B0.1_V1_DD31122015.

The version number shall be increased by one (1) with each new submission (i.e. MHSU_B0.1_V1_DD31122015, MHSU_B0.1_V2_DD04012016, MHSU_B0.1_V3_DD05012016, etc.) and the baseline descriptor shall be changed when the Authority has approved a new baseline and the new schedule is built with the new and approved baseline (i.e. MHSU_B0.1_V1_DD31122015, MHSU_B0.2_V2_DD04012016, MHSU_B0.3_V3_ DD05012016 etc.).

5.2 Project Dates

Project Planned Start and Must Finish By dates shall be defined as follows:

i. The Planned Start date shall be equal to date of issuance of the Notice of Award;
ii. The Must Finish By date shall be equal to the fixed date for Total Completion as per the Agreement.

5.3 Project Activity Default Settings

The Design-Builder shall apply the following settings:

i. Duration Type: Specify Fixed Duration & Units as the default duration type;
ii. Percent Complete Type: The default percent complete type shall be specified as “Physical”.
iii. Activity Type: Specify “Task Dependent” as the default activity type. The Activity Type may be modified for each individual activity, as necessary and if approved or instructed by the Authority.
iv. Calendar: Specify a default Project-level calendar that will be assigned to new activities. Specific Project-level calendars may be assigned at the activity level to individual activities, as necessary and if approved or instructed by the Authority.

5.7 Date Format

Schedule dates shall be shown in the “Day-Month-Year” format, with 2-digit numbers for the day and year and an abbreviated descriptor for the month, e.g. 15-Oct-15.

5.9 Admin Preferences

5.9.1 General

The Design-Builder shall define and assign the following settings:

i. Starting Day of the week for calendars: “Monday”.

5.9.2 Time Periods

The Design-Builder shall define and assign the following settings:

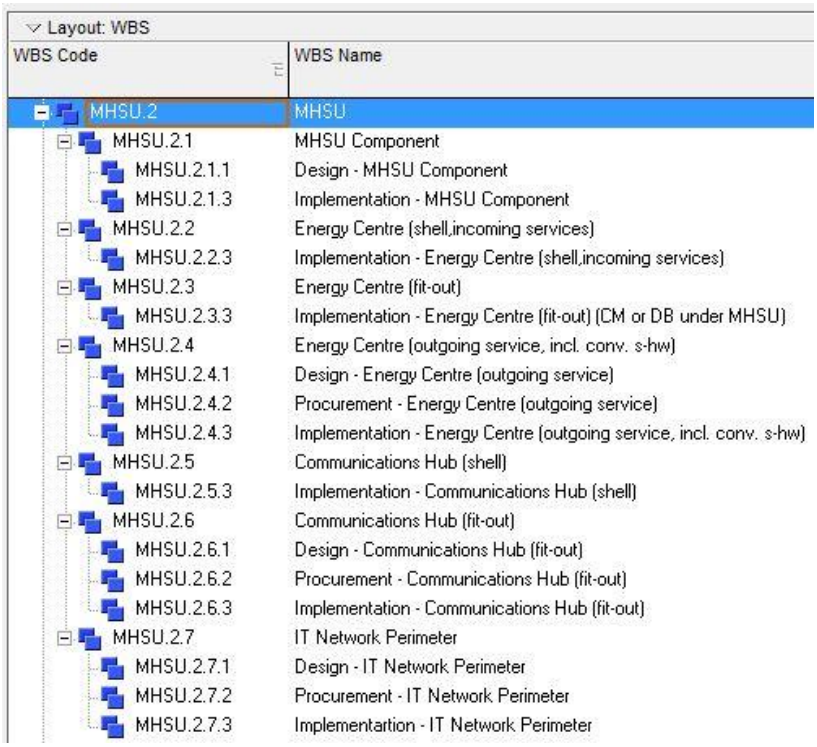
i. Hours per Time Period: Hours/Day 8, Hours/Week 40, Hours/Month 173.33, Hours/Year 2080;
ii. Check “Use assigned calendar to specify the number of work hours for each time period.

6. Properties

6.1 WBS Properties

For scheduling purposes, the Project consists of seven (7) Components delivered by the Design-Builder according to the methodologies assigned to the Components in the following table:

#	Component	Delivery Methodology
1.	MHSU	Design-Build
2.	Energy Centre (shell,i/services)	DB
3.	Energy Centre (fit-out)	Design-Build
4.	Energy Centre (o/services, incl. conversion steam to hot water)	Design-Builder TBD
5.	Communications Hub (shell)	Design-Build
6.	Communications Hub (fit-out)	Authority
7.	IT Network Perimeter	Design-Builder



The WBS subcategories Design, Procurement and Implementation shall capture activities including but not limited to the following:

Design:

- All design and engineering activities for the Component and applicable subComponents. Design activities related to the Components Energy Centre (shell,i/services), Energy Centre (fit-out), and Communications Hub (shell) shall be captured WBS Code MSHU 2.1.1 Design – MHSU Component.

The Components Energy Centre (o/services, incl. conversion steam to hot water), Communications Hub (fit-out), and IT Network Perimeter have their own design WBS subcategory to capture design, engineering and permit related activities.

- All activities related to the development, submission, coordination and obtaining of the Development and Building Permit.
- Authority review and approval periods and dates.
-

Implementation:

- Mobilization and demobilization.
- Construction.
- Start-up and Commissioning.
- Submissions by the Design-Builder to the Authority.
- Authority review and approval periods and dates.
- Training.
- Preparation and submission of As-built and O&M materials.
- Close-out activities.

6.2 Activity Properties

1.6.2 Activity Name

Activity Name shall be unique and recognizable. It shall identify the feature, phase, type of operation, and location of the work.

1.6.3 Activity Duration Type

Duration Type shall be defined as Fixed Duration & Units.

1.6.4 Activity Percent Complete Type

The Percent Complete Type shall be defined as “Physical”. The Design-Builder shall ensure that the percent complete and remaining duration are manually updated for each progressed activity to reflect the amount of work completed and amount of time required to complete the remaining work as of the data date.

1.6.5 Activity Type

Activity Type shall be defined as “Task Dependent”, unless the activity is a WBS Summary activity, Start Milestone activity, Finish Milestone activity, or Level of Effort activity. Use of “Resource Dependent” activities shall be on a case-by-case basis and the Design-Builder shall suggest activities for approved by the Authority.

1.7 Activity Duration

Activity duration shall be reasonable to allow for an accurate determination of progress of ongoing activities between update periods. Activity durations shall be defined and assigned as follows:

i. Durations shall be defined in number of workdays except for activities that are assigned a 7-day calendar. For such activities, activity durations shall be defined in calendar days.
ii. Durations for on-site work activities shall not exceed fifteen (15) workdays or thirty (21) calendar days, unless specified in the Agreement or approved by the Authority.
iii. Longer durations may be allowed for certain activities that typically span long periods of time and cannot be feasibly broken down into discrete activities. Such activities may include procurement activities such as fabrication and delivery of long lead materials, activities for settlement, curing, or testing periods, or activities included for work by third parties or the Authority. The durations

for such activities shall not include intermittent periods of inactivity of more than ten (10) workdays. In such cases the activity shall be split to show discrete period(s) of work, unless approved by the Authority.

1.8 Activity Codes

6.3 Calendars

The Design-Builder shall define and assign as appropriate, project-specific calendar to each activity to indicate when the activity can be performed. The Design-Builder shall define the project calendars using the project-level option. The project calendars shall indicate, as applicable, the standard working hours per day, standard working days per week, and non-work days such as week-ends, holidays, weather days, local events, environmental, time-of year restrictions, etc. Use of global calendars shall not be allowed and shall be justification for rejecting the Progress Schedule submission.

The project calendars shall be defined and assigned as follows:

i) Standard Working Calendar: Define and assign a standard 4-day, 5-day, or 6-day calendar, as applicable to activities and milestones that will be completed during the Design-Builder's normal working schedule. The Design-Builder's standard working calendar must indicate the standard work hours, work days, and any planned or anticipated non-work days such as week-ends, holidays, special events, weather days, etc.

ii) Standard 7-Day Calendar: Define and assign a standard 7-day calendar (without holidays or other non-work days) to activities that are not constrained by week-ends, holidays, weather, or other non-work day restrictions. The 7-Day Calendar may also be used for activities whose durations are specified in calendar days rather than work days. Such activities may include Authority review, administrative, procurement, fabrication, curing period, load test period, etc.

iii) Special Calendars: Define and assign standard 4-day, 5-day, or 6-day special calendars such as Seasonal, Environmental, Weather, or Winter Shutdown, as applicable, for weather sensitive activities that are typically affected by adverse weather or other activities that are constrained by temperature, seasonal, or environmental restrictions that do not permit work during such conditions or time of year. Such calendars may be based on the Design-Builder's standard working calendar, with exclusions for the additional non-work periods.

iv) Other Special Calendars: Define and assign other standard 4-day, 5-day, or 6-day special calendars, as applicable, for activities to be performed by Subcontractors, utilities, or other involved parties, whose working calendars are different from the Design-Builder's normal working calendar.

6.4 Schedule Constraints

The Design Builder's use of schedule constraints with the exception of the specific requirements defined below is not allowed, unless approved by the Authority. The use of schedule constraints such as "Start On" or "Finish On" for the purpose of manipulating float or the use of schedule constraints that violate network logic such "Mandatory Start" or "Mandatory Finish" shall not be allowed. When a schedule constraint is used, other than the schedule constraints defined below, the Design-Builder shall provide explanation for the use of such constraint. The explanation shall be provided within the narrative of the Monthly Time Schedule Status Report. Milestone activities for Agreement mandated milestones shall be constrained as follows:

i. All milestone activities for Agreement mandated milestones shall be constrained with a date equal to the associated dates, as specified in the Contract and as follows:

a) Start-no-earlier-than Agreement milestone activities shall be constrained with a "Start On or After" milestone date;
b) Start-no-later-than Agreement milestone activities shall be constrained with a "Start On or Before" milestone date;
c) Finish-no-earlier-than Agreement milestone activities shall be constrained with a "Finish On or After" milestone date;
d) Finish-no-later-than Agreement milestone activities shall be constrained with "Finish On or Before" milestone date.

ii. For Agreements that include a Agreement provision with requirements to complete the Work or a portion of the Work by a specified interim completion milestone date, the interim completion milestone activity shall be constrained with a "Finish On or Before" date equal to the Agreement specified "Must Finish By" date.

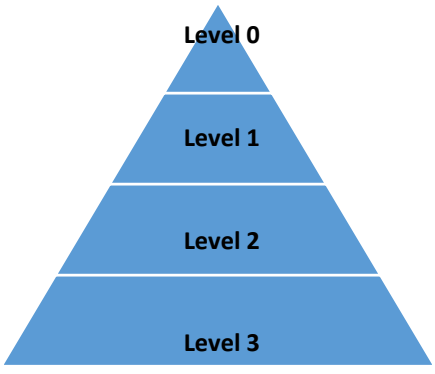
iii. For Agreements that include a provision with "Early Completion" incentive requirements to complete the Work or a portion of the Work earlier than an Agreement specified completion milestone date, the "Early Completion" milestone activity shall be constrained with a "Finish On or Before" date equal to the later of the Design-Builder's proposed early completion milestone date, as shown on the approved Baseline Time Schedule, and the early date corresponding with the maximum number of days of early completion incentive allowed in the Agreement.

6.5 Level of Detail

The Authority deploys multi-level scheduling and will develop, control and utilize Level 0 to Level 2 schedules. The Design-Builder's shall develop a Level 3 or higher Time Schedule. The Time Schedule shall show an appropriate level of detail that allows for effective use of the Time Schedule to monitor progress of the Work and to quantify the impacts of time-related changes on the project and include sufficient details to allow for the formation of a reasonable critical path. The Design-Builder's Time Schedule shall be developed to Level 4 at a minimum and include all work items and necessary time-based tasks required for completion of the project, including as applicable, work to be performed by the Authority, subcontractors, suppliers, and other involved parties. The Design-Builder's Time Schedule shall also include, as applicable, Agreement milestones and other key milestones needed to monitor the status of significant project events.

The below Figure 1 is a visualization of the principle of multilevel scheduling for the Phase 1 project.

Figure 1 –Multilevel Scheduling



Level 0: Integrated Schedule
Controlled by: FHA
Maintained by: FHA

Level 1: Integrated Project Schedule
Controlled by: FHA
Maintained by: Project Assurance Manager

Level 2: Integrated Master Schedule
Controlled by: FHA
Maintained by: Project Assurance Manager

Level 3: Consultant/Constructor Schedule
Controlled by: Consultant/Constructor
Maintained by: Consultant/Constructor

The Design-Builder's Time Schedule shall be developed to include Work packages, i.e. Level 2 summary activities, within the following quantity ranges for the different project Components:

#	Component SubComponent	Quantity of Level 2 Summary Activities
1.	MHSU	40-60
2.	Energy Centre (shell,i/services)	15-25 each
3.	Energy Centre (fit-out)	
4.	Energy Centre (o/services, incl. conversion steam to hot water)	
5.	Communications Hub (shell)	
6.	Communications Hub (fit-out)	
7.	IT Network Perimeter	

All Level 3 and Level 4 activities shall roll-up into Work packages at Level 2, the Level 2 summary activities, for reporting purposes.

The Work shall be broken down into discrete and measurable work tasks by trade based on the Design-Builder's proposed means and methods. The Work shall be broken down in sufficient details necessary to distinctly identify the feature, type of work, and specific location or limits of the work that the activity represents. To the extent feasible, the Work shall be broken down to a level of detail such that the activity durations for on-site work, excluding activities whose durations are specified in the Agreement, are fifteen (15) work days or less. Longer durations may be allowed, as approved by the Authority, for activities that typically span long periods of time such as fabrication and delivery of long lead materials or other such level of effort activities.

The following are exemplary guidelines for defining the detail activities required to complete a project:

i) Administrative: Define the administrative activities associated with the Work, including as applicable, but not limited to:
   a. Agreement milestones;
   b. Key submittals such as permits, schedules, etc;
   c. Notifications such as road closures, shutdowns, outages, etc.;
   d. Authority reviews.

ii) Design and Engineering: Define the individual activities associated with the design and engineering of the project, including as applicable, but not limited to:
   a. Meetings with the Authority;
   b. Design and Engineering phases by discipline;
   c. Design coordination meetings;
   d. Meetings with the authorities having jurisdiction and other authorities;
   e. Modelling and testing as applicable;
   f. Coordination with Utilities;
   g. LEED related tasks;
   h. Submissions to the Authority;
   i. Review and approval periods by the Authority.

iii) Procurement: Define the individual activities associated with the procurement of construction services, e.g. for the CM Components, long lead materials, services required to complete project Components or specialty items, including as applicable, but not limited to:
   a. Procurement including approvals required by the Authority;
   b. Preparation of shop drawings, installation drawings, etc.;
   c. Fabrication;
   d. Delivery.

iv) Implementation: Define the individual activities associated with the implementation of the project, including as applicable, but not limited to:
   a. Mobilization;
   b. Excavation;
   c. Shoring;
   d. Site services;
   e. Demolition;
   f. Testing;
   g. Curing;
   h. Work of utilities and service providers including, but not limited to BC Hydro, Fortis, City of New Westminster;
   i. Traffic management;
   j. Structural work;
   k. Envelope work;
   l. Fit-out work;
   m. Building systems;
   n. FF&E receipt and installation;
   o. Start-up;
   p. Commissioning;
   q. Acceptance testing;
   r. Occupancy;
   s. Substantial Completion;
   t. Demobilization;
   u. Hand-over;
   v. Deficiency correction;
   w. As-built drawings;
   x. O&M Manuals;
   y. Total Completion;
   z. Close-out.

6.6 Data Date

The data date for calculating the schedule for the Baseline Time Schedules, Monthly Time Schedule Updates, and the 2-Week-Look-ahead Schedules shall be defined as follows:

i) The data date shall be no more than five (5) business days prior to the date of the Bi-weekly or Monthly Scheduling Meeting; and

ii) The data date shall be the Design-Builder's monthly progress estimate date.

6.7 Float

The definition, Authorityship of float, and use of float, as described in this section are intended solely for the purpose of evaluating time extension requests resulting from changes or delays on the project. For considerations for other requests for adjustments to the Agreement, refer to the applicable sections in the specifications. Any float available in the Time Schedule, at any time, including "Total Float" and "Free Float" shall be considered project float and is not for the exclusive use or benefit of either the Authority or the Design-Builder. It shall be understood by the Authority and the Design-Builder that float is a shared commodity and either party has the right to full use of any available float. Until such time that all available float is depleted, project float shall be used responsibly to mitigate delays on the project. Total float is defined as a CPM network calculated property that represents the amount of time (workdays) that an activity can be delayed without extending the completion date of a related Agreement milestone activity or the project completion milestone activity, as applicable, beyond the dates specified in the Agreement or subsequently approved by the Authority. Free float is defined as a CPM network calculated property that represents the amount of time (workdays) that an activity can be delayed without delaying its immediate successor activity.

Project float shall be calculated relative to a constrained Agreement milestone activity or the project "Must Finish By" date (the fixed completion date/s under the Agreement), as applicable, and as follows:

i) For Agreements that do not include a provision with requirements to complete the Work or a portion of the Work by a specified completion milestone date other than the Agreement fixed completion date, project float for all activities shall be calculated relative to the Agreement fixed completion date.

ii) For Agreements that include a provision with requirements to complete the Work or a portion of the Work by a specified completion milestone date, project float for all activities leading to the completion milestone activity shall be calculated relative to the completion milestone date specified in the Agreement.

iii) For Agreements that include a provision with "Early Completion" Incentive/Disincentive requirements to complete the Work or a portion of the Work earlier than a specified milestone date, project float for all activities leading to the "Early Completion" milestone activity shall be calculated relative to the early completion date corresponding with the maximum number of days of early completion Incentive allowed in the Agreement or the Design-Builder's initial proposed early completion milestone date, as calculated in the Baseline Time Schedule, if later. For Agreements that include a provision with Incentive/Disincentive requirements to complete the Work or a portion of the Work no later than a specified milestone date, project float for all activities leading to the Incentive/Disincentive milestone activity shall be calculated relative to the Incentive/Disincentive completion milestone date specified in the Agreement.

If the Contractor submits a Time Schedule showing a calculated completion date that is earlier than a specified completion milestone date or the Agreement fixed completion date, as applicable, the Design-Builder shall declare in writing, at the time of submitting the Time Schedule or as specified in the Agreement, its intension to finish early. The Design-Builder may request a modification of the Agreement specified completion dates to the proposed early completion dates. Otherwise, any float available as a result of the early completion schedule, shall be considered project float. Any requests for a time

extension shall be evaluated in accordance with the Agreement and based on available project float. No time extensions will be considered until all available project float has been depleted.

Any modifications of the Time Schedule, at any time, for the purpose of manipulating float shall be justification for rejecting the Progress Schedule. Negative float conditions shall not be allowed.

Float suppression techniques (e.g., preferential sequencing, out-of-sequence activity relationships, crew movements, equipment use, form reuse, extended durations, imposed dates, etc.) shall not be allowed. Design-Builder shall seek the Authority's approval in case the Design-Builder intents to apply float suppression techniques with a detailed description of the activities, the type of float suppression technique, reasoning and identify the number of days suppressed.

The Design-Builder shall adjust or remove any float suppression techniques (e.g., preferential sequencing, out-of-sequence activity relationships, crew movements, equipment use, form reuse, extended durations, imposed dates, etc.) as a prerequisite to a request for an increase in Contract Price and/or Contract Time.

The use of artificial float constraints such as "zero free float" or "zero total float" shall not be allowed.

6.9 Authority Right To Change Properties

Once accepted by the Authority, properties shall never be changed without the Authority's approval.

The Authority retains the right to instruct the Design-Builder to change any of the settings to suit Project and/or Authority requirements. The Design-Builder shall apply the settings requested by the Authority with the next updated of Schedule Information.

Should the Design-Builder wish to apply different properties, the Design-Builder shall request the Authority's approval in writing explaining which properties the Design-Builder would like to change, what setting the Design-Builder intends to apply, and what the reasoning for and the desired effects of the change are.

7. Revisions

The Design-Builder shall maintain separate Time Schedule data-bases for each of the following:

i. Schedules of Record;
ii. Monthly Time Schedule Updates;
iii. 2-Week Look-ahead Schedules.

The corresponding Status Reports shall be saved with each Time Schedule in a designated folder in the respective Time Schedule data-base.

The Design-Builder shall provide a log of the saved versions and any or all documents from the Time Schedule data-base upon the Authority's request within 24 hours.

7.1 Baseline Management

Baselines approved by the Authority via written approval shall be numbered as a new version, named according to the following protocol:

Baseline 1.0

Baseline 1.1

Baseline 1.3

Baseline 1.4

etc.

and be saved for future reference by applying the "Add" function under the "Maintain Baselines…" menu and in every Time Schedule. As a standard, the latest baseline shall be displayed for Time Schedule submissions.

7.2 Version Management

Each new version of the Time Schedule shall be numbered as a new version, named according to the following protocol:

Version 1

Version 2

Version 3

Version 4

etc.

7.3 File Name Management

The file names for all Time Schedules including but not limited to Time Schedules exported for approval by the Authority, Time Schedules for coordination of Consultants and Subcontractors shall follow the nomenclature as described under Project Identification of this specification and reflect the current Project ID including the latest approved baseline, the latest schedule version of the exported file and the applicable data date (e.g. MHSU_B0.1_V1_DD31122015).

7.4 Updates

The Monthly Time Schedule Updates and the 2-Week Look-ahead Schedules shall reflect the actual status of the Work and the current plan to complete the remaining work as of the current data date. The updates shall be based on the most recent accepted Time Schedule and prepared as follows:

i. Create a copy of the previously accepted Time Schedule and rename it as per this specification;
ii. Update the standard working calendars to reflect actual days lost due to weather or other causes beyond the contractor's control for which work on all activities to which the calendars were assigned were suspended.
iii. Updates shall be carried out in the following order and as follows:
    a. Update status of the completed and on-going activities as necessary. Mark "Started' for activities that began this period. Mark "Finished" for activities that were completed this period.
    b. Specify the actual start dates for activities that began this period and finish dates for activities that were completed this period. (Note: All actual dates must occur prior to the current update data date).
    c. Update the remaining duration for on-going activities. Remaining duration shall be based on amount of time needed to complete the remaining work as of the data date.
    d. Updates from Level 3 and Level 4 activities shall summarize in the Level 2 summary activities.
iv. Calculate the schedule using the current data date.
v. Review/analyze the schedule to determine if the activities are being performed out-of-sequence and if logic changes are required based on the current plan.
vi. Review the schedule to ensure that it conforms to the requirements of the Contract and that the project objectives are met.

vii. Create and save a copy of the update;

8. Deliverables

8.1 Schedule Meetings

8.1.1 Bi-weekly Schedule Meetings

8.1.2 Monthly Schedule Meetings

The Design-Builder shall facilitate and minute Monthly Schedule Meetings to review actual progress against planned progress and other schedule related matters with the Authority.

8.1.3 Scheduling Conferences

To discuss and clarify requirements and settings for the Baseline Time Schedule for the Design-Builder and as an opportunity for the Authority to make further adjustments to the Baseline Time Schedule to better suit Authority and Project objectives, the Design-Builder shall attend two Scheduling Conferences:

1. Scheduling Conference 1 after five (5) working days of the issuance of the Notice of Award;
   The Baseline Time Schedule and related schedule information submitted by the Design-Builder during the RFP stage will be reviewed at this meeting. The objective of the meeting is to clarify all Authority and Project schedule requirements so the Design-Builder can develop Time Schedule – Baseline 1.0 for the Authority's approval.
2. Scheduling Conference 2 at thirty (30) working days before Construction.
   The Design-Builder shall submit a draft Time Schedule – Baseline 2.0 ten (10) days prior to Scheduling Conference 2 for the Authority's review. The objective of the meeting is to clarify all Authority and Project schedule requirements so the Design-Builder can develop Time Schedule – Baseline 2.0 for the Authority's approval.

The Design-Build Scheduler and the Design-Builder's Representative from the Design-Builder's team shall attend the Scheduling Conferences 1 and 2. The Authority will facilitate the Scheduling Conferences 1 and 2 and attend with its designated representatives including, but not limited to, the Project Manager.

Items for clarification and discussion may include:

- Scheduling and submission requirements such as software settings, WBS, activity codes, calendars, reports, etc.;
- Phasing or sequencing;
- Milestone(s) and other time-related requirements;
- Work to be performed by the Authority or other involved parties;
- Time of year restrictions;
- Project constraints.

The Authority will chair and minute the Scheduling Conferences.

8.2 Time Schedules

8.2.1 General

All Time Schedules shall indicate the sequence and dates on which the activities that make up the Project, project milestones, and all necessary tasks required to complete the project are scheduled to be completed. Time Schedules shall also include, as applicable, all work to be performed by the Authority and other involved parties.

All Time Schedule submissions shall include the following submittals:

i. Three (3) time-scaled Gantt Chart plots in a paper size format approved by the Authority showing:
   a) All activities and their respective dependencies required to complete the Work under the Agreement and as required by this specification including all Level 1, Level 2, Level 3 and Level 4 activities;
   b) The current and approved baseline for each activity, summary activity and milestone;
   c) Progress for each activity, summary activity and milestone;
   d) For each activity the, Activity Name, Original Duration, Planned Start Date, Planned Finish Date, Total Float, Schedule Percent Complete, Performance Percent Complete,. The Authority retains the right to change these settings to better suit the Project and Authority requirements at any time;
   e) The critical path depicting the project critical path based on the "Longest Path";
   f) Activities shall be arranged according to the waterfall model, i.e. in a linear arrangement;
   g) Progress line.

ii. Searchable and printable PDF copy of the plot;

iii. Upon on the Authority's request, three (3) plotted network logic diagrams on a paper size format approved by the Authority depicting the inter-relationships between the activities and the sequence in which the Design-Builder proposes to perform the Work.

8.2.2 Time Schedule – Baseline 1.0

The Design-Builder shall revise the Time Schedule, as submitted during the RFP stage and accepted by the Authority, according to the decisions made at the Scheduling Conference #1, save the new baseline and export it as a new schedule and name it according to this specification, e.g. MHSU_B1.0_VX_DDXXXXXXXX. Ten (10) working days after the Scheduling Conference 1, the Design-Builder shall submit to the Authority the Time Schedule – Baseline 1.0 for review and approval. Once approved by the Authority, the Time Schedule – Baseline 1.0 will become the new Time Schedule.

The Design-Builder shall submit the Time Schedule Status Report - Baseline 1.0 with the Time Schedule – Baseline 1.0.

8.2.3 Time Schedule – Baseline 2.0

The Design-Builder shall revise the Time Schedule according to the decisions made at the Scheduling Conference #2, export it as a new schedule, save the new baseline, and name it according to this specification, e.g. MHSU_B2.0_VX_DDXXXXXXXX. Ten (10) working days after the Scheduling Conference #2, the Design-Builder shall submit to the Authority the Time Schedule – Baseline 2.0 for review and approval. Once approved by the Authority, the Time Schedule – Baseline 2.0 will become the new Time Schedule.

The Design-Builder shall submit the Time Schedule Status Report - Baseline 2.0 with Time Schedule – Baseline 2.0.

8.2.4 As-built Time Schedule

Within twenty (20) working days after Total Completion, the Design-Builder shall submit to the Authority an As-built Time Schedule. The As-built Time Schedule shall show the actual start and finish dates for each activity in the schedule. The Design-Builder shall certify in writing that the As-built Time Schedule accurately reflects the dates on which all activities contained in the last version of the Baseline Time

Schedule were actually performed. The As-built Time Schedule shall be submitted in the form of a Monthly Time Schedule Update and shall represent the last Monthly Time Schedule Update submission.

8.2.5 Monthly Time Schedule Update

Three (3) days prior to the Monthly Schedule Meeting, the Design-Builder shall submit a Monthly Time Schedule Update providing the as-built status of the project as of the data date and the Design-Builder's current plan to complete the remaining work as of the data date. The Monthly Time Schedule Update shall meet the following criteria:

i. Submitted to the Authority three (3) days prior to the Monthly Status Meeting;
ii. Updated as per this specification;
iii. All Level 3 and Level 4 activities shall be included in the schedule and be rolled-up into Level 2 summary activities, the Work packages at Level 2, for the softcopy submission;
iv. Accompanied by the Monthly Time Schedule Status Report.

8.2.6 2-Week Look-ahead Time Schedule

Three (3) days prior to the Bi-weekly Status Meeting, the Design-Builder shall submit a 2-Week Look-ahead Schedule to provide a more detailed day-to-day plan of upcoming work identified on the Monthly Time Schedule Update. The first submission shall follow the Authority's approval of the Time Schedule – Baseline 1.0. The 2-Week Look-ahead Schedule. The 2-Week Look-ahead Schedule shall meet the following criteria:

i. Submitted to the Authority three (3) days prior to the Bi-weekly Status Meeting;
ii. Identify critical path activities on the 2-Week Look-ahead Schedule based on the "Longest Path";
iii. Derived from but maintained separately from the Monthly Time Schedule Update;
iv. Activity durations must not exceed 5 working days;
v. Show all Level 1, 2, 3, and 4 activities and milestones that have started, that have not started and that are scheduled to start within the coming two (2) weeks;
vi. Accompanied by the 2-Week Look-ahead Status Report.

8.3 Schedule Status Reports

Schedule Status Reports shall describe the current status of the Work, any deviations from scheduled performance, and any changes in the Design Builder's work plan as of the data date. The Design-Builder shall submit a Status Report with each schedule submission.

Each Status Report shall be submitted as a printed and bound Status Report plus a softcopy in one searchable and printable PDF format plus Earned Value calculations and the applicable logs in one (1) file in editable and printable Excel format (Excel 2010 or later).

8.3.1 Time Schedule Status Report – Baseline 1.0/2.0

The Design-Builder shall submit a Time Schedule Status Report – Baseline 1.0 with Time Schedule – Baseline 1.0 and a Time Schedule Status Report – Baseline 2.0 with Time Schedule – Baseline 2.0 to the Authority.

The Time Schedule Status Report – Baseline 1.0/2.0 shall describe and include the following:

i. The proposed general sequence of Work indicating where the work will begin and how it will progress.

ii. Milestone dates for Agreement milestones and other key events, including but not limited to start/finish dates for the Project, start/finish dates for each Component, start/finish dates for each Work package, etc.
iii. A description of the critical path. The critical path (also known as the longest path) is defined as the series of work items or time-based tasks that collectively will take the longest time to complete.
iv. Work to be performed by the Authority and other involved parties, including when the work must be performed.
v. Logs identifying the following:
    a. Constraints used in the schedule and reasons for using the constraints.
    b. Dependencies used in the schedule and reasons for using the dependencies.
    c. WBS Names
    d. WBS Codes
    e. Activity Properties
    f. Resource IDs
    g. Resource Codes
vi. The Design-Builder shall describe the calendar(s) used in the schedule. For each calendar, the Design-Builder shall describe the Calendar ID, standard number of work days per week, number of shifts per day, and number of hours per day as well as the anticipated number of non-working days per month for each calendar with considerations, as applicable, for holidays, normal weather conditions; as well as for seasonal or other known or specified restrictions (i.e. traffic, local events, environmental, permits, utility, etc.).
vii. Any known or foreseeable risks that may impact the schedule. Also, describe how the risk may impact the schedule, any actions taken, and actions required to avoid, mitigate or exploit the impact.
viii. A draft Monthly Time Schedule Status Report.

8.3.2 Monthly Time Schedule Status Report

On a monthly basis with the Monthly Time Schedule Update and with the As-built Time Schedule after completion of the Project, the Design-Builder shall submit a Monthly Time Schedule Status Report.

The Monthly Time Schedule Status Report shall describe and include the following:

i. The current period and data date for which the report is written.
ii. The current status of the project milestones including the Component completion dates and the Substantial Completion and Total Completion dates as per the Agreement. It shall also describe any deviations from the date(s) specified in the Agreement. If a milestone activity is scheduled to occur later than the date specified in the Agreement, then provide an explanation stating why the milestone date is forecasted to occur late. Also, describe any actions taken or proposed to correct the delay.
iii. The project critical path and any deviations from the Time Schedule.
iv. The work performed since the previous Monthly Time Schedule Update submission and any deviations from the Time Scheduled.
v. Any major changes in the Design Builder's work plan in terms of sequence of construction, shifts, means and methods, manpower, equipment, or materials.
vi. A log of changes made to the Monthly Time Schedule Update since the previous submission.

vii. A log of Force Majeure events during the current update period including a description and start/finish times of the Force Majeure event or condition, activities affected and how the activities were affected, and any impacts on the critical path or project milestones. Also, describe any actions taken and proposed to mitigate Force Majeure delays.

viii. An assessment of all known or foreseeable risk that may impact the schedule. Also, describe how the issues will impact the schedule and any actions taken or needed to avoid or mitigate the impact.

ix. Any known or foreseeable risks that may impact the schedule. Also, describe the status of previously identified risks, how new risks may impact the schedule, any actions taken, and actions required to avoid, mitigate or exploit the impact.

x. Work planned for the next update period and any actions needed to be taken by the Authority or other involved parties to facilitate progress of the Work.

xi. Summary log of all schedule submissions including Project ID and Project Name;

xii. Summary log of all Change Orders which were incorporated into the Agreement up to the data date and on which the latest Monthly Time Schedule Update is based on;

xiii. Summary log of all activities Schedule Percent Complete > Performance Percent Complete including their respective status, an explanation as to why Schedule Percent Complete > Performance Percent Complete and mitigating action to achieve Schedule Percent Complete < or = Performance Percent Complete.

8.3.3 2-Week Look-ahead Status Reports

On a bi-weekly basis with the 2-Week Look-ahead Time Schedule, the Design-Builder shall submit a 2-Week Look-ahead Status Report.

The 2-Week Look-ahead Status Report shall describe and include the following:

i. The current period and data date for which the report is written;

ii. The current status of the project milestones and activities;

iii. The project critical path and any deviations from the Time Schedule;

iv. The work performed since the previous Monthly Time Schedule Update submission and any deviations from the Time Scheduled.

v. Any major changes in the Design Builder's work plan in terms of sequence of construction, shifts, means and methods, manpower, equipment, or materials.

vi. Any changes made to the Monthly Time Schedule Update since the previous submission.

vii. Force Majeure days during the current update period. Provide a list of the Force Majeure events, including a description and start/finish times of the Force Majeure event or condition; activities affected and how the activities were affected, and any impacts on the critical path or project milestones. Also, describe any actions taken and proposed to mitigate the weather delays.

viii. An assessment of all known or foreseeable risk that may impact the schedule. Also, describe how the issues will impact the schedule and any actions taken or needed to avoid or mitigate the impact.

ix. Any known or foreseeable risks that may impact the schedule. Also, describe the status of previously identified risks, how new risks may impact the schedule, any actions taken, and actions required to avoid, mitigate or exploit the impact.

x. Work planned for the next update period and any actions needed to be taken by the Authority or other involved parties to facilitate progress of the Work.

xi. Summary list of all schedule submissions including Project ID and Project Name;

xii. A log of all Change Orders which were incorporated into the Agreement up to the data date and on which the latest Monthly Time Schedule Update is based on;

xiii. Summary log of all activities illustrating their Schedule Percent Complete and their Performance Percent Complete and forecasting their future two (2) week Schedule Percent Complete and their Performance Percent Complete.

9. Software

The scheduling software shall be Microsoft Project.

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Outpatient Mental Health and Substance Use Services Program and Mental health and Substance Use Clinical Education and Applied Research Program

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter with Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile chart rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G1.0.1	**MAIN ENTRANCE LOBBY**																																															
G1.0.1.1	Café, Patient-run								X		X			X					X			X																										
G1.0.1.2	Café, Storage														X		X																														
G1.0.1.3	Security Office																								X(2)			X (2)																		X	
G1.0.1.4	Lobby																						X																							
G1.0.1.5	Patient/Public Washroom (Male)				X																																										
G1.0.1.6	Patient/Public Washroom (Female)				X																																									
G1.0.2	**LARGE MULTIPURPOSE ROOM**																																													
G1.0.2.1	Large Multipurpose Room, 120 seat																																												X (3)	
G1.0.2.2	Projection Room																								X			X																		
G1.0.2.3	Staging/ Preparation Room																				X																									
G1.0.2.4	Lobby																						X																							
G1.03	**RECEPTION**																																													
G1.0.3.1	Reception/Registration Desk																											X								X	X									X	
G1.0.3.2	Not used																																													
G1.0.3.3	Clerical Workstation																																													X	
G1.0.3.4	Office, Intake Nurse																																													X	
G1.0.3.5	Work Room														X		X	X																												
G1.0.3.6	Waiting Area (for 25 people)																																												X		
G1.0.3.7	Not used																																													
G1.0.3.8	Patient/Public Washroom (Unisex)				X																																									
G1.0.4	**OUTPATIENT TREATMENT**																																													
G1.0.4.1	Consultation / Therapy Room																																													X	
G1.0.4.2	Large Consultation / Therapy Room																																													X	
G1.0.4.3	Exam / Treatment Room										X			X			X	X							X		X																		X	
G1.0.4.4	Neuropsychologist Consultation / Office																																													X	
G1.0.4.5	Patient Washroom																																													
G1.0.4.6	Large Group Therapy Room																				X																								X (2)	
G1.0.4.7	Observation Room																								X			X																		X	
G1.0.4.8	Conference Room/Team Room																																													X (2)	
G1.0.4.9	Print/Copy Alcove										X				X		X	X																												
G1.0.5	**PTOP Clinic Space**																																													
G1.0.5.1	Clinician Workstation																								X (5)			X(5)								X									X	
G1.0.5.2	Office, Coordinator																																													X	
G1.0.5.3	Consultation / Therapy Room																																													X	
G1.0.5.4	Patient Observation Lounge (PTOP)								X					X			X	X	X																									X		
G1.0.5.5	Medication Room										X			X			X								X			X							X										X	
G1.0.5.6	Pneumatic Tube Station																																														

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1	*The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.*																																																
2																																																
3																																																
4	**Outpatient Mental Health and Substance Use Services Program and**	**Mental health and Substance Use Clinical Education and Applied Research Program**																																															
5																																																
6																																																
7	**Room ID**	**Room Name**	**Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors**	**Patient Bedroom Safebox (part of Wardrobe) with code lock and key override**	**Patient Bedroom Desk /Writing surface**	**Washroom Vanity, Solid Surface with Integral Sink**	**Lockable Narcotic Cabinet/Drawer**	**Supply Cabinet**	**Laminate Counter - no Sink**	**Solid Surface Counter with Utility Sink**	**Island; Solid Surface Counter with lower cabinetry**	**Solid Surface Counter**	**Stainless steel Counter with Sink**	**Stainless Steel Counter**	**Upper Cabinets with Doors & Fixed Shelves (Lockable)**	**Open Upper Shelves**	**Lower Cabinets with Doors - No Shelves**	**Lower Cabinets with Doors & Fixed Shelves (Lockable)**	**Lower Cabinets with Flush Pull Drawers (Lockable)**	**Microwave Shelf (For Commercial type)**	**Full Height Cabinet with Doors & Fixed Shelves (Lockable)**	**Full Height Cabinet - Open Shelves**	**Lower Cabinets - No Doors**	**Notice Board/Art Display**	**Standing height Work Surface (# of WS/room)**	**Seating Height Work Surface (# of workstations/room)**	**Bench - Locker Room (* Antiligature)**	**Workbench/Heavy Duty Workbench***	**PC Workstation (# of WS/room)**	**Dictation Cubicle**	**Special Equipment Storage**	**Lab Work Surface with Sink and Millwork Phlebotomy Chair**	**Pharmacy Casework**	**Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion**	**Mobile chart rack**	**Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)**	**Entertainment Centre Millwork c/w TV Housing**	**Millwork Headwall**	**Lockable cabinetry with Fold-Down Ironing Shelf**	**Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)**	**Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)**	**Millwork Storage for Patient Lift Motor (Lockable)**	**Lockers - Full Height**	**Lockers - Half Height**	**Wall Mount Stainless Steel Wire Shelving**	**Mail Slots**	**TV Housing**	**Magnetic White Board Large (# of units/room)**	**Magnetic White Board Medium (# of units/room**	**Magnetic White Board Small (# of units/room)**	
46	**G1.0.6**	**SUPPLIES/EQUIPMENT/ENVIRONMENTAL**																																															
47	G1.0.6.1	Central Equipment Room																																													X			
48	G1.0.6.2	Housekeeping Closet																																												X		X		
49	G1.0.6.3	Soiled Holding																																															
50	G1.0.6.4	Soiled Utility											X																																					
51	G1.0.6.5	Electrical Room																																															
52	G1.0.6.6	Communications Room																																															
53	**G1.0.7**	**STAFF SUPPORT AREA**																																															
54	G1.0.7.1	Physician Lead Office																																														X		
55	G1.0.7.2	Staff Lounge								X					X			X	X	X						X			X																	X		
56	G1.0.7.3	Staff Washroom																																															
57	G1.0.7.4	Staff Lockers																											X																			X (50)					
58	G1.0.7.5	Manager Office (1 for inpt; 1 for outpt)																																														X		
59	G1.0.7.6	Administrative Assistant for Director, Managers, Physicians																																														X		
60	G1.0.7.7	Not used																																															
61	G1.0.7.8	Clinician Workstation																																															
62	G1.0.7.9	Psychology Workspace																																															
63	G1.0.7.10	Staff Washroom																																															
64	**G1.0.8**	**NEUROSTIMULATION CLINIC**																																															
65	G1.0.8.1	Receptionist/Registration Desk										X																	X							X	X									X		
66	G1.0.8.2	Wheelchair Alcove																																															
67	G1.0.8.3	General Waiting Room, ECT/TMS																																														X	X (2)			
68	G1.0.8.4	Patient/Public Washroom				X																																												
69	G1.0.8.5	In-patient Stretcher Waiting Area																																															
70	G1.0.8.6	Pt Change Room																											X*																		X(20)					
71	G1.0.8.7	Pre-Treatment Gowned Waiting Area																																															
72	G1.0.8.8	Exam / Treatment Room										X			X			X	X																													X		
73	G1.0.8.9	ECT Treatment Room										X			X																																X(2)			X		
74	G1.0.8.10	TMS Room								X					X			X									X			X																	X		
75	G1.0.8.11	Recovery Room																										X(4)			X(4)	X													X(6)					
76	G1.0.8.12	Blanket Warmer Alcove																																															
77	G1.0.8.13	Post-Recovery Room								X					X			X		X							X			X																			
78	G1.0.8.14	Clean Supply																																															
79	G1.0.8.15	Soiled Utility											X																																					
80	G1.0.8.16	Staff Washroom																																															
81	**G1.1**	**MENTAL HEALTH AND SUBSTANCE USE CLINICAL EDUCATION AND APPLIED RESEARCH PROGRAM**																																															
82	**G1.1.1**	**Meeting Spaces**																																															
83	G1.1.1.1	Video conference Room																																													X		
84	G1.1.1.2	Multipurpose Room																																													X		
85	G1.1.1.3	Seminar/ Small Group Therapy																																													X		
86	G1.1.1.4	Staff Washroom																																															
87	**G1.1.2**	**Departmental Offices**																																															
88	G1.1.2.1	Department Head																																														X		
89	G1.1.2.2	Associate																																														X		
90	G1.1.2.3	Business Manager																																														X		
91	G1.1.2.4	Executive Assistant (Admin)																																													X		
92	G1.1.2.5	Executive Assistant (Education)																																													X		
93	G1.1.2.6	Office support (copier, supplies)										X			X			X	X																														
94	G1.1.2.7	Learner's Lounge								X					X			X		X							X			X																	X(12)				X		
95	**G1.1.3**	**Researchers**																																														
96	G1.1.3.1	Clinical Research Psychiatrist																																														X		
97	G1.1.3.2	Clinical Research Team Room (2 people)																																														X		
98	G1.1.3.3	Learner Workstations																																														X(2)		
99	**G1.1.4**	**Clinical Trials Area**																																														
100	G1.1.4.1	Admin Assistant																																														X		
101	G1.1.4.2	Data Manager																																													X	X		
102	G1.1.4.3	Research Coordinators																																														X		
103	G1.1.4.4	File Storage																																															
104	G1.1.4.5	Clinical trials prep/staging area										X			X			X	X																															
105	**G1.1.5**	**Research Testing area**																																															
106	G1.1.5.1	Clinical Exam/Observation Room										X			X			X	X								X			X																	X		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1	*The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.*																																																	
2																																																		
3																																																		
4	**Outpatient Mental Health and Substance Use Services Program and Mental health and Substance Use Clinical Education and Applied Research Program**																																																	
5																																																		
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7	**Room ID**	**Room Name**	**Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors**	**Patient Bedroom Safebox (part of Wardrobe) with code lock and key override**	**Patient Bedroom Desk /Writing surface**	**Washroom Vanity, Solid Surface with Integral Sink**	**Lockable Narcotic Cabinet/Drawer**	**Supply Cabinet**	**Laminate Counter - no Sink**	**Solid Surface Counter with Utility Sink**	**Island; Solid Surface Counter with lower cabinetry**	**Solid Surface Counter**	**Stainless steel Counter with Sink**	**Stainless Steel Counter**	**Upper Cabinets with Doors & Fixed Shelves (Lockable)**	**Open Upper Shelves**	**Lower Cabinets with Doors - No Shelves**	**Lower Cabinets with Doors & Fixed Shelves (Lockable)**	**Lower Cabinets with Flush Pull Drawers (Lockable)**	**Microwave Shelf (For Commercial type)**	**Full Height Cabinet with Doors & Fixed Shelves (Lockable)**	**Full Height Cabinet - Open Shelves**	**Lower Cabinets - No Doors**	**Notice Board/Art Display**	**Standing height Work Surface (# of WS/room)**	**Seating Height Work Surface (# of workstations/room)**	**Bench - Locker Room (* Antiligature)**	**Workbench/Heavy Duty Workbench***	**PC Workstation (# of WS/room)**	**Dictation Cubicle**	**Special Equipment Storage**	**Lab Work Surface with Sink and Millwork Phlebotomy Chair**	**Pharmacy Casework**	**Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion**	**Mobile chart rack**	**Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)**	**Entertainment Centre Millwork c/w TV Housing**	**Millwork Headwall**	**Lockable cabinetry with Fold-Down Ironing Shelf**	**Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)**	**Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)**	**Millwork Storage for Patient Lift Motor (Lockable)**	**Lockers - Full Height**	**Lockers - Half Height**	**Wall Mount Stainless Steel Wire Shelving**	**Mail Slots**	**TV Housing**	**Magnetic White Board Large (# of units/room)**	**Magnetic White Board Medium (# of units/room**	**Magnetic White Board Small (# of units/room)**
107	G1.1.5.2	Consult / Exam Room (Clinical Skills)										X			X			X	X							X		X																				X			
108	G1.1.5.3	Exam / Procedure Room (Clinical Skills)										X			X			X	X							X		X																				X			
109	G1.1.5.4	Testing Rooms (Clinical Skills)										X						X								X(2)		X(2)																				X			
110	G1.1.5.5	Phlebotomy Station																													X																			
111	G1.1.5.6	Waiting Area																																																
112	G1.1.5.7	Patient/Public Washroom				X																																											
113	**G1.1.6**	**OTHER**																																															
114	G1.1.6.1	Server Telecommunication																																															
115	G1.1.6.2	Housekeeping Closet																																														X			

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 1 & 2 - each 15 Bed IPUs

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile Chart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing (Lockable)	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G2.0	**Unit 1 - each 15 Bed IPUs**																																															
G2.0.1	**FAMILY SUPPORT AREAS**																																															
G2.0.1.1	Patient/Public Washroom				X																																											
G2.0.1.2	Visitor Lounge																						X																									
G2.0.2	**STAFF SUPPORT AREAS**																																															
G2.0.2.1	Reception										X														X(2)		X(2)						X	X											X		
G2.0.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)										X										X (2)	
	Care Team Base (Open portion)										X													X (2)				X(2)												X						
G2.0.2.3	Pneumatic Tube Station										X						X																													
G2.0.2.4	Work Room										X			X			X	X																										X		
G2.0.2.5	Staff Washroom																																														
G2.0.2.6	Staff Conference Room																																												X		
G2.0.2.7	Nursing Leader Office																																												X (2)	
G2.0.2.8	Social Work Office																																												X	
G2.0.3	**CLINIC SUPPORT AREAS**																																														
G2.0.3.1	Central Storage Room										X																																			
G2.0.3.2	Crash Cart Closet																																														
G2.0.3.3	Medication Room										X			X			X								X								X											X	
G2.0.3.4	Wheelchair/Stretcher Alcove																																														
G2.0.4	**PATIENT BEDROOMS (2x15 BED IPUs)**																																														
G2.0.4.1	Patient Bedroom	X	X	X																																										
G2.0.4.2	Patient Bedroom Contact Isolation Ante Room																																														
G2.0.4.3	Not used																																														
G2.0.4.4	Ensuite				X																																										
G2.0.5	**PATIENT SUPPORT ZONE**																																														
G2.0.5.1	Comfort Room																			X																											
G2.0.5.2	Dining/Lounge Room								X		X			X			X		X							X(2)			X(2)									X				X				
G2.0.5.3	Hamper Alcove																																														
G2.0.5.4	Laundry Facility								X																																	X					
G2.0.5.5	Linen Closet																																														
G2.0.5.6	Lounge (Quiet)																																														
G2.0.5.7	Food Cart Closet																																														
G2.0.5.8	Secure Room																																														
G2.0.5.9	Secure Room Ante Room				X												X																														
G2.0.5.10	Secure Outdoor Space																																														
G2.0.6	**THERAPY ZONE**																																														
G2.0.6.1	Exam/Treatment										X			X			X	X								X		X																X		
G2.0.6.2	Exercise /Wellness Room																			X																									X	X		
G2.0.6.3	Individual Consult Therapy Room																																													X	
G2.0.6.4	Large Consult Therapy Room																																													X	
G2.0.6.5	Large Group Therapy Room										X						X																												X (2)		
G2.1	**Unit 2 - each 15 Bed IPUs**																																														
G2.1.1	**FAMILY SUPPORT AREAS**																																														
G2.1.1.1	Patient/Public Washroom				X																																										
G2.1.1.2	Visitor Lounge																							X																					X		
G2.1.2	**STAFF SUPPORT AREAS**																																														
G2.1.2.1	Reception										X														X(2)		X(2)						X	X											X		
G2.1.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)										X										X (2)	
	Care Team Base (Open portion)										X													X (2)				X(2)												X						
G2.1.2.3	Pneumatic Tube Station										X						X																													
G2.1.2.4	Work Room										X			X			X	X																										X		
G2.1.2.5	Staff Washroom																																														
G2.1.2.6	Staff Conference Room																																												X		
G2.1.2.7	Nursing Leader Office																																												X (2)	
G2.1.2.8	Social Work Office																																												X	
G2.1.3	**CLINIC SUPPORT AREAS**																																														
G2.1.3.1	Central Storage Room										X																																			
G2.1.3.2	Crash Cart Closet																																														
G2.1.3.3	Medication Room										X			X			X								X								X											X	
G2.1.3.4	Wheelchair/Stretcher Alcove																																														
G2.1.4	**PATIENT BEDROOMS (2x15 BED IPUs)**																																														
G2.1.4.1	Patient Bedroom	X	X	X																																										
G2.1.4.2	Patient Bedroom Contact Isolation Ante Room																																														
G2.1.4.3	Not used																																														
G2.1.4.4	Ensuite				X																																										

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 1 & 2 - each 15 Bed IPUs

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile Chart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing (Lockable)	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G2.1.5	**PATIENT SUPPORT ZONE**																																														
G2.1.5.1	Comfort Room																			X																											
G2.1.5.2	Dining/Lounge Room								X		X			X			X		X					X(2)			X(2)					X			X									
G2.1.5.3	Hamper Alcove																																													
G2.1.5.4	Laundry Facility								X																												X								
G2.1.5.5	Linen Closet																																												
G2.1.5.6	Lounge (Quiet)																																												
G2.1.5.7	Food Cart Closet																																												
G2.1.5.8	Secure Room																																												
G2.1.5.9	Secure Room Ante Room				X												X																													
G2.1.5.10	Secure Outdoor Space																																												
G2.1.6	**THERAPY ZONE**																																												
G2.1.6.1	Exam/Treatment										X			X			X	X							X		X															X	
G2.1.6.2	Exercise /Wellness Room																				X																				X	X		
G2.1.6.3	Individual Consult Therapy Room																																										X	
G2.1.6.4	Large Consult Therapy Room																																										X	
G2.1.6.5	Large Group Therapy Room										X						X																									X (2)		
G2.2.1	**SHARED AREAS PER FLOOR**																																											
G2.2.1.1	Allied Health Room																			X					X(2)			X(2)		X											X		
G2.2.1.2	Clean Supply Room																																									X		
G2.2.1.3	Housekeeping Closet																																									X		
G2.2.1.4	Life Skills Assessment Room								X	X				X			X	X	X																							X		
G2.2.1.5	Soiled Utility Room											X																																
G2.2.1.6	Soiled Holding Room																																											
G2.2.1.7	Staff Lockers																											X														X(80)			
G2.2.1.8	Staff Lounge								X					X			X	X	X						X		X															X	
G2.2.1.9	Staff Washroom																																											
G2.2.1.10	Elecitical Room																																											
G2.2.1.11	Communications Room																																											
G2.2.1.12	Elevator Vestibule																																											
G2.2.1.13	Secure Vestibule																																											

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 3 & 4

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk;c/w wheelchair accessible portion	Mobile Cart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down IroningShelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height Metal	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G3.0	**Unit 3 - 15 Bed IPU**																																															
G3.0.1	**FAMILY SUPPORT AREAS**																																															
G3.0.1.1	Patient/Public Washroom				X																																												
G3.0.1.2	Visitor Lounge																						X																							X			
G3.0.2	**STAFF SUPPORT AREAS**																																															
G3.0.2.1	Reception										X														X(2)			X(2)						X	X										X			
G3.0.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)											X									X (2)	
	Care Team Base (Open portion)										X													X (2)				X(2)													X						
G3.0.2.3	Pneumatic Tube Station										X						X																															
G3.0.2.4	Work Room										X			X			X	X																											X			
G3.0.2.5	Staff Washroom																																															
G3.0.2.6	Staff Conference Room																																													X		
G3.0.2.7	Nursing Leader Office																																													X (2)	
G3.0.2.8	Social Work Office																																													X	
G3.0.3	**CLINIC SUPPORT AREAS**																																															
G3.0.3.1	Central Storage Room										X																																					
G3.0.3.2	Crash Cart Closet																																															
G3.0.3.3	Medication Room										X			X			X									X			X						X										X		
G3.0.3.4	Wheelchair/Stretcher Alcove																																															
G3.0.4	**PATIENT BEDROOMS (1x 15 BEDS IPU)**																																															
G3.0.4.1	Patient Bedroom	X	X	X																																											X
G3.0.4.2	Ensuite																																															
G3.0.4.3	Patient Bedroom Bariatric Contact Isolation Room	X	X	X																																											X
G3.0.4.4	Patient Bedroom Bariatric Contact Isolation Ensuite																																														
G3.0.4.5	Patient Bedroom Bariatric Contact Isolation Ante Room				X																																										
G3.0.5	**PATIENT SUPPORT ZONE**																																														
G3.0.5.1	Comfort Room																			X																											
G3.0.5.2	Dining/Lounge Room								X		X			X			X		X						X(2)			X(2)									X					X				
G3.0.5.3	Hamper Alcove																																														
G3.0.5.4	Laundry Facility								X																																						
G3.0.5.5	Linen Closet																																														
G3.0.5.6	Lounge (Quiet)																																														
G3.0.5.7	Food Cart Closet																																														
G3.0.5.8	Secure Room																																														
G3.0.5.9	Secure Room Ante Room				X												X																															
G3.0.5.10	Secure Outdoor Space																																														
G3.0.6	**THERAPY ZONE**																																															
G3.0.6.1	Allied Health Room																			X					X(2)			X(2)		X														X			
G3.0.6.2	Exam/Treatment Room										X			X			X	X							X			X																	X		
G3.0.6.3	Exercise /Wellness Room																			X																											X	X	
G3.0.6.4	Individual Consult Therapy Room																																														X	
G3.0.6.5	Large Consult Therapy Room																																														X	
G3.0.6.6	Large Group Therapy Room										X			X			X																													X (2)		
G3.1	**Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU**																																															
G3.1.1	**FAMILY SUPPORT AREAS**																																															
G3.1.1.1	Patient/Public Washroom				X																																												
G3.1.1.2	Visitor Lounge																						X																							X			
G3.1.2	**STAFF SUPPORT AREAS**																																															
G3.1.2.1	Reception										X														X(2)			X(2)						X	X										X			
G3.1.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)											X									X (2)	
	Care Team Base (Open portion)										X													X (2)				X(2)													X						
G3.1.2.3	Pneumatic Tube Station										X						X																															
G3.1.2.4	Work Room										X			X			X	X																											X			
G3.1.2.5	Staff Washroom																																															
G3.1.2.6	Staff Conference Room																																													X		
G3.1.2.7	Nursing Leader Office																																													X (2)	
G3.1.2.8	CNE Office																																													X	
G3.1.3	**CLINIC SUPPORT AREAS**																																															
G3.1.3.1	Central Storage Room										X																																					
G3.1.3.2	Crash Cart Closet																																															
G3.1.3.3	Medication Room										X			X			X									X			X						X										X		
G3.1.3.5	Wheelchair/Stretcher Alcove																																															
G3.1.4	**PATIENT BEDROOMS (1x 10 BEDS PHAU)**																																															
G3.1.4.1	Patient Bedroom	X	X	X																																											X
G3.1.4.2	Patient Bedroom Contact Isolation Ante Room																																														
G3.1.4.3	Ensuite				X																																										
G3.1.5	**PATIENT SUPPORT ZONE**																																														
G3.1.5.1	Comfort Room																			X																											
G3.1.5.2	Dining/Lounge Room								X		X			X			X		X						X(2)			X(2)									X					X				
G3.1.5.3	Hamper Alcove																																														
G3.1.5.4	Laundry Facility								X																																						
G3.1.5.5	Linen Closet																																														
G3.1.5.6	Lounge (Quiet)																																														
G3.1.5.7	Food Cart Closet																																														
G3.1.5.8	Secure Room																																														
G3.1.5.9	Secure Room Ante Room				X												X																															

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 3 & 4

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk;c/w wheelchair accessible portion	Mobile Cart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down IroningShelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height Metal	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G3.1.5.10	Secure Outdoor Space																																														
G3.1.6	**THERAPY ZONE**																																														
G3.1.6.1	Allied Health Room																			X					X(2)			X(2)		X														X		
G3.1.6.2	Exam/Treatment Room										X			X			X	X							X			X																X		
G3.1.6.3	Exercise / Wellness Room																			X					X																			X	X		
G3.1.6.4	Individual Consult Therapy Room																																													X	
G3.1.6.5	Large Consult Therapy Room																																													X	
G3.1.6.6	Large Group Therapy Room										X						X																												X (2)		
G3.2.1	**SHARED AREAS PER FLOOR**																																													
G3.2.1.1	Clean SupplyRoom																																														
G3.2.1.2	Housekeeping Closet																																													X		
G3.2.1.3	Life Skills Assessment Room								X	X				X			X	X	X																									X		
G3.2.1.4	Soiled Utility Room											X																																			
G3.2.1.5	Soiled Holding Room																																														
G3.2.1.6	Staff Lockers																											X																	X(80)			
G3.2.1.7	Staff Lounge								X					X			X	X	X							X			X																	X	
G3.2.1.8	Staff Washroom																																														
G3.2.1.9	Electrical Room																																														
G3.2.1.10	Communications Room																																														
G3.2.1.11	Elevator Vestibule																																														
G3.2.1.12	Secure Vestibule																																														

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 5

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island: Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile Chart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room
G4.0	**Unit 5 - 20 Bed Older Adult Psychiatric Unit**																																														
G4.0.1	**FAMILY SUPPORT AREAS**																																														
G4.0.1.1	Patient/Public Washroom				X																																										
G4.0.1.2	Visitor Lounge																						X																					X		
G4.0.2	**STAFF SUPPORT AREAS**																																													
G4.0.2.1	Reception										X															X(2)			X(2)						X	X							X		
G4.0.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)												X							X (2)	
	Care Team Base (Open portion)										X													X (2)				X(2)										X							
G4.0.2.3	Pneumatic Tube Station										X						X																												
G4.0.2.4	Work Room										X			X			X	X																									X		
G4.0.2.5	Staff Washroom																																												
G4.0.2.6	Staff Conference Room																																											X		
G4.0.2.7	Physician Lead Office																																												X (2)
G4.0.2.8	Nursing Leader Office (PCC, CNE)																																												X
G4.0.2.9	Social Work Office																																												X
G4.0.2.10	Staff Lounge								X					X			X	X	X							X			X															X
G4.0.2.11	Staff Lockers																										X															X			
G4.0.2.12	Staff Washroom																																												
G4.0.2.13	Multi-Purpose Room																																											X(2)	
G4.0.2.14	Staff Outdoor Space																																												
G4.03	**CLINIC SUPPORT AREAS**																																												
G4.0.3.1	Central Storage Room										X																																		
G4.0.3.2	Clean Supply																																												
G4.0.3.3	Crash Cart Closet																																												
G4.0.3.4	Housekeeping Closet																																										X		X	
G4.0.3.5	Medication Room										X			X			X									X			X						X								X
G4.0.3.6	Soiled Utility Room								X																																			
G4.0.3.7	Soiled Holding Room																																												
G4.0.3.8	Wheelchair/Stretcher Alcove																																												
G4.0.3.9	Electrical Room																																												
G4.0.3.10	Communications Room																																												
G4.0.3.11	Elevator Vestibule																																												
G4.0.3.12	Secure Vestibule																																												
G4.0.4	**Service Delivery Space**																																												
G4.0.4.1	Clean Holding Room																																												
G4.0.4.2	Food Services Holding Room																																												
G4.0.4.3	Soiled Holding Room																																												
G4.0.5	**Patient Bedrooms (1 x 20 Beds Older Adult Unit)**																																												
G4.0.5.1	Patient Bedroom	X	X	X																																								
G4.0.5.2	Ensuite				X																																							
G4.0.5.3	Patient Bedroom Bariatric Contact Isolation Room	X	X	X																																								
G4.0.5.4	Patient Bedroom Bariatric Contact Isolation Ensuite				X																																						
G4.0.5.5	Patient Bedroom Contact Isolation Ante Room																																												
G4.0.6	**PATIENT SUPPORT ZONE**																																												
G4.0.6.1	Comfort Room																			X																									
G4.0.6.2	Dining /Lounge Room								X		X			X			X		X						X(2)			X(2)							X			X						
G4.0.6.3	Hamper Alcove																																												
G4.0.6.4	Linen Closet																																												
G4.0.6.5	Lounge (Quiet)																																												
G4.0.6.6	Laundry Facility								X																																	X			
G4.0.6.7	Life Skills Assessment Room								X	X				X			X	X	X																					X				X
G4.0.6.8	Food Cart Closet																																												
G4.0.6.9	Secure Room																																												
G4.0.6.10	Secure Room Ante Room				X									X																															
G4.0.6.11	Tub Room										X			X																															
G4.0.6.12	Secure Outdoor Space (East)																																												
G4.0.6.13	Secure Outdoor Space (West)																																												
G4.0.7	**THERAPY ZONE**																																												
G4.0.7.1	Allied Health Room																			X						X			X(2)		X											X		
G4.0.7.2	Exam/Treatment Room										X			X			X	X								X			X														X
G4.0.7.3	Exercise/Wellness Room																			X																							X	X	
G4.0.7.4	Individual Consult Therapy Room																																												X
G4.0.7.5	Large Consult Therapy Room																																												X
G4.0.7.6	Large Group Therapy Room										X			X																										X			X (2)	
G4.0.7.7	Patient Washroom																																												

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

Inpatient Mental Health Services Unit 5

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile Chart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	TV Housing	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
G4.0	**Unit 5 - 20 Bed Older Adult Psychiatric Unit**																																														
G4.0.1	**FAMILY SUPPORT AREAS**																																														
G4.0.1.1	Patient/Public Washroom				X																																										
G4.0.1.2	Visitor Lounge																							X																				X			
G4.0.2	**STAFF SUPPORT AREAS**																																														
G4.0.2.1	Reception										X															X(2)			X(2)						X	X								X			
G4.0.2.2	Care Team Base (Enclosed portion)										X			X			X							X (3)	X (3)												X							X (2)		
	Care Team Base (Open portion)										X													X (2)				X(2)														X				
G4.0.2.3	Pneumatic Tube Station										X						X																														
G4.0.2.4	Work Room										X			X			X	X																										X			
G4.0.2.5	Staff Washroom																																														
G4.0.2.6	Staff Conference Room																																												X			
G4.0.2.7	Physician Lead Office																																													X (2)		
G4.0.2.8	Nursing Leader Office (PCC, CNE)																																													X		
G4.0.2.9	Social Work Office																																													X		
G4.0.2.10	Staff Lounge								X					X			X	X	X							X			X																X		
G4.0.2.11	Staff Lockers																										X																	X				
G4.0.2.12	Staff Washroom																																															
G4.0.2.13	Multi-Purpose Room																																													X(2)		
G4.0.2.14	Staff Outdoor Space																																														
G4.03	**CLINIC SUPPORT AREAS**																																														
G4.0.3.1	Central Storage Room										X																																				
G4.0.3.2	Clean Supply																																														
G4.0.3.3	Crash Cart Closet																																														
G4.0.3.4	Housekeeping Closet																																												X			
G4.0.3.5	Medication Room										X			X			X									X			X						X								X		X	
G4.0.3.6	Soiled Utility Room								X																																						
G4.0.3.7	Soiled Holding Room																																														
G4.0.3.8	Wheelchair/Stretcher Alcove																																														
G4.0.3.9	Electrical Room																																														
G4.0.3.10	Communications Room																																														
G4.0.3.11	Elevator Vestibule																																														
G4.0.3.12	Secure Vestibule																																														
G4.0.4	**Service Delivery Space**																																														
G4.0.4.1	Clean Holding Room																																														
G4.0.4.2	Food Services Holding Room																																														
G4.0.4.3	Soiled Holding Room																																														
G4.0.5	**Patient Bedrooms (1 x 20 Beds Older Adult Unit)**																																														
G4.0.5.1	Patient Bedroom	X	X	X																																										
G4.0.5.2	Ensuite				X																																										
G4.0.5.3	Patient Bedroom Bariatric Contact Isolation Room	X	X	X																																										
G4.0.5.4	Patient Bedroom Bariatric Contact Isolation Ensuite				X																																									
G4.0.5.5	Patient Bedroom Contact Isolation Ante Room																																													
G4.0.6	**PATIENT SUPPORT ZONE**																																														
G4.0.6.1	Comfort Room																			X																											
G4.0.6.2	Dining /Lounge Room								X		X			X			X		X						X(2)			X(2)									X			X					
G4.0.6.3	Hamper Alcove																																														
G4.0.6.4	Linen Closet																																														
G4.0.6.5	Lounge (Quiet)																																														
G4.0.6.6	Laundry Facility								X																																		X				
G4.0.6.7	Life Skills Assessment Room								X	X				X			X	X	X																								X				X	
G4.0.6.8	Food Cart Closet																																														
G4.0.6.9	Secure Room																																														
G4.0.6.10	Secure Room Ante Room				X												X																														
G4.0.6.11	Tub Room										X						X																														
G4.0.6.12	Secure Outdoor Space (East)																																														
G4.0.6.13	Secure Outdoor Space (West)																																														
G4.0.7	**THERAPY ZONE**																																														
G4.0.7.1	Allied Health Room																			X						X			X(2)		X												X			
G4.0.7.2	Exam/Treatment Room										X			X				X	X						X			X																X		
G4.0.7.3	Exercise/Wellness Room																			X																										X	X		
G4.0.7.4	Individual Consult Therapy Room																																														X	
G4.0.7.5	Large Consult Therapy Room																																														X	
G4.0.7.6	Large Group Therapy Room										X							X																							X					X (2)	
G4.0.7.7	Patient Washroom																																														

The following Matrix indicates the various millwork, casework, fixtures and fittings requirements for the spaces listed in Appendix 1A [Clinical Specifications] for each program of the Building.

ENERGY CENTRE/CCH

MILLWORK, CASEWORK, FIXTURES & FITTINGS SCHEDULE

Room ID	Room Name	Patient Bedroom Wardrobe, fixed shelf and 3 antiligature hooks, no doors	Patient Bedroom Safebox (part of Wardrobe) with code lock and key override	Patient Bedroom Desk /Writing surface	Washroom Vanity, Solid Surface with Integral Sink	Lockable Narcotic Cabinet/Drawer	Supply Cabinet	Laminate Counter - no Sink	Solid Surface Counter with Utility Sink	Island; Solid Surface Counter with lower cabinetry	Solid Surface Counter	Stainless steel Counter withu Utility Sink	Stainless Steel Counter	Upper Cabinets with Doors & Fixed Shelves (Lockable)	Open Upper Shelves	Lower Cabinets with Doors - No Shelves	Lower Cabinets with Doors & Fixed Shelves (Lockable)	Lower Cabinets with Flush Pull Drawers (Lockable)	Microwave Shelf (For Commercial type)	Full Height Cabinet with Doors & Fixed Shelves (Lockable)	Full Height Cabinet - Open Shelves	Lower Cabinets - No Doors	Notice Board/Art Display	Standing height Work Surface (# of WS/room)	Seating Height Work Surface (# of workstations/room)	Bench - Locker Room (* Antiligature)	Workbench/Heavy Duty Workbench*	PC Workstation (# of WS/room)	Dictation Cubicle	Special Equipment Storage	Lab Work Surface with Sink and Millwork Phlebotomy Chair	Pharmacy Casework	Custom Workstation Seating Height / Reception Desk/c/w wheelchair accessible portion	Mobile Chart Rack	Full Height Cabinetry with Lockable Drawers (for Patient Phone Charging and Key Storage)	Entertainment Centre Millwork c/w TV Housing	Millwork Headwall	Lockable cabinetry with Fold-Down Ironing Shelf	Custom Millwork Protective Enclosure for Computer Screens, Keyboards and PCs (Lockable)	Custom Millwork Wall for Ping-Pong Table and Equipment Storage (Lockable)	Millwork Storage for Patient Lift Motor (Lockable)	Lockers - Full Height	Lockers - Half Height	Wall Mount Stainless Steel Wire Shelving	Mail Slots	Millwork for TV	Magnetic White Board Large (# of units/room)	Magnetic White Board Medium (# of units/room	Magnetic White Board Small (# of units/room)
	EC CONTROL ROOM LEVEL																																														
	Control Room																X								X																							
	EC GENERATOR LEVEL																																													
	Staff Room								X					X			X		X						X																						
	Workshop																				X						X*																		X		
	EC GENERATOR LEVEL																																													
	Tech Room	Note: Refer to Schedule 1 [Statement of Requirements] for details																																												

Appendix 1H – Wood First Matrix

The Design-Builder will use wood in the Design of the Building in accordance with the following table, using wood where it is marked as “Appropriate” subject to any comments set out under the “Justification” column.

Area of Usage	Appropriateness	Justification
Substructure		
Forming/ Shutter (temporary)	Appropriate	The use of wood in this process is a traditional method of construction.
Structure		
Slab on grade	Inappropriate	The loads applied to the slab are in excess of wood’s capabilities and wood is subject to rot, mould and insects such as termites, impacts that are exacerbated by proximity to the ground.
Beams	Inappropriate	Not permitted by the BC Building Code.
Columns	Inappropriate	Not permitted by the BC Building Code.
Upper Flooring	Inappropriate	Not permitted by the BC Building Code.
Roof (Penthouse)	Inappropriate	Not permitted by the BC Building Code.
Heavy Timber Structure or Non-Structural Elements	Potentially Appropriate as an 'Alternative Solution' Approach	Proponents are strongly urged to consider a heavy timber design.
Exterior Cladding		
Roof Finish (Flat Roof)	Inappropriate	There is no known wood product for this application.
Walls above ground level	Appropriate or Potentially Appropriate as an “Alternative Solution” Approach	Exterior cladding, details, trims, etc., are permitted provided the interior surface of the wall assemblies are protected by a thermal barrier, the exterior wall assembly is design and constructed in accordance with the “rain-screen” principle as defined in Schedule 1 [Statement of Requirements], and the wall assembly satisfies the referenced test criteria for fire spread on exterior wall assemblies. Beyond that permitted by the BC Building Code, exterior components such as wood cladding and soffit/trims could be supported with an 'alternative solution' approach'.
Exterior Windows	Inappropriate	Ability to clean and water/chemical resistance are paramount in this location.
Curtain Wall	Inappropriate	There is no known wood product for this application.
Exterior Doors and Screens	Appropriate	Wood doors and screens can be used in low traffic areas.

Area of Usage	Appropriateness	Justification
Roof	Appropriate	Wood permitted
Interior Partitions and Doors		
Partition Studding	Inappropriate	Not permitted by the BC Building Code.
Interior Doors	Appropriate for offices only Inappropriate for all other areas including Patient accessible areas	Framing, core and facing of door can be wood for locations not requiring greater than a 90 minute fire resistance rating.
Vertical Movement		
Stairs (Structural)	Inappropriate	Not permitted by the BC Building Code.
Stairs (treads, risers)	Inappropriate	Not permitted by the BC Building Code.
Guardrails	Appropriate for non-exit stairs	Wood can be used in these locations where there is a low to medium risk of impact.
Handrails	Appropriate	Permitted by the BC Building Code.
Fittings and Equipment		
Hardwood Floor	Appropriate	Wood could be used in certain, non-clinical locations as a floor finish; this would be limited to high end finished areas which are not subject to low acoustic or high usage requirements. Building code requirements would have to be met.
Ceiling Tiles	Appropriate	Wood could be used in ceiling tiles for aesthetic requirements in certain, non-clinical areas within the building as permitted by the BC Building Code. This would be limited to high end finished areas which are not subject to low acoustic or high usage requirements.
Wall Finish	Appropriate	Wood could be used as a wall finish for aesthetic and acoustic requirements in certain, non-clinical areas within the building as permitted by the BC Building Code. This would be limited to high end finished areas which are not impaired by acoustic and high usage requirements. Beyond that permitted by the BC Building Code, interior finishes could be supported with an 'alternative solution' approach.
Toilet Partitions	Appropriate	The core material for the partitions can be made from wood particles.
Signs	Appropriate	The base material on which the sign is mounted can be of wood.
Loose Equipment (Desks, chairs, etc)	Appropriate	The core material for the desks, chairs, etc., can be made from particle and complete wood substrate except where CSA standards require non-porous materials.

Area of Usage	Appropriateness	Justification
Fixed Equipment (Millwork)	Appropriate	Frames, core material, doors and substrate for millwork can be constructed with wood. This includes show windows, aprons/backing, shelves, cabinets and counters.
Modular Benches	Inappropriate	
Specialized Equipment	Inappropriate	Clinical equipment and associated environment cannot utilise wood as these environments need to be inert.
Blocking within walls	Appropriate	For attachment of handrails, accessories and similar interior finish items mounted on the surface of walls.
Nailing Elements	Appropriate	Wood nailing elements attached directly to or set into a non-combustible backing for the attachment of interior finishes as permitted by the BC Building Code.
Mechanical		
None Known		
Electrical		
None Known		
Site Development		
Landscaping (Architectural, decorative, site furnishings, etc)	Appropriate	Wood could be used in Landscaped areas for the Arts, Architectural features/site furnishings; seats, pagodas, etc.
Contractor		
Site establishment	Appropriate	Where appropriate, the Design-Builder is to endeavour to utilise materials of wood and wood derivative for their site establishment.

APPENDIX 1I(I)

IMIT Roles & Responsibility Matrix

1 INTENT

1.1 Summary:

1.1.1 To provide an overview of IMIT roles and responsibilities between the Design-Builder and the Authority and does not override specifics in Schedule 1 Statement of Requirements;

1.1.2 For specifics, refer to the appropriate section reference numbers in the Schedule 1, Statement of Requirements, or the other noted Appendices.

2 DEFINITIONS

2.1 In this Schedule:

2.1.1 The attachment is the matrix;

2.1.2 The matrix is for the Facility and the Building (MHSU);

2.1.3 “Primary Stakeholder” and “Secondary Stakeholder” are reference categories of key contacts from the Authority or its agents for a particular item;

2.1.4 “Applies To” is a means to identify the applicability of each Division 27 Section and Subsection to a particular component of the project.

2.1.4.1 “Facility” refers to Schedule 1, Statement of Requirements, for the correct definition of “Facility”.

2.1.4.2 “MHSU” means Mental Health and Substance Use (the “Building”).

2.1.5 “Design” means who has responsibility for delivery of design specifications and drawings;

2.1.6 “Procure” means who has responsibility for the management and completion of procurement processes, up to and including delivery including the payment to vendors;

2.1.7 “Install” means who has responsibility to install in the Facility, including making connections to necessary building services (including plumbing, heating, cooling, ventilation and electricity) and connections to necessary communication or network interfaces or devices;

2.1.8 “Test, Commission & Certify” means who is responsible to test, commission and certify the equipment or system in accordance with any commissioning requirements set out in this Agreement, and applicable standards and good industry practices, including to ensure that the Equipment/System is operating in accordance with the manufacturer’s requirements and specification;

2.1.9 “Integration with other systems” means who is responsible to make the integration with other systems;

2.1.10 “IMIT” means the Authority’s Information Management Information Technology representatives;

2.1.11 “HSSBC” means Health Shared Service BC the Authorities’ specific Information Technology representative;

2.1.12 “DB” means the Design Builder organization;

2.1.13 “N/A” means representative Not Applicable;

2.1.14 “FAC” means the Authority’s Facilities Management representative;

2.1.15 “HA” means the Authority organization and its representatives;

2.1.16 “Clinical” means the clinical department who is the primary user of the infrastructure and or system being provided.

3 ATTACHMENT 1 IMIT ROLES & RESPONSIBILITY MATRIX

Refer to companion document with the filename Appendix 1I(I) IMIT Roles and Responsibility Matrix.

RCH Redevelopment IM/IT Roles & Responsibilities Matrix

Division	Section Heading	Section Ref.	Primary Stakeholder	Secondary Stakeholder	Applies To	Construction					Comments
						Design	Procure	Install	Test, Commission + Certify	Integration with other systems	
27	**Common Works**	7.9.4			Facility						
	Telecommunications Grounding System	7.9.4.1	IMIT	HSSBC	Facility	DB	DB	DB	DB	N/A	
	Communication Pathways	7.9.4.2			Facility						
	Fire stop Systems	*7.9.4.2(9)(a)*	FAC, IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Cable Tray	*7.9.4.2(10)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*N/A*	*N/A*	
	Conduits and Sleeves	*7.9.4.2(11)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*N/A*	*N/A*	
	Surface Raceways and Furniture Pathways	*7.9.6.2(12)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*N/A*	*N/A*	
	Service Entrance Facilities	*7.9.6.2(13)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*N/A*	*N/A*	
	Communications Rooms	7.9.4.3			Facility						
	Telecommunications Rooms	*7.9.4.3(3)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Equipment Racks and Cabinets/Cable Management	*7.9.4.3(4)*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
27	**Structured Cabling**	7.9.5			Facility						
	Horizontal Cabling Subsystem	*7.9.5.2*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Backbone Cabling Subsystem	*7.9.5.3*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Telecommunications Outlets	*7.9.5.4*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Patch Cords, Cross Connect Wire and Harness Cables	*7.9.5.5*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
27	**Wireless Network Infrastructure (WIFI)**	7.9.6			Facility						
	Wireless Cabling Grid	*7.9.6.2*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Wireless Network Hardware, Components and Enclosures	*7.9.6.3*	IMIT	HSSBC	Facility	***HA***	***HA***	*DB / **HA***	***HA***	***HA***	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
27	**Data Communications (LAN)**	7.9.7	IMIT	HSSBC	Facility	**HA**	**HA**	DB/**HA**	**HA**	**HA**	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details Refer to Structured Cabling Section for the cabling requirements.*
27	**Voice Communications**	7.9.8	IMIT	HSSBC	Facility	**HA**	**HA**	**HA**	**HA**	**HA**	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment] List for further details Refer to Structured Cabling Section for the cabling requirements.*
27	**AV and Videoconference Equipped Multimedia Rooms**	7.9.9			MHSU						
	AV Systems and Equipment (Auditorium/VC Rooms)	7.9.9			MHSU						
	Type 1	7.9.9	IMIT	HSSBC	MHSU	*DB*	*DB*	*DB*	*DB*	*N/A*	
	Type 2	7.9.9	IMIT	HSSBC	MHSU	*DB*	*DB*	*DB*	*DB / HA*	*DB / HA*	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
	Type 3	7.9.9	IMIT	IMIT, HSSBC	MHSU	***HA***	***HA***	***HA***	***HA***	*DB / HA*	*Refer to Appendix 1J(II) [Clinical Education and Apllied Research Space Infrastructure Specifications] and Appendix 1I(II) [IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
	Type 4 (Large Multipurpose Room)	7.9.9	IMIT	HSSBC	MHSU	*DB*	*DB*	*DB*	*DB / HA*	*DB / HA*	*Refer to Appendix 1J(I)[RCH Large Multipurpose Room Specifications] and Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
	Type 5	7.9.9	IMIT	HSSBC	MHSU	*DB*	*HA*	*DB*	*DB / HA*	*DB / HA*	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
	Type 6	7.9.9	IMIT	HSSBC	MHSU	*DB*	*DB*	*DB*	*DB / HA*	*DB / HA*	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
27	**Clinical Education and Observation Camera and Audio Systems**	7.9.10	IMIT	Clinical	MHSU	DB	DB	DB	*DB / HA*	*DB / HA*	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
27	**CATV/IPTV**	7.9.11			MHSU						
	Horizontal Cabling Distribution	*7.9.11*	IMIT	HSSBC	MHSU	*DB*	*DB*	*DB*	*DB*	*N/A*	
	CATV System and Hardware	*7.9.11*	IMIT	FAC	MHSU	***HA***	***HA***	*DB / **HA***	***HA***	***HA***	*Refer to Appendix 1P[Equipment List] for further details.*
27	**Electronic Digital Signage System**	7.9.12	IMIT	FAC	MHSU	DB	DB	DB	DB	N/A	*No screens are being installed in Phase 1. Rough-in of infrastructure only.*
27	**Interactive Media Systems (in Comfort Rooms)**	7.9.13	IMIT	Clinical	MHSU	DB	DB	DB	DB	N/A	*No media walls are being installed in Phase 1. Rough-in of infrastructure only.*
27	**Supplemental Sound Systems**	7.9.14	FAC	IMIT	MHSU	DB	DB	DB	DB	N/A	
27	**Public Address Systems**	7.9.15	FAC	IMIT, HSSBC	Facility	DB	DB	DB	DB	DB/**HA**	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
27	**Intercommunications**	7.9.16	FAC	IMIT,HSSBC	Facility	DB	DB	DB	DB	DB/**HA**	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*
27	**Nurse Call Systems**	7.9.17	FAC	IMIT,HSSBC	MHSU	DB	DB	DB	DB	DB/**HA**	
27	**Distributed Antenna System (DAS)**	7.9.18			Facility						
	DAS Cabling System	*7.9.18*	IMIT	HSSBC	Facility	*DB*	*DB*	*DB*	*DB*	*N/A*	
	DAS System and Equipment	*7.9.18*	IMIT	HSSBC	Facility	***HA***	***HA***	***HA***	***HA***	*DB / **HA***	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details*
27	**End Use Equipment (IMIT)**	n/a	IMIT	HSSBC	Facility	**HA**	**HA**	**HA**	**HA**	**HA**	*Refer to Appendix 1I(II)[IMIT, Clinical Equipment (FF&E) Responsibilities and IMIT Equipment List] for further details.*

APPENDIX 1I(II)

IMIT, Clinical Equipment (FF&E) Responsibilities & IMIT Equipment List

1 INTENT

1.1 Intent

1.1.1 To provide further requirements and information between the Design- Builder and the Authority in terms of Clinical Equipment and Furniture in Appendix 1P [Equipment List] and IMIT equipment referred to primarily in Schedule 1 [Statement of Requirements], “Section 7.9 Communications” and in Appendix 1B(II) [Campus Communications Hub Technical Specifications] for the design, construction and commissioning of the Facility;

1.1.2 To provide a sample IMIT equipment list (refer to Appendix 1P [Equipment List] for Clinical Equipment and Furniture);

1.2 Overview

1.2.1 In this Appendix contains sample IMIT Equipment listed by:

1.2.1.1 End-use Equipment;

1.2.1.2 Communications Rooms;

1.2.1.3 Campus Communications Hub;

1.2.1.4 Multimedia Rooms;

1.2.2 IMIT Equipment items are classified into one of three categories of Design-Builder and Authority responsibilities:

1.2.2.1 Category 1 Authority Supplied, Authority Installed, Authority Paid;

1.2.2.2 Category 2 Authority Supplied, Design-Builder Installed, Authority Paid;

1.2.2.3 Category 3 Design-Builder Supplied, Design-Builder Installed, Design-Builder Paid;

1.2.3 Appendix 1P [Equipment List] contains Clinical Equipment and Furniture items classified into one of five categories of Design-Builder and Authority responsibilities:

1.2.3.1 Category OSOI Owner Supplied Owner Installed;

1.2.3.2 Category OSCI Owner Supplied Contractor Installed;

1.2.3.3 Category OSVI Owner Supplied Vendor Installed;

1.2.3.4 Category CSCI Contractor Supplied Contractor Installed

1.2.3.5 Category VSVI Vendor Supplied Vendor Installed

1.2.4 This Appendix describes general and category equipment specific responsibilities.

2 DEFINITIONS

2.1 In this Appendix

2.1.1 “Category 1IMIT Equipment” means the equipment described and listed as “Category 1” in the IMIT Equipment List (or similar equipment) and “Category 1” have corresponding meaning;

2.1.2 “Category 2 IMIT Equipment” means the equipment described and listed as “Category 2” in the IMIT Equipment List (or similar equipment) and “Category 2” have corresponding meaning;

2.1.3 “Category 3 IMIT Equipment” means the equipment described and listed as “Category 3” in the IMIT Equipment List (or similar equipment) and “Category 3” have corresponding meaning;

2.1.4 “Category OSOI Owner Supplied Owner Installed” means the equipment described and listed as “OSOI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSOI” and “OSOI” have corresponding meaning;

2.1.5 “Category OSCI Owner Supplied Contractor Installed” means the equipment described and listed as “OSCI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSCI” and “OSCI” have corresponding meaning;

2.1.6 “Category OSVI Owner Supplied Vendor Installed” means the equipment described and listed as “OSVI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSVI” and “OSVI” have corresponding meaning

2.1.7 “Category CSCI Contractor Supplied Contractor Installed” means the equipment described and listed as “CSCI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category CSCI” and “CSCI” have corresponding meaning;

2.1.8 “Category VSVI Vendor Supplied Vender Installed” means the equipment described and listed as “VSVI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category VSVI” and “VSVI” have corresponding meaning;

2.1.9 “Commission” means to test and commission the equipment or system in accordance with any commissioning requirements set out in this Agreement, and applicable standards and Good Industry Practice, including to ensure that the Equipment is operating in accordance with the manufacturer’s requirements and specification, and “Commissioned” and “Commissioning” have a corresponding meaning;

2.1.10 “Contractor” in relation to Category CSCI means Design-Builder;

2.1.11 “Deliver” means to deliver Equipment to the Facility, and “Delivered” and “Delivery” have corresponding meanings;

2.1.12 “Equipment” means:

2.1.12.1 the Category 1 IMIT Equipment, Category 2 IMIT Equipment and Category 3 IMIT Equipment as described in this Appendix, and “IMIT Equipment” has corresponding meaning;

2.1.12.2 the Category OSOI Owner Supplied Owner Installed, Category OSCI Owner Supplied Contractor Installed, Category OSVI Owner Supplied Vendor Installed, Category CSCI Contractor Supplied Contractor Installed and Category VSVI Vendor Supplied Vendor Installed as described in Appendix 1P [Equipment List], and “Clinical Equipment and Furniture” has corresponding meaning;

2.1.13 “Joint Equipment Coordination Committee” means the committee established pursuant to Section 3.3 of this Schedule and “Equipment Coordination Committee” has corresponding meaning;

2.1.14 “Equipment List” means the list of Equipment set out in the four attachments of this Appendix and Appendix 1P [Equipment List], and “IMIT Equipment List” has corresponding meaning;

2.1.15 “Install” means to install in the Facility, including making connections to necessary building services (including plumbing, heating, cooling, ventilation and electricity) and

connections to necessary communication or network interfaces or devices, and “Installed” and “Installation” have corresponding meanings;

2.1.16 “Receive” means the provision of equipment and staff to accept Delivery and provide an appropriate and secure staging and storage area to be used prior to Setup, and “Received” and “Receiving” have corresponding meanings;

2.1.17 “Setup” includes:

2.1.17.1 transportation and movement within the Facility from the Delivery or storage location to the final installation location;

2.1.17.2 placement in the final location within the Facility; and

2.1.17.3 any necessary unwrapping, unpacking, disposing and/or recycling all wrapping and packaging materials, assembly.

2.1.18 “Supply” means the management and completion of procurement processes, up to and including Delivery, for Equipment, including the payment to vendors, and “Supplied” has a corresponding meaning.

2.1.19 “Vendor” in relation to Category OSVI and Category VSVI means Authority when Authority assigns to supply and installation to a third party.

3 GENERAL

3.1 Physical Integration of Equipment with Design of Facility

3.1.1 Notwithstanding integration requirements elsewhere in the Statement of Requirements, the Design-Builder will ensure that all Equipment is physically integrated with the overall Design of the Facility and will include such Equipment as part of the development of Design under this Agreement. To the extent practicable, any required changes to the Design of the Facility as a result of changes to Equipment requirements will be resolved as part of the design development process.

3.2 Changes affecting Design or Construction

3.2.1 If the Authority increases or decreases the quantities of Equipment, procures other items in substitution for those identified on the Equipment List or otherwise changes the items to be procured and there is an effect on the Design or Construction, such increase, decrease, procurement or change, and the effect thereof, will constitute a Change. The parties will endeavour to agree to an expedited Change process to deal with Equipment changes.

3.3 Joint Equipment Coordination Committee

3.3.1 The parties will establish an Equipment Coordination Committee composed of at least two (or any other number agreed between the parties) representatives of each party. The Joint Equipment Coordination Committee will meet regularly (not less than once per month) to review the status of, and to provide advice to the parties with respect to the Equipment Supply, Delivery, Receiving, Setup, Installation and Commissioning.

3.3.2 The parties will ensure at least one representative from each party from the Joint Equipment Coordination Committee are members of the IMIT Coordination Committee (refer to Schedule 1 [Statement of Requirements], Section 7.9.1 Design and Implementation Principles and Guidelines);

3.4 **Equipment Logistics Schedule**

3.4.1 The Design-Builder will propose a draft schedule (the "Equipment Logistics Schedule") within 6 months after the Effective Date and the parties will seek to finalize the Equipment Logistics Schedule, each party acting reasonably, within 11 months after the Effective Date, in accordance with the following principles:

3.4.1.1 in order to take advantage of the most recent technological advances, final decisions on the selection of Equipment sensitive to or anticipated to be revised with newer technology prior to the Target Substantial Completion Date, together with any training or service requirements, will not be made by the Authority until as late as possible in the period for Construction;

3.4.1.2 the Design-Builder will provide adequate time to issue competitive bidding documents, receive proposals, clarify aspects of proposals, and Receive, Install and Commission the Equipment;

3.4.1.3 the Authority will require the ability to take advantage of bulk or other purchase opportunities advantageous to it;

3.4.1.4 the Design-Builder will undertake the precautions set out by Equipment vendors to protect any Equipment that is required to be Delivered or Installed while construction is still underway; however, as an additional precaution some sensitive Equipment (such as equipment with electronic components) may require Delivery, Receiving, Installation and Commissioning dates that are late in the period for Construction. Refer to Schedule 1 [Statement of Requirements], Sections 7.9.6 Wireless Network Infrastructure (WIFI) and 7.9.7 Data Communications for specific conditions required by the Authority before installation of equipment; and,

3.4.1.5 the parties may modify the Equipment Logistics Schedule by mutual agreement, each acting reasonably.

3.5 **Staging and Storage**

3.5.1 The Design-Builder will:

3.5.1.1 provide a secure, dry, clean space to accommodate staging, storage and commissioning of Equipment;

3.5.1.2 allow Authority representatives to access and work within the space;

3.5.1.3 will ensure the space is able to maintain a reasonable temperature to store and work in; and

3.5.1.4 provide power to the space and will notify the Authority, in advance (no less than 24 hours), of any power interruptions;

3.5.1.5 provide for office furniture and network connections for Authority computers, phones and printers to facilitate activities related to the use of the space; and

3.5.1.6 ensure the space is well serviced by nearby elevator to enable Setup.

3.6 **Storage Costs**

3.6.1 Any storage costs incurred by the Design-Builder due to Equipment being delivered before or by the delivery date as set out in the Equipment Logistics Schedule delivery date, but not ready for Setup, will be borne by the Design-Builder.

3.7 **Title**

3.7.1 The Design-Builder will cause the procurement arrangements for Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed to provide for a direct transfer of title to such Equipment from the vendors to the Authority. Title to Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed may be reserved by third party unpaid vendors until the earlier of the date of payment and the Target Substantial Completion Date. The Design-Builder will pay all such unpaid vendors prior to the Target Substantial Completion Date for amounts owing on outstanding invoices.

3.8 **Damage and Loss**

3.8.1 Any damage or loss occurring prior to the Target Substantial Completion Date to:

3.8.1.1 Equipment after it has been Received and prior to the Target Substantial Completion Date, is the responsibility of the Design-Builder.

3.9 **Equipment Commissioning**

3.9.1 The Design-Builder will incorporate its Commissioning responsibilities under this Schedule into its commissioning activities for the Facility as set out in this Agreement.

3.9.2 All Category 3, Category CSCI, and Category OSCI Equipment must be Commissioned, and the Acceptance Protocol completed where applicable, prior to Substantial Completion of the Facility.

3.10 **Addition of Additional Equipment or Replacement of Existing Equipment**

3.10.1 If the Authority identifies Equipment that is in addition to, or in replacement of certain items of, the Equipment, the Authority may in its discretion:

3.10.1.1 elect to have the Design-Builder Supply, Deliver, Receive, Setup, Install and/or Commission such additional Equipment, in accordance with and subject to the procedures for Changes; or

3.10.1.2 itself perform any of such activities.

3.11 **Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed Approvals**

3.11.1 All equipment identified as Category 3 and CSCI is required to be approved by the Authority prior to purchasing and supplying.

3.11.2 Timelines for Authority approvals are to be identified on the Equipment Logistics Schedule, and will include sufficient time for the Authority to consider the Design-Builder's proposed procurement process (including for conformity, where required, with procurement practices consistent with those that would be carried out by the Authority itself) and for the Authority to consider the proposed Category 3 and CSCI Equipment prior to purchase.

3.11.3 Authority may request Design-Builder to facilitate mock ups on-site installation reviews for Category 3 and CSCI Equipment. Authority to identify which equipment items mock-up will be required for prior to the finalization of the Equipment Logistics Schedule.

3.11.4 Sample manufacturers and sample models are given in the Equipment List and do not override statements of "approved equal" in the Statement of Requirements.

3.11.5 Equipment Lists are for reference only and do not preclude the Authority or Design-Builder from selecting equipment not identified in the Equipment List.

3.12 Acceptance Protocol

3.12.1 A document will be provided by the Design-Builder to the Authority for each Category 2, Category 3, Category OSCI and Category CSCI item that certifies all testing of the relevant Equipment has been completed to demonstrate that it has been Installed and Commissioned in accordance with the manufacturer's requirements and is functioning in accordance with the specifications included in the relevant equipment purchase contract or purchase order (the "Acceptance Protocol").

3.12.2 Without limiting the Design-Builder's obligation to Commission the relevant Equipment, the Design-Builder will, to the Authority's reasonable satisfaction, complete all aspects of the Acceptance Protocol for each item of Category 2, Category 3, Category OSCI, and Category CSCI Equipment if:

3.12.2.1 prior to the Target Substantial Completion Date, the Design-Builder fails to complete any aspect of an Acceptance Protocol for any item of Category 2, Category 3, Category OSCI and Category CSCI Equipment; and

3.12.2.2 the Authority waives the requirement for the Design-Builder to complete the relevant Acceptance Protocol prior to the Target Substantial Completion Date, then subject to meeting the other requirements for Substantial Completion of the Facility each such failure will be a deficiency and the Authority may make the withholding described in Section 43 of the Design-Build Agreement.

4 CATEGORY 1 IMIT EQUIPMENT, CATEGORY OSOI, CATEGORY OSVI, CATEGORY VSVI (AUTHORITY SUPPLIED, AUTHORITY INSTALLED, AUTHORITY PAID)

4.1 Responsibilities for Category 1, OSOI, OSVI, VSVI Equipment

4.1.1 The Authority intends to, but is not obligated to, Supply, Deliver, Setup, Install and Commission the Equipment.

4.1.2 The Design-Builder will Receive the Equipment and provide space for Authority, and its agents, receiving staff to also Receive into their systems.

4.1.3 The Authority may, at its option, engage with third parties to, Supply, Deliver, Setup, Install and Commission the Equipment.

4.2 Responsibilities for Timing of Delivery and Installation of Category 1, OSOI, OSVI, VSVI Equipment

4.2.1 The Design-Builder will:

4.2.1.1 As early as practicable:

4.2.1.1.1 for each item of Equipment, provide on the Equipment Logistics Schedule the earliest date when the Facility will be available to the Authority to Install such item, which date must, for all Equipment and any required Setup or Installation equipment that will not fit through the constructed doorways and other physical constraints on access, be a reasonable period in advance of the construction of such doorways and other physical constraints on access; and

4.2.1.1.2 identify to the Authority the date by which each item of Equipment must be Delivered, Installed and Commissioned so as not to delay the Design, the Construction, and Substantial Completion of the Facility or the Authority's use and occupation of the Facility; and

4.2.1.2 as required from time to time until Substantial Completion of the Facility, but no less than once per calendar month, update and make available the information in Section 3.4 so that at all times it is an accurate, reasonable and realistic representation of the Design-Builder's plans for the completion of the Design and Construction of the Facility.

4.2.2 The Authority will:

4.2.2.1 cause the relevant item of Equipment the Authority wishes to install in the Facility to be delivered by the date specified by the Design-Builder under Section 3.4 above.

4.3 **Indicative Precedence of Delivery and Installation of Category 1 IMIT Equipment**

4.3.1 An indicative precedence of activities for Category 1 IMIT Equipment is included below in Section 4.3.2. The Authority's IMIT group requires a reasonable amount time to prepare, deploy, test and operationalize IMIT related equipment in the Facility.

4.3.2 Indicative precedence of Authority activities for installation of Category 1 IMIT Equipment:

4.3.2.1 Network switches racked and stacked including pigtails complete to patch/Gigabit panels switches racked and stacked provided by Design-Builder ready for Authority programming with network to be live in Staging space;

4.3.2.2 Wireless access points installation starts after ceiling is in place;

4.3.2.3 Receiving/Staging/Commissioning space ready before IMIT Equipment deployment starts. Includes space located in close proximity to elevators, elevators are operational, space is clean and secured with key or proximity card reader restricted and audited access, desks installed, network cabling to desks for computer/phone, network cabling to printer(s), ideally near an existing communications room;

4.3.2.4 Elevators accessible for use by Authority for IMIT Equipment deployments;

4.3.2.5 Wall mounts and all wiring in place in advance of related IMIT Equipment deployments;

4.3.2.6 IMIT Equipment deployments start typically around two months prior to Target Substantial Completion Date with space that is clean – dust free, walls are painted, flooring and ceilings are finished, furnishings complete, desktop grommets complete;

4.3.2.7 Multimedia IMIT Equipment deployment starts earlier with completion earlier because of the degree of functionality programming and testing required.

4.3.3 The Authority's IMIT group requires a period starting several months in advance 4.3.2 to prepare, deploy, test and operationalize IMIT related equipment in the Campus Communications Hub required for building occupancy and owner operations testing. Refer to Schedule 1 [Statement of Requirements], Section 2.11.12 for further details concerning CCH Early Access. An indicative precedence of activities for Category 1 IMIT Equipment is included below in Section 4.3.4.

4.3.4 Indicative precedence of Authority activities for installation of Category 1 IMIT Equipment in the Campus Communications Hub:

4.3.4.1 Enterprise Network Gateway (ENG) switch and dependent services ready. Includes ENG Firewall, 3rd Party (Telus, HSSBC) CIUs, MRVs, Modems and Management Tools;

4.3.4.2 Network core switch installed and ready;

4.3.4.3 CCH specific switches installed and ready;

4.3.4.4 Network critical services (DHCP, DNS, NTP appliances) installed and ready;

4.3.4.5 Perimeter security firewalls, installed and ready;

4.3.4.6 Storage Area Network (SAN) directors installed and ready;

4.3.4.7 SAN storage to provide storage disk for virtual server farm and standard network backups, installed and ready;

4.3.4.8 Chassis and blade servers installed and ready;

4.3.4.9 Network load balancers installed and ready;

4.3.4.10 Phone switchboard (IP-PBX) including all dependent hardware, software and services, installed and ready. Includes virtual servers, voice gateways, session border controller, media gateways, integration with current campus.

5 CATEGORY 2 IMIT EQUIPMENT AND CATEGORY OSCI (AUTHORITY SUPPLIED, DESIGN-BUILDER INSTALLED, AUTHORITY PAID)

5.1 Responsibilities for Category 2 and OSCI Equipment

5.1.1 The Authority will Supply, Deliver and Commission the Category 2 IMIT Equipment.

5.1.2 The Authority will Supply and Deliver Category OSCI Equipment.

5.1.3 The Design-Builder will Receive, Setup, Install the Category 2 Equipment and Category OSCI Equipment and additionally Commission Category OSCI Equipment.

5.1.4 The Design-Builder will provide space for Authority, and its agents, receiving staff to also Receive into their systems.

5.1.5 The Authority may, at its option, engage with third parties to Commission Equipment identified as to be commissioned by the Authority.

5.2 Responsibilities for Timing of Delivery and Installation of Category 2 and OSCI Equipment

5.2.1 The Design-Builder will:

5.2.1.1 As early as practicable:

5.2.1.1.1 for each item of Equipment, provide on the Equipment Logistics Schedule the earliest date when the Facility will be available to the Design-Builder to Install such item, which date must, for all Equipment and any required Setup or Installation equipment that will not fit through the constructed doorways and other physical constraints on access, be a reasonable period in advance of the construction of such doorways and other physical constraints on access; and

5.2.1.1.2 identify to the Authority the date by which each item of Equipment must be Delivered, Installed and Commissioned so as not to delay the Design, the

Construction, Substantial Completion of the Facility or the Authority's use and occupation of the Facility; and

5.2.1.2 as required from time to time until Substantial Completion of the Facility, but no less than once per calendar month, update and make available the information in Section 3.4 so that at all times it is an accurate, reasonable and realistic representation of the Design-Builder's plans for the completion of the Design and Construction of the Facility.

5.2.2 The Authority will:

5.2.2.1 cause the relevant item of Equipment the Authority wishes to install in the Facility to be delivered by the date specified by the Design-Builder under Section3.4 above.

5.3 Indicative Precedence of Delivery and Installation of Category 2 IMIT Equipment

5.3.1 An indicative precedence of activities for Category 2 IMIT Equipment is included below in Section 5.3.2. The Authority's IMIT group requires a reasonable amount time to prepare, deploy, test and operationalize IMIT related equipment in the Building and Energy Center required for building occupancy and owner operations testing.

5.3.2 Refer to 4.3.2 for indicative precedence of Authority activities for installation of Category 2 IMIT Equipment.

5.3.3 The Authority's IMIT group requires a period starting several months in advance of 5.3.2 to prepare, deploy, test and operationalize IMIT related equipment in the Campus Communication Hub required for building occupancy and owner operations testing. Refer to Schedule 1 [Statement of Requirements], Section 2.11.12 for further details concerning CCH Early Access. An indicative precedence of activities for Category 2 IMIT Equipment is included below in Section 5.3.4

5.3.4 Refer to 4.3.4 for indicative precedence of Authority activities for installation of Category 2 IMIT Equipment in the Campus Communications Hub

6 CATEGORY 3 IMIT EQUIPMENT and category csci (DESIGN-BUILDER SUPPLIED, DESIGN-BUILDER INSTALLED, DESIGN-BUILDER PAID)

6.1 Responsibilities for Category 3 and CSCI Equipment

6.1.1 The Design-Builder will Supply (and pay for), Deliver, Receive, Setup, Install and Commission Equipment included in this category.

6.2 Standards for Equipment

6.2.1 The Design-Builder will cause all Equipment to be:

6.2.1.1 new;

6.2.1.2 of good quality and in a safe, serviceable and clean condition in accordance with the Equipment List;

6.2.1.3 of the type specified in the Statement of Requirements, if applicable;

6.2.1.4 in compliance with all Laws; and

6.2.1.5 in compliance with all certifications or standards or Authority standards & guidelines.

6.2.2 The Design-Builder will, as soon as practicable after receiving a request from the Authority, supply to the Authority evidence demonstrating its compliance with this Section 6.2.

6.3 **Warranties**

6.3.1 The Design-Builder will ensure that all manufacturers' and vendors' warranties for all Equipment:

6.3.1.1 commence no earlier than the date of first clinical use of the relevant item of Equipment; and

6.3.1.2 are in the Authority's name.

6.4 **Training**

6.4.1 The Design-Builder will include the Authority staff and other representatives to be notified and included in all stages of the Receiving, Setup, Installation and Commissioning to ensure there is a comprehensive overview of the Equipment, including its features, calibration and interfaces.

6.4.2 The Design-Builder will be knowledgeable on the proper use and maintenance of all Equipment and will provide sufficient training and education of the Authority and persons designated by the Authority to enable proper use and maintenance of the Equipment. The Design-Builder will not be responsible for providing the Authority with training and education in respect of Category 1, Category 2, OSOI, OSCI, OSVI and VSVI Equipment.

6.4.3 On or before the Target Substantial Completion Date, the Design-Builder will transfer and deliver to the Authority all guidance and materials and manuals relating to Equipment items as produced and provided by the manufacturer or the vendor of such items.

7 SAMPLE EQUIPMENT LIST – END USE EQUIPMENT

8 SAMPLE EQUIPMENT LIST – COMMUNICATIONS ROOMS

9 SAMPLE EQUIPMENT LIST – CAMPUS COMMUNICATIONS HUB

10 SAMPLE EQUIPMENT LIST – MULTIMEDIA ROOMS

RCH Phase 1 Sample Equipment List - End Use Equipment

Item #	Category	General item description	Further item description	Quantity	Responsibility	Power Req'd	Sample Make/Model (Subject to Change)
Mental Health Building							
Computers							
100	C	Standard PC	Standard PC may be further sub divided as more detailed requiredment are defined	180	Cat 1	Yes	Lenovo Thinkcenter M93p Tiny PC with single Lenovo LT2224z monitor, keyboard, mouse
102	C	Standard PC w Dual Monitors	None defined at present. TBD at Detail Design We anticipate that less than 15% of PCs will be equipped with dual monitors	0	Cat 1	Yes	Lenovo Thinkcenter M93p Tiny PC with dual Lenovo LT2224z monitors, keyboard, mouse
106	C	Standard Computer, Wall Mounted	None defined at present. TBD at Detail Design We anticipate less than 5% of PCs will be wall mounted	0	Cat 1	Yes	Lenovo Thinkcenter M93p Tiny PC with single Lenovo LT2224z monitor, keyboard, mouse
101	C	Laptop	None defined at present. TBD at Detail Design. We anticipate that up to 10% of computers will be laptops. Laptops will be wi-fi enabled	0	Cat 1	Yes	Lenovo Thinkpad T450p
110	C	Laptop Docking Station or Port Replicator	None defined at present. TBD at Detail Design. We expect that most laptops acquired will also have docks or port replicators along with extra monitor, keyboard, mouse	0	Cat 1	Yes	A variety of products depending on requirements
111	C	Standard Thin Client Computer	It is probable that Thin Clients will replace PCs in many instances at Detail Design. No size or power implications at present.	57	Cat 1	Yes	Lenovo M53 with 23" Lenovo Monitor, keyboard, mouse
105	C	Thin Client on WOW Cart	These will operate over wi-fi rather than hard wired network connection	2	Cat 1	Yes	Lenovo M53 with 23" Lenovo Monitor, keyboard, mouse
119	C	WOW Cart	A cart will be chosen at the time of deployment	2	Cat 1	Yes	GCX VHRC Series model or equivalent
112	C	Standard Thin Client , Wall Mounted	We expect less than 10% of thin clients will be wall mounted	0	Cat 1	Yes	Lenovo M53 with 23" Lenovo Monitor, keyboard, mouse
114	C	Standard Computer Used to Drive a Bed Management Monitor	Infrastructure (Power/Data) will be provided in each Care Station for these in the event that FH choses to deploy bed management monitors	0	Cat 1	Yes	Lenovo Thinkcenter M93P Tiny PC
117	C	Thin Client on Supply Cart	Similar to a Thin Client for Workstation on Wheels. None currently anticipated	0	Cat 1	Yes	Lenovo M53 with 23" Lenovo Monitor, keyboard, mouse
Telephones							

Item #	Category	General item description	Further item description	Quantity	Responsibility	Power Req'd	Sample Make/Model (Subject to Change)
120	C	Voip Phone, Single Line	We will replace approximately 10% of these with a multi-line model at Detail Design	223	Cat 1	No	Single Line: Avaya I1120E Multi-Line: Avaya I1140E
128	C	Voip Phone, Single Line, Wall Mounted	Minor wall backing would be required	21	Cat 1	No	Avaya I1120E
121,	C	Voip Phone, Multi-Line	It is probable that we will swap some single line Voip phones for multi-line phones at Detail Design. 10%	0	Cat 1	No	Avaya I1120E
125	C	Phone, Wayfinding		0	Cat 1	No	Avaya Analog
126	C	Moneris	Retail Dr/Cr machine. To be deployed in the Coffee Kiosk	1	Cat 1	No	Current model provided by Moneris
130	C	Conference Phone, Voip	Meeting/Conference phone. Provided either with or without satellite microphones		Cat 1	No	Avaya Voip Conference Phone
132	C	Analog Phone	Standard, phone switch based, phone set used for backup phone, taxi phone, public phone	24	Cat 1	No	Avaya Analog
133	C	Analog Phone, Wall Mounted		2	Cat 1	No	Avaya Analog
134	C	Analog Phone, Wireless (DECT 6.0)	Used as patient and translation phones. Quantity to be defined at Detail Design	0	Cat 1	No	Not defined at present
185	C	Taxi Phone		2	Cat 1	No	Basic analog phone or equivalent to be determined
Printers							
140	C	Printer, Multi-Function, Floor	Floor standing multi-function printer; Analog port for fax line	9	Cat 1	Yes	HP Laserjet Enterprise M4555fskm
141	C	Printer, Multi-Function, Desktop	Desktop multi-function printer; Analog port for fax line	2	Cat 1	Yes	HP Laserjet M3035xs
142	C	Printer, Laser	Standard Laser Printer; These have largely been replaced by MFP's. None currently planned	0	Cat 1	Yes	HP Laserjet Enterprise 600xh with 2 paper trays
143	C	Printer, Color	Small, light duty, color printer	7	Cat 1	Yes	HP Laserjet Enterprise M551xh
144	C	Printer, Color, Large	Heavier Duty Color Printer, usually not a MFP	0	Cat 1	Yes	HP CLJCP4525xh
146	C	Printer, Label, I-Class		10	Cat 1	Yes	Datamax I-Class Printer
147	C	Printer, Label, E-Class		0	Cat 1	Yes	Datamax E-Class Printer
Intercoms							
	C	Master Station	Located at Cate Team Base Reception of each Inpatient Unit.	6	Cat 3	Yes	Commend IP-Version wall station WS 810P I series
	C	A/V Intercom Door-Station	Entry door of Inpatient Unit, Sally Port, Ante Rooms and Exterior Locked Doors as determined by the Authority.	TBD	Cat 3	No	Commend IP-Sub Station ES 962A series
	C	Audio Intercom	Secure Room and Isolation Bariatric	10	Cat 3	No	Commend IP-Version wall station WS 202V I CM series

Item #	Category	General item description	Further item description	Quantity	Responsibility	Power Req'd	Sample Make/Model (Subject to Change)
Access Points and Antennas							
	C	Wireless Access Point (Indoor)		165	Cat 2	No	Cisco 3702i/e, external antennas and pounting brackets.
	C	Wireless Access Point (Outdoor)		6	Cat 2	No	Cisco 1572 with external antennas and mounting hardware.
	C	DAS UHF Antenna		3	Cat 1	No	The authority is considering multiple DAS options. Refer to the SOR for more detail.
	C	DAS Cellular Antenna		50	Cat 1	No	The authority is considering multiple DAS options. Refer to the SOR for more detail.
	C	Roof Top Antennas		4	Cat 1	No	Sinclair Yagi Antennas
Energy Centre							
Computers							
100	C	Standard PC	Standard PC may be further sub divided into as more detailed requirement are defined	17	Cat 1	Yes	Lenovo Thinkcenter M93p Tiny PC with single Lenovo LT2224z monitor, keyboard, mouse
Telephones							
120	C	Voip Phone, Single Line		24	Cat 1	No	Avaya I1120E
132	C	Analog Phone	Basic analog phone	6	Cat 1	No	Avaya Analog
130	C	Conference Phone, Voip	Meeting/Conference phone	1	Cat 1	No	Avaya Voip Conference Phone
Printers							
141	C	Printer, Multi-Function, Desktop	Desktop multi-function printer; Analog port for fax line	1	Cat 1	Yes	HP Laserjet M335xs
143	C	Printer, Color	Small, light duty, color printer	1	Cat 1	Yes	HP Laserjet Enterprise M551xh
Intercoms							
	C	A/V Intercom Door-Station	Exterior Locked Doors as determined by the Authority.	TBD	Cat 3	No	Commend IP-Sub Station ES 962A series
Access Points and Antennas							
	C	Wireless Access Point (Indoor)		19	Cat 2	No	Cisco 3702i/e, external antennas and pounting brackets.
	C	DAS UHF Antenna		1	Cat 1	No	
	C	DAS Cellular Antenna		2	Cat 1	No	
PA System							
	C	Speakers and Speaker Mounts		TBD	Cat 3	No	

RCH Phase 1 Sample Equipment List - Communications Rooms						
Item #	Category	General item description	Further item description	Quantity	Responsibility	Sample Make/Model (Subject to Change)
Mental Health Building						
Network Hardware						
	C	Network Switches		45	Cat 2	HP5500 HI PoE Port
DAS						
	C	ROU/Amplifier - UHF	Remote Optical Unit - UHF	2	Cat 1	
	C	ROU/Amplifier - cellular	Remote Optical Unit/Amplifier - cellular	12	Cat 1	
PA System						
	C	Multichannel Power Amplifier	TBD at Detail Design		Cat 3	TOA DA-250FH
Energy Center						
Network Hardware						
	C	Network Switches		6	Cat 2	HP5500 HI PoE Port
DAS						
	C	ROU/Amplifier - UHF	Remote Optical Unit - UHF	1	Cat 1	
	C	ROU/Amplifier - cellular	Remote Optical Unit/Amplifier - cellular	2	Cat 1	

RCH Phase 1 Sample Equipment List - Campus Communications Hub

Item #	Category	General item description	Further item description	Quantity	Responsibility	Sample Make/Mode
Mental Health Building						
Network Hardware						
	C	Network CORE Switches	One assigned to be Network CORE1, the other is the ENG CORE.	2	Cat 1	HP12508
	C	DC CORE Switches	Two DC CORE switches that connect to existing DC CORE switches to form one virtual Data Center	2	Cat 1	HP12916E
	C	Firewalls	Enterprise Firewall appliance for Data Centers, with 40 Gb Port capability	2	Cat 1	Fortigate 3700D
	C	Load Balancers	High Performance appliances that distribute workloads acorss multiple computing resources.	2	Cat 1	BIG-IP 4000
	C	DHCP & DNS Appliance	Appliance that automates critical network services	1	Cat 1	Bluecat S45-R
	C	Network Switches	Count as per Phase 1 Design	24	Cat 1	HP5500 HI 48 Port
	C	ENG Network Switch	Network Switch as part of the ENG configuration	1	Cat 1	CISCO 1800
	C	CIU	ENG Component - Customer Interface Unit	2	Cat 1	TBD
	C	MRV	ENG Component - Applicances that support serial port connections	1	Cat 1	LX Series
WLAN						
	C	Wireless LAN Controllers	Provides centralized control, management for high scale wireless deployments	2	Cat 1	CISCO 8540 Series
	C	Mobility Services Engine	Platform that uses wifi to increase visibility into the network, deploy location-based mobile services, and strengthen security.	2	Cat 1	CISCO 3365
	C	CISCO Prime Appliance	Converged wired, wireless, security policy management for efficient network operations and faster troubleshooting.	1	Cat 1	CISCO Prime NCS Appliance
Server and Storage						
	C	Chassis	Server Architecture that houses multiple blades in an enclosure	2	Cat 1	HP
	C	Blades	Hot swapable hardware device	4	Cat 1	HP
	C	SAN Director	Transforming SAN fabrics into optimized SANs	2	Cat 1	HP StoreFabric Series
	C	Storage	Enterprise class flash array to improve storage performance	2	Cat 1	HP 3PAR 8440
PBX						
	C	Session Border Controller (SBC)	The SBC controls session admission, IP PBX, IP network transport and SIP/H.323 session routing	2	Cat 1	AcmePacket Net-Net x Series
	C	CISCO Voice Gateway	Gateway for VoIP calls to/from analog or digital PBX calls	5	Cat 1	CISCO VGW350
	C	CISCO Voice Gateway	Gateway for VoIP calls to/from analog or digital PBX calls	2	Cat 1	CISCO C2951 CUBE
Multi-Carrier DAS						**The authority is considering multiple DAS options. Refer to the SOR for more detail.**
	C	BIU	Base Station Interface Unit	2	Cat 1	
	C	BIU Modules (1900, 800PS, 900P, 850, 2100, 260	Base Station Interface Unit Remotes	1	Cat 1	
	C	RMP 480	Power Supply	4	Cat 1	
	C	ODU/OEU Chassis	Optical Distribution Unit/Optical Expansion Unit Chassis	6	Cat 1	
	C	ODU/OEU Modules	Optical Distribution Unit/Optical Expansion Unit Modules	12	Cat 1	
	C	DMS	DAS Management System	2	Cat 1	

	C	BDA - UHF	G-WAVE Bi-Directional Amplifiers/Repeaters	1	Cat 1	
	C	BDA - E-COMM	G-WAVE Bi-Directional Amplifiers/Repeaters	1	Cat 1	
	C	BDA - 900Mhz - Security	G-WAVE Bi-Directional Amplifiers/Repeaters	1	Cat 1	
	C	BDA - 900Mhz - Paging	G-WAVE Bi-Directional Amplifiers/Repeaters	1	Cat 1	
Intercoms						
	C	Digital IP-Intercom Server	DB to install in rack 13.8		Cat 3	Commend GE 800 Series

RCH Phase 1 Sample Equipment List - Multimedia Rooms

Item #	Category	General item description	Further item description	Quantity	Responsibility	Sample Make/Model (Subject to Change)
Mental Health Building						
Type 1 (AV Room)			**Refer to SOR 7.9.9.1**			
	C	Screen	Monitor size (47inch - 70inch) dependent on room size.	1	Cat 3	Sharp PNY475 (47inch) Sharp PNY455 (55inch) Sharp PNE 603 (60inch) Sharp PNE 703 (70inch)
	C	Mount	Universal Monitor Wall Mount	1	Cat 3	Chief Mount LTM1U
	C	Cable Management	Cable Cubby or Wall Plate	1	Cat 3	Extron
Type 2 (VC Room)			**Refer to SOR 7.9.9.1 for room quantities**			
	C	Screen	Monitor size (47inch - 70inch)	2	Cat 3	Sharp PNY475 (47inch) Sharp PNY455 (55inch) Sharp PNE 603 (60inch) Sharp PNE 703 (70inch)
	C	Mount	Universal Monitor Wall Mount	2	Cat 3	Chief Mount LTM1U
	C	Control System	Touch Panel	1	Cat 3	Crestron TSW1050BS
	C	Control System	Touch Panel Mount	1	Cat 3	Crestron TSW1050BSTKK
	C	Control System	Control System Processor	1	Cat 3	Crestron CP3N
	C	Control System	Crestron Network Switch	1	Cat 3	Crestron CENSWP0E5
	C	Audio System	Speakers and Speaker Mounts	2	Cat 3	Tannoy DI6 (Black)
	C	Audio System	Audio Amplifier	1	Cat 3	Extron 60-845-01 MPA401-70V mini audio amplifier
	C	Audio System	Volume Control	1	Cat 3	Crestron C2N-VEQ4
	C	Audio System	Microphones 1 or 2 depending on room size	1 or 2	Cat 3	Cisco -Biamp Tesira TESIRAFORTETI -Clear One 910-001-013-W Polycom -Ceiling Microphone Array 2200-23809-002 -For 2nd Mic: 2200-23810-002
	C	Cable Management	Cable Cubby or Wall Plate	1	Cat 3	Extron
	C	Video System	Codec	1	Cat 3	Cisco SX20 or Polycom HDX8000
	C	Video System	Camera Mount	1	Cat 3	Cisco - VADDIO 535-2000-231 Polycom - For Eagle Eye II PTZ HD Camera
	C	Video System	Video Switcher	1	Cat 3	Crestron DMMD6X4
	C	Video System	Video Transmitter	1	Cat 3	Crestron DM-TX-2011-C
	C	Video System	Video Receiver	1	Cat 3	Crestron DM-RMC-200-C
	C	Video System	Video Scaler	1	Cat 3	Crestron HDSCALERVGAE
	C	Video System	Video Scaler	2	Cat 3	Crestron DMRMCSCALERC
	C	Video System	Video Scaler	1	Cat 3	Extron 60-1489-01
	C	Video System	Video Scaler	1	Cat 3	Extron 60-1075-01
	C	Video System	Video Scaler	1	Cat 3	Extron Scaler 60-1253-01
Type 3 (multimedia rooms)			**Refer to Appendix 1J(II)[Clinical Education and Applied Research Space Infrastructure Specifications] for additional information**			
		Clinical Skills Rooms (CSR)	Refer to Appendix 1J(II)[Clinical Education and Applied Research Space Infrastructure Specifications] 3 for additional information			
	C	Video Screen	Wall mounted LCD	1	Cat 1	Size and model to be determined by the Authority
		Flexible Seminar Rooms (FSR)	Refer to Appendix 1J(II)[Clinical Education and Applied Research Space Infrastructure Specifications] 2 for additional information		Cat 1	Size and model to be determined by the Authority representative
	C	Screens	80" LCD	2	Cat 1	Size and model to be determined by the Authority representative
	C	Teleprescence systems	Cisco SX20 Quickset	1	Cat 1	Size and model to be determined by the Authority representative
	C	Cameras	PTZ for videoconferencing	2	Cat 1	Size and model to be determined by the Authority representative
	C	Ceiling Microphones		multiple	Cat 1	Size and model to be determined by the Authority representative
	C	Codecs	Cisco	2	Cat 1	Size and model to be determined by the Authority representative
	C	Speakers		multiple	Cat 1	Size and model to be determined by the Authority representative
	C	Audio Processing sytem	Biamp Tesira Forte	1	Cat 1	Size and model to be determined by the Authority representative
	C	Accessories		As required	Cat 1	Size and model to be determined by the Authority representative
Type 4 (120 seatmultipurpose room)			**Refer to SOR 7.9.9.9 and to Appendix 1J(I) [RCH MHSU Large Multipurpose Room Specifications]**			
	C	Microphones	Beltpack Wireless Microphone Systems	2	Cat 3	Shure SLX-1 transmitter with Shure WL93 condenser lapel microphone, WCE6i condenser earset microphone, and Shure SLX4 receiver, plus two 1.5 V “AA” NiMh rechargeable batteries and charger
	C	Microphones	Handheld Wireless Microphone Systems with table stands	6	Cat 3	Shure SLX-2/SM86 transmitter, and Shure SLX4 receiver, plus two 1.5 V “AA” NiMh rechargeable batteries and charger
	C	Microphones	Wireless headset presenter Microphone Systems	2	Cat 3	Shure

	C	Microphones	Wireless Microphone Antenna Distribution Amplifier	1	Cat 3	Shure UA844SWB
	C	Microphones	Stereo Lectern Microphone	1	Cat 3	Audio Technical ES905CL w/ESE-H capsule
	C	Microphones	Audience Microphones	60	Cat 3	To Be Determined
	C	Microphones	Operator Microphone	1	Cat 3	Clockaudio CUSTOM S 120s-MC-RF
	C	Microphones	Ceiling Microphone	1	Cat 3	Audio Technical ES945
	C	Microphones	Microphone Floor Stand	2	Cat 3	Atlas MS-12CE
	C	Microphones	Microphone Table Stand	4	Cat 3	
	C	Microphones	Spare Audience Microphone	6	Cat 3	To Be Determined
	C	Audio Mixers, Signal Processing	Matrix Mixer Audio Processor System	1	Cat 3	Biamp 2x Tesira Server I/O AVB; 2x AVB-1, 17x SEC-4 input modules, 2x SIC-4 input modules, 3x SOC-4 input modules, 1x STC-2 telephone hybrid card
	C	Audio Mixers, Signal Processing	AVB Remote Input	16	Cat 3	Biamp Tesira EX-IN c/w POE+ PSU
	C	Audio Mixers, Signal Processing	AVB Interface	1	Cat 3	Biamp Tesira EX-IO c/w POE+ PSU
	C	Audio Mixers, Signal Processing	AVB Ethernet Switch	1	Cat 3	Extreme Networks Summit X440-48p (Qty 1), Extreme Networks 10051H 1000BASE-SX SFP module (Qty 2)
	C	Audio Mixers, Signal Processing	Stereo To Mono Input Adaptor	As required	Cat 3	Radio Design Labs TX-J2
	C	Audio Mixers, Signal Processing	Mono To Dual Channel Output Adaptor	As required	Cat 3	Radio Design Labs TX-A2
	C	Audio Mixers, Signal Processing	Unbalanced line to Balanced Line Adapter	As required	Cat 3	Radio Design Labs TX-AT1
	C	Audio Amplifiers	Main Loudspeaker Amplifier	1	Cat 3	QSC CX302
	C	Audio Amplifiers	Lectern Monitor Amplifier	1	Cat 3	Radio Design Labs FP-PA20 c/w PS-24U2A
	C	Audio Amplifiers	Booth Headphone Monitor Amplifier	1	Cat 3	Whirlwind PA-1
	C	LoudSpeakers	AV Loudspeaker	2	Cat 3	Tannoy VLS30
	C	LoudSpeakers	Ceiling Speakers	As required		
	C	LoudSpeakers	Lectern Foldback Loudspeaker	1	Cat 3	Soundtube SM3-EZ
	C	LoudSpeakers	Booth Monitor Loudspeaker	1	Cat 3	Tannoy Di5A with i5AW Yoke
	C	LoudSpeakers	Monitor Headphones	1	Cat 3	Sennheiser HD280-Pro
	C	Listening Assist	FM Transmitter	1	Cat 3	Listen Technologies LT-800-072 base station c/w antenna, LA-326 rack mount kit, LA-122 remote antenna mount kit to extend antenna to the exterior of rack, outboard power supply
	C	Listening Assist	FM Receivers	6	Cat 3	Listen Technologies LR-300-072 tuneable personal receiver complete with LA-165 walkman type Headphone and LA-166 induction loop, plus AA NiMh batteries
	C	Listening Assist	Receiver Rechargeable Batteries	6	Cat 3	AA NiMH (pair per receiver)
	C	Listening Assist	Receiver Battery Charger /Case	1	Cat 3	Listen Technologies LA-321 charger/carrying case
	C	Listening Assist	Extra Ear cushions	50	Cat 3	Listen Technologies LA-167 ear cushions
	C	Video Source Equipment	Document Camera	1	Cat 3	Elmo P30HD, with Elmo bundle image software and Elmo SV-450
	C	Video Source Equipment	Robotic Video Camera	4	Cat 3	Panasonic AW-HE60H, with external power supply; Vaddio 535-2000-231 wall/ceiling mounts
	C	Video Source Equipment	DVD/Blu-Ray players	2	Cat 3	Standalone model for lectern. Rackmount model for control room
	C	Video Processing, Interfacing and Distribution Equipment	Mountable HDMI to Fibre Optics Interface/Transmitter	5	Cat 3	Extron FOXBOX Tx HDMI MM Version # 503783 (5) with external power supply, Mounting Accessories: MBU123 (5); break out cables: HDMI Micro/6 (1), HDMIF-DVIDM (1), DPHDMIF(1)
	C	Video Processing, Interfacing and Distribution Equipment	Mountable Fibre Optics to HDMI Interface/Receiver	7	Cat 3	Extron FOXBOX Rx HDMI MM (7) with external power supply, Extron MBU 123 (7)
	C	Video Processing, Interfacing and Distribution Equipment	Mountable VGA to Fibre Optics Interface/Transmitter	1	Cat 3	Extron FOXBOX 4G Tx VGA MM (1) with external power supply, VGA A M-M MD/3 (1), Break-out cables; VGA A M-M MD/6 (1), MBU 123 (1)
	C	Video Processing, Interfacing and Distribution Equipment	Fiber Optics Audio Extractor	1	Cat 3	Extron FOX AEX 108 MM, RSU 129
	C	Video Processing, Interfacing and Distribution Equipment	Fiber Optics Interface/Receiver Enclosure	2	Cat 3	Extron PowerCage 1600 #60-978-01 with redundant power supply part # 70-784-01
	C	Video Processing, Interfacing and Distribution Equipment	Modular VGA to Fiber Optics Transmitter Boards	1	Cat 3	Extron PowerCage FOX 4G Tx VGA MM (1)
	C	Video Processing, Interfacing and Distribution Equipment	Modular HDMI to Fiber Optics Transmitter Boards	9	Cat 3	Extron PowerCage FOX 4G Tx HDMI MM Version # 503783 (9); break out cables: HDMI Micro/6 (4), HDMIF-DVIDM (4), DPHDMIF(4)
	C	Video Processing, Interfacing and Distribution Equipment	Modular Fiber Optics to HDMI Receiver Boards	1	Cat 3	Extron PowerCage FOX 4G Rx HDMI MM (1)
	C	Video Processing, Interfacing and Distribution Equipment	Modular Fiber Optics to HDMI Receiver/scaler Boards	4	Cat 3	Extron PowerCage FOX 4G Rx HDMI Scaler MM(4)
	C	Video Processing, Interfacing and Distribution Equipment	4Gbps Fibre Optics Video Matrix Switcher	1	Cat 3	Extron Fibre Matrix 3200 (1) equipped with two (2) Fibre Matrix 4G 88 I/O MM board
	C	Video Processing, Interfacing and Distribution Equipment	Fibre Optics Connector housing	1	Cat 3	Corning Pretium PCH-02U (1) with CCH-CP-24-D3I (4) and the required accessories
	C	Video Processing, Interfacing and Distribution Equipment	Videoconferencing CODEC	2	Cat 3	Cisco Codec C-60 with NPP and rack mount
	C	Video Display Systems	Video/Data Projector	3	Cat 3	Panasonic PT-DW11KU, with ET-LADD310AW; Chief HC-
	C	Video Display Systems	Video/Data Projector Lens	3	Cat 3	Panasonic ET-D75LE30
	C	Video Display Systems	Projector Screens	1	Cat 3	Elite Projection Motorized Screen or approved equal (model based on room and required image size)
	C	Video Display Systems	Confidence Monitors	2	Cat 3	Panasonic TH-42LF60U
	C	Video Display Systems	LCD Annotation Touch Screen Display	1	Cat 3	Smart Podium - 18" or larger
	C	Video Display Systems	Operator Displays	3	Cat 3	Current model from Samsung - 20" or larger
	C	Control System Equipment	Control System Processor	1	Cat 3	Crestron PRO2 Processor, C2ENET-1 Ethernet Card (Qty 1), C2COM-3 3 Port RS-232 Control Card (Qty 2)
	C	Control System Equipment	Secondary Control System Processor	1	Cat 3	Crestron CP2E Processor
	C	Control System Equipment	Touch Screen Panel	1	Cat 3	Crestron TPMC-V15-TILT-B
	C	Control System Equipment	Control System Ethernet Switch	1	Cat 3	

	C	Control System Equipment	Compact Flash Memory Card	1	Cat 3	Compatible Type II Compact Flash memory card
	C	Control System Equipment	AV System Rack UPS	2	Cat 3	APC SMX1500RM2U (Qty 2), APC AP9620 RS232 Card (Qty 2)
	C	Control System Equipment	Power Conditioning/Surge Suppressors (Rack Mounted)	3	Cat 3	SurgeX SX1115, Middle Atlantic 1U vented security cover
	C	Control System Equipment	Power Controller	1	Cat 3	Synaccess netBooter NP-02
	C	Control System Equipment	Input/Output Control Units	10	Cat 3	Biamp Tesira EX-LOGIC
	C	Control System Equipment	Audio Level Control	1	Cat 3	RDL RLC-10R Remote Level Control Rotary Encoder
	C	Enclosures and Cabinets	AV Equipment Racks	4	Cat 3	Middle Atlantic SR-40-22 series plus rear rack rails plus Hammond 1583H6B1 power strips
	C	Enclosures and Cabinets	Lectern Millwork Equipment Racks	As required	Cat 3	Middle Atlantic Slim-5-12-26 plus rear rack rails plus Hammond 1583H6B1 power strips
	C	Enclosures and Cabinets	19" Rack Shelf	As required	Cat 3	Middle Atlantic
	C	Enclosures and Cabinets	Fibre Connection Box	As required	Cat 3	Corning RIO D4-A8-B-35
	C	Enclosures and Cabinets	Fibre Connection Housing	As required	Cat 3	Corning SPH-01P, CCH-CP12-E4
	C	Connector Plates & Mounting Boxes	Lectern Plates	As required	Cat 3	Extron AAP 106, Extron 70-101-73, Extron 70-331-11, Extron 70-616-02, Extron 70-432-11, Extron 70-454-12 with 6' USB connection cable, plus 70-090-11/12 as required
	C	Connector Plates & Mounting Boxes	AV booth Operator Station Input Connector Plates & Mounting Box	As required	Cat 3	Extron SMB-102, Extron AAP-102, Extron 70-101-73, Extron 70-331-11, Extron 70-616-02, Extron 70-090-11/12/14 as required
	C	Connector Plates & Mounting Boxes	Record Output Connection Plate	As required	Cat 3	XLR-3M connector and connect to Record Output on DSP
	C	Connector Plates & Mounting Boxes	A/V Connection Back-Box Cover	As required	Cat 3	Cover plates with the properly sized grommet holes. Double or triple gang as required
	C	Security Cable System	AV Equipment Security Cable System	2	Cat 3	Chief HC-1
	C	Display Mounts	LCD Annotation Screen Display Desk Mount Arm & Bracket	1	Cat 3	Ergotron LX Desk Mount Arm
	C	Display Mounts	Confidence Monitor Wall Mount Bracket	2	Cat 3	Suitable bracket from Chief, Peerless or Premier Mounts with all required accessories
	C	Display Mounts	Large projector ceiling mounting bracket	2	Cat 3	Chief VCM75P; CMA x-x, Unistrut hardware (as required)
Type 5b (Virtual Care Room)			**Refer to SOR 7.9.9.1 for room quantities**			
	C	Screen	Monitor size (47inch - 70inch) depended on room size	2	Cat 2	Sharp PNY475 (47inch) Sharp PNY455 (55inch) Sharp PNE 603 (60inch) Sharp PNE 703 (70inch)
	C	Screen	Universal Monitor Wall Mount	2	Cat 2	Chief Mount LTM1U
	C	Control System	Touch Panel	1	Cat 2	Crestron TSW1050BS
	C	Control System	Touch Panel Mount	1	Cat 2	Crestron TSW1050BSTKK
	C	Control System	Control System Processor	1	Cat 2	Crestron CP3N
	C	Control System	Crestron Network Switch	1	Cat 2	Crestron CENSWP0E5
	C	Audio System	Speakers and Speaker Mounts	2	Cat 2	Tannoy DI6 (Black)
	C	Audio System	Audio Amplifier	1	Cat 2	Extron 60-845-01 MPA401-70V mini audio amplifier
	C	Audio System	Volume Control	1	Cat 2	Crestron C2N-VEQ4
	C	Audio System	Microphones 1 or 2 depending on room size	1 or 2	Cat 2	Cisco -Biamp Tesira TESIRAFORTETI -Clear One 910-001-013-W Polycom -Ceiling Microphone Array 2200-23809-002 -For 2nd Mic: 2200-23810-002
	C	Cable Management	Cable Cubby	1	Cat 2	Extron
	C	Cable Management	Wall Plate	1	Cat 2	Extron
	C	Video System	Codec	1	Cat 2	Cisco SX20 or Polycom HDX8000
	C	Video System	Camera Mount	1	Cat 2	Cisco - VADDIO 535-2000-231 Polycom - For Eagle Eye II PTZ HD Camera
	C	Video System	Video Switcher	1	Cat 2	Crestron DMMD6X4
	C	Video System	Video Transmitter	1	Cat 2	Crestron DM-TX-2011-C
	C	Video System	Video Receiver	1	Cat 2	Crestron DM-RMC-200-C
	C	Video System	Video Scaler	1	Cat 2	Crestron HDSCALERVGAE
	C	Video System	Video Scaler	2	Cat 2	Crestron DMRMCSCALERC
	C	Video System	Video Scaler	1	Cat 2	Extron 60-1489-01
	C	Video System	Video Scaler	1	Cat 2	Extron 60-1075-01
	C	Video System	Video Scaler	1	Cat 2	Extron Scaler 60-1253-01
Type 6 (Educational Camera Rooms) refer to SOR 7.9.9.1 for room quantities						
	C	Head Phones	Used for Educational Cameras	16	Cat 1	To Be Determined by the Authority
	C	Headphone connection plates	3, in observation room only	3	Cat 3	
	C	Control System	System centralized controller	1	Cat 3	Typically Crestron
	C	PTZ Camera	2 ptz cameras per interview room	2	Cat 3	
	C	Ceiling Microphone	1 stereo mic per interview room	1	Cat 3	
	C	Monitor and mounts	2 screens per viewing room	2	Cat 3	
	C	Amplified Speakers and mounts	1 pair per viewing room	1	Cat 3	
	C	Wall control Panel	1 per viewing room	1	Cat 3	Typically Crestron

Interactive Media Systems in Comfort Rooms refer to SOR 7.9.13						
	C	Interactive Touch Screens	Max 1 per comfort room	1	Cat 1	To Be Determined by the Authority
Supplemental Sound Systems refer to SOR 7.9.14						
	C	Ceiling Speakers	Amplified stero pair	1	Cat 3	
	C	Volume controls	Wall mounted with stereo and Bluteooth input	1	Cat 3	Signa ST-WBT1 or equivalent

APPENDIX 1I(III)

HSSBC Communications Infrastructure Standards and Specifications

1 PURPOSE

This appendix includes the HSSBC Communications Infrastructure Standards and Specifications which is the supporting document to the requirements identified in the Communications (Division 27) Section of the Statement of Requirements.

The HSSBC Communications Infrastructure Standards and Specifications apply to all types of projects and healthcare facilities. For Royal Columbian Hospital Redevelopment Project, there are certain sections and references contained within the HSSBC Communications Infrastructure Standards and Specifications that will not apply. These are as follows:

1. References, requirements, standards, specifications and drawings related to Community Sites.
2. References, requirements, standards, specifications and drawings related to Category 6 horizontal cabling.
3. References, requirements, standards, specifications and drawings related to Uninterruptible Power Supplies (UPS), back-up power, power outlets and metered power bars (ePDUs). The Design-Builder is to refer to the Statement of Requirements and associated appendices for the requirements concerning these areas.
4. References, requirements, standards, specifications and drawings related to HVAC for Communications Rooms. The Design-Builder is to refer to the Statement of Requirements and associated appendices for the requirements concerning this area.

In the event, there is a conflict between the HSSBC Communications Infrastructure Standards, industry standards or the Statement of Requirements and it associated appendices, the more stringent standard or requirement will apply.

ATTACHMENT 1: HSSBC COMMUNICATIONS INFRASTRUCTURE STANDARDS AND SPECIFICATIONS

Refer to companion document with file name 2016-02-29 HSSBC Communications Infrastructure Standards & Specification.

ATTACHMENT 2: BCCSS COMMUNICATIONS INFRASTRUCTURE STANDARDS AND SPECIFICATIONS – ADDENDUM 01

Refer to companion document with file name BCCSS Communications Infrastructure Standards and Specifications_Addendum 01_09.12.16_Final.

The purpose of this Addendum is to correct, update and provide further clarifications to the HSSBC Communications Infrastructure Standard and Specifications, Version 1.0, issued on February 29, 2016.

COMMUNICATIONS INFRASTRUCTURE STANDARDS & SPECIFICATIONS

Version 1.0

February 29th, 2016

PUBLIC

Health Shared Services BC

A division of the Provincial Health Services Authority

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Date: February 8th, 2016	Date: <Month Day, Year>
Signature:	Signature:
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Date: <Month Day, Year>	Date: <Month Day, Year>
Signature:	Signature:

Revision History

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27 00 00 INTRODUCTION

1.1 GOALS

.1 The goals of the Communications Infrastructure Standards and Specifications are to ensure:
- .1 Provide a communications infrastructure that is capable of meeting current and future operational and clinical needs of the Health Authorities.
- .2 Functionality, reliability and serviceability of facilities, systems and components.
- .3 Minimum lifecycle cost of ownership including design, construction, operating and maintenance costs.
- .4 Flexibility for growth and change.
- .5 Resource efficiency (energy, materials).
- .6 Safety and security.
- .7 Value in facilities and infrastructure investment.

.2 In the design and installation of a robust healthcare solution, the Communications Infrastructure Standards and Specifications emphasize the importance of:
- .1 Utilizing best practices for design and deployment of cabling infrastructures.
- .2 Considering the impacts of multiple technologies, networks and cabling systems.
- .3 Addressing how MACs and future cabling upgrades will be achieved.
- .4 Considering the type of area and zone density needs (Acute Environments - Low, Medium and High per ANSI/TIA-1179 / Community Environment – Commercial Building ANSI/TIA 568-C) in conjunction with end user functional requirements.
- .5 Anticipating and accommodating future needs in complex healthcare environments.

1.2 SCOPE

.1 This document serves as the standard of quality and performance for the design and installation of communications infrastructure within healthcare facilities. The document covers the materials, physical components and systems that comprise of all types of Healthcare facilities. The level of quality deemed by any one standard or specification is determined on the basis of achievement of the above noted goals regarding facility functionality, reliability, sustainability, accessibility, safety, security, serviceability and life-cycle cost.

.2 The document covers:

- .1 Mandatory minimum standards and specifications.
- .2 Acceptable practices.
- .3 Common systems and components.
- .4 Performance and Acceptance criteria.
- .5 Procedural standards.

1.3 APPLICATION AND INTENT

.1 The standards and specifications apply to all projects involving communications infrastructure.

.2 Applicable projects include new construction (regardless of delivery method - P3, Design-Build, Design-Bid-Build, Construction Management, etc.), renovations, upgrades and cyclical maintenance / renewal work.

.3 Compliance with these standards and specifications will be part of all consultant agreements. Specific applicability of the standards and specifications will be directed to the consultant before fees are submitted. All proposed variances from these standards and specifications must be approved by HSSBC Network Edge (NE) Representative throughout all stages of the design and construction.

.4 The standards and specifications are intended to be used by:

.1 Consultants and Professional Engineers.
.2 Facilities Management, Maintenance and Operations
.3 Suppliers and contractors

.5 Consultants and Professional Engineers are expected to use these standards and specifications to develop their own Project specific specifications and drawings.

.6 Contractors that are engaged directly by HSSBC or Facilities Maintenance and Operations will refer to these standards and specifications for all their installations.

END OF SECTION 27 00 00

27 01 00 COMMUNICATIONS SYSTEMS OVERVIEW

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 List of abbreviations
.3 Documents
.4 Introduction
.5 Overview
.6 Reference codes and standards
.7 Application standards
.8 Approved manufacturers
.9 Manufacturers
.10 Contractor qualifications
.11 Approved Communications contractors
.12 Warranty
.13 Manufacturer's cabling system application warranty
.14 Acceptance conditions
.15 Description of system
.16 Communications Consultant

1.2 LIST OF ABBREVIATIONS

.1 The following abbreviations may be used within this specification document and in the drawings.
- .1 AHJ: Authority Having Jurisdiction
- .2 ANSI: American National Standards Institute.
- .3 ASTM: American Society for Testing and Materials
- .4 BICSI: Building Industry Consulting Service International
- .5 CATV: Cable TV
- .6 CP: Consolidation Point
- .7 CSA: Canadian Standards Association – equipment safety approvals and testing for Canada
- .8 EF: Entrance Facility
- .9 EGB: Electrical Ground Breaker
- .10 ETL: ETL Testing Laboratories – product testing laboratory for U.S. and Canada
- .11 FDC: Fiber Distribution Centre (Fiber splice tray or termination tray)
- .12 IDF: Intermediate Distribution Frame
- .13 IEEE: Institute of Electrical and Electronic Engineers
- .14 ISO: International Standards Organization
- .15 MEGB: Main Electrical Ground Busbar
- .16 NEMA: National Electrical Manufacturer's Association
- .17 TGB: Telecommunications Ground Busbar
- .18 MER: Main Equipment Room (Typical location of Network Core Switches)
- .19 EF: Entrance Facility
- .20 TR: Local Telecommunications Room
- .21 TMGB: Telecommunications Main Ground Busbar
- .22 TO: Telecommunications Outlet
- .23 ULC: Underwriters Laboratories of Canada – testing laboratory for Canada (see C-UL and UL)

.24 UTP: Unshielded Twisted Pair
.25 WA: Work Area
.26 NE: Network Edge
.27 HSSBC: Health Shared Services British Columbia

1.3 DOCUMENTS

.1 This section of the specifications forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.4 INTRODUCTION

.1 Health Shared Services British Columbia (HSSBC) with few exceptions administers all cabling within healthcare facilities. Network Edge (NE), a department within HSSBC's Technology Service's Group, operates, maintains and supports Communications systems and infrastructure.

.2 The intent of this document is to provide standards and specifications for the implementation and maintenance of the cabling infrastructure systems in new and existing acute and community buildings. Examples of acute sites include hospitals, mental health and outpatient facilities. Examples of non-acute sites include offices, hospices, assisted living, rehabilitation centres and labs. Prior to commencing design, the design team is to engage the HSSBC NE Representative to determine the appropriate cabling standard (TIA-1179 vs. TIA-568C) to apply to the project.

.3 Any new building shall be opened up for competitive pricing between AMP NetConnect and Belden systems. For existing building in a hospital or community site, if it is standardized on AMP NetConnect, then that system shall be implemented. If it is a Belden system, then that system shall be implemented.

.4 This document is the property of HSSBC NE Department.

1.5 OVERVIEW

.1 This document must be read, interpreted and coordinated with all other related HSSBC technical standards and specifications to deliver a complete Communications infrastructure system.

.2 These standards and specifications prescribe minimum mandatory requirements for communications infrastructure systems within all buildings, up to and including the Communications outlet, and between buildings to the extent of a region and province wide environment.

.3 A structured approach is specified which will ensure a flexible distribution system that will minimize the future costs of moves, additions and changes.

.4 The Contractor will supply, furnish, and install: all material, labour, apparatus, tools, equipment and services required for construction and put into regular operation the complete Communications system, as shown on the Communications Drawings, described in the specifications and any attached appendices.

.5 Renovations in existing buildings shall always reflect the intent of these standards and specifications.

.6 Any and all proposed changes to standards and specifications shall be subject to approval in writing to the HSSBC NE Representative prior to implementation.

1.6 REFERENCED CODES AND STANDARDS

.1 Comply with the latest British Columbia Building Code, and Canadian Electrical Code, including all provincial and other amendments, any local by-laws or rules and regulations requirements of Lower Mainland Facilities Management regulating the installation of Communications facilities.

.2 Provide underground systems in accordance with CSA C22.1-15 edition, except where specified otherwise.

.3 Equipment and materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having jurisdiction. Include in the contract all costs associated with obtaining local approvals.

.4 If there is a conflict between the Drawings and Specifications and the above noted codes, by-laws, rule and orders, the codes, by-laws, rules and orders shall govern. In no instance, however, shall the standards established by the Contract Documents be reduced by any of these codes or regulations.

.5 Install and test telecommunications cabling networks as per the latest manufacturer's requirements and in accordance with the following standards:
Note: the current ANSI/TIA Standards will apply:

- .1 ANSI/TIA Standards.
  - .1 ANSI/TIA 568-D.1-2015 Generic Telecommunications Cabling for Customer Premises standard.
  - .2 ANSI/TIA -568-0-D-2015 Commercial Building Telecommunications Cabling Standard
  - .3 ANSI/TIA-568-C.2-2009 Commercial Building Telecommunications Cabling Standard – Balanced Twisted Pair Cabling Components.
  - .4 ANSI/TIA-568-C.3-2008 Optical Fiber Cabling Components Standard.
  - .5 ANSI/TIA-569-D-2015 Commercial Building Standard for Telecommunications Pathways and Spaces.
  - .6 ANSI/TIA-606-B-2011 Administration Standard for Commercial Telecommunications Infrastructure.
  - .7 J-STD-607-B-2011 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
  - .8 ANSI/TIA-570-C-2012 Residential Telecommunications Cabling Standard.
  - .9 ANSI/TIA-758-B-2012 Customer Owned Outside Plant Telecommunications Cabling Standard.
  - .10 ANSI/TIA-1179-2010 Health Care Telecommunications Cabling Standard.
  - .11 ANSI/TIA-942-A-2012 Telecommunications Infrastructure Standard for Data Centers.
  - .12 ANSI/TIA-TSB-162-A Telecommunications Cabling Guidelines for wireless Access Points.
- .2 CSA 2318.7-95 Commissioning of Communications Systems in Health Care Facilities.
- .3 The Canadian Electrical Code Part 1, C22.1-15 edition.
- .4 BC Amendments to the CEC and associated bulletins.
- .5 IEEE 802.3 series of Ethernet Standards.
- .6 IEEE 802.11 series of Wireless Standards.
- .7 ISO 8802-3 series of Standards.
- .8 BICSI latest technical manuals:
  - .1 ANSI/BICSI 002-2014, Data Centers Design and Implementation Best Practices.
  - .2 ANSI/BICSI 003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems

.3 ANSI/BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
.4 ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design and Implementation Best Practices
.5 ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
.6 NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
.7 Information Technology Systems Installation Methods Manual
.8 Network Systems and Commissioning (NSC) reference
.9 Outside Plant Design Reference Manual 5th Edition
.10 Telecommunications Distribution Methods Manual 13th Edition
.11 Electronic Safety and Security Design Reference Manual

.6 If the Contractor notes items in the drawings or the specifications that are code violations, promptly bring them to the attention of the Communications Consultant and or the HSSBC NE Representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

.7 Conform to current safety and security standards, codes, and practices in effect at Health Authorities including, but not limited to:
.1 Workers Compensation Act – Part 3 – Occupational Health & Safety.
.2 BC Electrical Safety Act.
.3 The British Columbia Building Code with Amendments.

.8 Any other reference material must be approved by HSSBC before work commences.

.9 For installations in an acute hospital setting, if there is conflict between any of the ANSI/TIA or BISCI referenced standards, ANSI/TIA-1179 takes precedence.

1.7 APPLICATION STANDARDS

.1 The Certified Structured Cabling System shall be guaranteed to operate the applications which the System was originally designed to support, as well as any new applications. New applications are defined as any application introduced in the future by recognized standards organizations or user forums that use the TIA-568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling.

1.8 APPROVED MANUFACTURERS

.1 All signal carrying components (connectors, cabling, panels, etc.) of the structured cabling systems for telecommunications system provision shall be from a single manufacturer.

.2 Approved Structured Cabling Products Manufacturer: Refer to 27 01 00 1.4 Introduction.

1.9 MANUFACTURERS

.1 All horizontal cable and associated jacks, connectors, patch panels and faceplates shall be manufactured by AMP NetConnect or Belden.

.2 All voice backbone (Riser) cables shall be Category 3; however, termination hardware located in Communications Rooms shall be Category 6.

.3 All fiber cable shall be manufactured by AMP NetConnect or Belden.

.4 All fiber termination hardware including SM/MM Pigtails shall be manufactured AMP NetConnect or Belden.

.5 All fiber connectors shall be manufactured by AMP NetConnect or Belden.

1.10 CONTRACTOR QUALIFICATIONS

.1 All structured cabling installations must be performed by HSSBC prequalified cable contractors.

.2 Certified Personnel

.1 The Contractor shall be an authorized "AMP NetConnect ND&I" and/or Belden CSV cabling system Installer.

.2 All Technicians performing cable system installation work shall be current AMP NetConnect ACT 1 & 2 and/or IBDN-700 certified. All Technician certification cards shall be checked prior to work start up. Technicians must be current employees of the Communications Contractor. No sub-contracting shall be allowed.

.3 The Communications Contractor shall assign a Supervisor with current RCDD certification to provide Quality Control based on the “Communications Infrastructure Standards and Specifications,” and to provide weekly report to the Communications Consultant and or HSSBC NE Representative.

.4 The Contractor shall have worked satisfactorily for a minimum of five (5) years on "AMP NetConnect ND&I and/or Belden CSV" cabling system.

.5 Upon request of the Communications Consultant and or HSSBC NE Representative, supply a list of references with specific information regarding type of project and involvement in supplying and installing equipment and systems.

1.11 APPROVED COMMUNICATIONS CONTRACTORS

.1 Refer to HSSBC Procurement for the pre-approved list of cabling contractors.

1.12 WARRANTY

.1 Contractor shall process all warranty requests from the Owner or its agents during the warranty period.

.2 Warranties shall have certification numbers registering the installation and shall be in the effect starting from the date of Final Acceptance.

1.13 MANUFACTURER’S CABLING SYSTEM APPLICATION WARRANTY

.1 An applications Warranty shall be issued to guarantee that the Telecommunications Wiring Infrastructure shall support up to, but not limited to 1000Base-T applications or 10GBASE T (10GbE) over twisted-pair copper cabling) for Cat.6A solutions.

.2 All cabling products and workmanship must include coverage as follows:

.1 System Application Warranty from Manufacturer.

.2 System Performance Warranty Certificate must be provided by the Subject Warranty Manufacturer.

.3 The System Application Warranty term must be a minimum of 25 years provided by the Warranty Underwriting Manufacturer, from the date of final acceptance of the project.

.4 The name and address of the building/facility and location of site must appear on the warranty document.

.5 The contractor must be fully approved and certified by the proposed Warranty Underwriting Manufacturer prior to responding to the bid as a pre-qualification.

.6 Testing shall be performed by Telecommunications Technicians who are qualified to perform related tests as required by the manufacturer in accordance with the manufacturer’s methods.

.7 The original 25 Year Warranty Certificate from the Manufacturer’s shall be submitted to the Owner.

1.14 ACCEPTANCE CONDITIONS

.1 An applications Warranty shall be issued to guarantee to operate the applications which the System was originally designed to support, as well as any new applications. New applications are defined as any application introduced in the future by recognized standards organizations or user forums that use the TIA-568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling.

.2 Description of System

.1 All horizontal cabling shall be either Category 6 or Category 6A as per the requirements identified in the remainder of this document.

.2 Voice backbone cabling shall consist of multiples of 25, 50, or 100 pair Category 3 unshielded twisted pair cables and shall be installed from the Main Equipment Room (MER) to each TR Communications Room. The voice riser shall be sized by allocating 50 pairs per 1,000 m2 (10,000 ft2). The pair count shall be rounded to the next 25 pair multiple, for Communications Room Zones serving an area greater than 1,000 m2 (10,000 ft2).

.3 Fiber Data backbone cabling shall consist of OM4 multi-mode and or OS2 singlemode or the latest accepted standard of multimode and single mode optical cables, connectors and patch cables. The Communications Consultant will be responsible to engage the HSSBC NE Representative for instruction on the latest accepted standard of multimode and single mode optical cables, connectors and patch cables to use in the Facility prior to the completion of the project's design phase.

.4 OM4 and OS2 single mode optical cable shall be installed from the MER to each zone TR. Strand count and termination type as specified. Minimum strand count per cable shall be 24 strands.

.5 Horizontal cable length shall not exceed 80 meters. Horizontal cables for data and/or voice connections to BMS, Lighting control, Access Control, Nurse Call, CCTV, Metering, Generator, Elevator, Fire alarm, Master clock system and/or any other application, systems or devices not specifically noted shall conform to the standards and specifications within this document. Refer to C-STD drawings in 27 00 00.01.).

.6 The Contractor shall provide equipment rack(s), cabinets, cable management, PDU's and other equipment identified in other areas of this document.

.7 The Contractor will finalize equipment layouts of Communications rooms with Communications Consultant and or HSSBC NE Representative after award of Contract.

.8 Communications Pathways c/w Firestop of all penetrations of fire rated barriers (floors and walls).

.9 Communications Grounding and Bonding

.10 Installation of wired and wireless hardware and accessories supplied by HSSBC. Refer to other sections of this document for exact scope of work.

1.15 COMMUNICATIONS CONSULTANT

.1 Mandatory minimum qualifying requirements:

.1 BICSI Registered Communications Distribution Designer (RCDD) in good standing who has performed minimum 5 years of Communications infrastructure consulting services in Healthcare Industry. If the architectural or engineering firm does not have an RCDD on staff, HSSBC will provide a list of consultants who can contract for the project.

.2 Internationally recognized Manufacturer certification programs i.e. Belden and AMP NetConnect.

.3 Outside Plant / in-premise Backbone Pathway design, 5 years of experience.
.4 Wireless design & engineering, 5 years of experience.
.5 Low voltage systems' design, 5 years of experience - CCTV, CATV, Security, Access Control, Intrusion, DAS Cellular, Satellite Distribution, Nurse Call system, etc.
.6 General knowledge of HVAC, Generator and UPS power, Fire Protection, Server Cabinets c/w Seismic Bracing - relating to impact on telecommunications issues & designs.
.7 Data Centre design and implementation, 5 years of experience.
.8 Knowledge of standards, codes, best design practices including electrical grounding and bonding for telecommunications infrastructure (TIA standard based).

.2 Communications Consultant Responsibilities:
.1 Liaison between Construction Design Team and HSSBC NE Representative and the Health Authorities' IMIT Department during the planning, design and construction phases of the project through final construction close-out.
.2 Detail information & procedures needed for the uninterrupted service cutover of existing services from old to new cabling systems.
.3 Coordinate with other design disciplines. The main areas of coordination are:
.1 Architectural – Coordinate with the Architect on location, size and critical dimensions of communications rooms and on their construction and finishes.
.2 Structural – Coordinate with the Structural Engineer on floor loading and seismic bracing of equipment racks and cabinets in communications rooms.
.3 Mechanical – Coordinate with the Mechanical Engineer on environmental control and preferred cooling solutions for communications rooms. Provide the Mechanical Engineer with the BTU loads for each communications room considering network and vendor equipment as well as UPS. Mechanical equipment such as fan coils and associated supply and return air ducting that are providing dedicated cooling to communications rooms are to be located outside of the communications rooms unless otherwise approved by the Communications Consultant and or the HSSBC NE Representative).
.4 Electrical – Coordinate with the Electrical Engineer on electrical services for communications rooms (convenience outlets and rack/cabinet bay power, UPS and lighting)
.5 Fire Detection and Suppression – Coordinate with the Fire Protection Consultant or Engineer on fire detection and suppression system for communications rooms.
.6 Security – Coordinating with the Security Consultant on access control and CCTV coverage for communications rooms as well as the placement of security low voltage equipment within communications rooms.,
.7 Intelligent Building Systems (IBS) – Coordinate with all applicable disciplines and with the HSSBC NE Representative on the connectivity and integration requirements between the telecommunications or IT systems and the various IBS systems (BMS, Lighting Control, Access Control, CCTV, etc.)
.4 Design and provide a series of construction specifications based on Construction Specification Institute (CSI) guidelines and detail T-drawings (plans, elevations, sections, risers) based on the latest HSSBC Communications Infrastructure Standards and Specifications for review meetings with the HSSBC NE Representative at various design stages – preliminary, 50%, 95% and final. A typical construction drawing package must include:
.1 Floorplans showing the locations of all communications rooms, wiring zones, telecom outlets (identifying the types of outlets and number of cable drops per outlet) and all backbone pathway systems (risers and horizontal

pathways) and cabling routes including the routes of the telecommunications grounding backbone.

.2 Schematic diagram of the backbone pathway system consisting of riser conduits and sleeves and horizontal conduits, sleeves and cable tray.

.3 Schematic diagram of the Telecommunications Grounding System.

.4 Schematic diagram of the backbone fiber and copper cabling systems depicting the interconnection between Communications rooms, system components, sub-systems and equipment rack and cabinets.

.5 Detail elevation drawings of equipment layout in floor or wall mounted racks and cabinets in communications rooms.

.6 Detail plan view communications room layout illustrating the layout of all communications components and equipment and referencing information supplied by other engineering disciplines and consultants such as electrical distribution (panels and receptacles) and lighting fixtures, pathways (sleeves, conduits, entrance ducts, cable tray), grounding, mechanical ducting and equipment, fire detection and suppression systems, security equipment, etc.

.7 Elevation drawings of all walls of each Communications room, clearly showing the layout of all termination hardware, grounding & bonding components, horizontal pathway penetrations, and wall mounted equipment cabinets.

.8 General and project specific details where necessary (ex. Access floor)

.5 For new hospital buildings, the Communications Consultant shall provide design based on ANSI/TIA 1179 Healthcare Facility telecommunications cabling standard:

.1 Low cable density functional area – 6 cables;

.2 Medium cable density functional area – 14 cables;

.3 High cable density functional area – 15 cables or more as determined in consultation with the Authority; and

.4 Any additional cables necessary to support all of the networks, systems and equipment to be installed or used in the Facility.

.5 They shall also be based on Communications port requirements signed off by end user and provided by IMIT Project Manager.

.6 For buildings dedicated to office use, the Communications Consultant shall provide design based on ANSI/TIA 568-C Commercial Building Telecommunications Cabling Standard, and shall be based on two cables per 10 square meters of usable floor area assuming it is 80% of the total gross floor area.

.7 In administration and clinical areas, for each work area Communications outlet install a minimum of two (2) four-pair Horizontal cables plus IMIT Project Manager functional requirements or as specified. For Wireless Access Point (A/P) locations install two (2) four-pair Horizontal cable from the outlet location to the zone Communications Room (TR). Reception Desk shall be provided with two standard outlets with two cables each.

.8 Stamp all accepted design prints, material data sheets and shop drawings including but not limited to all outside plant duct banks and cabling, entrance facilities, Communications rooms, equipment rack layout, wall layout, riser diagrams and work area outlets. The stamp will reference the name of the RCDD, designator number and expiration date. An additional Professional Engineer's stamp may be needed if required by the Authority Having Jurisdiction (AHJ).

.9 Attend and participate in project meetings.

.10 Perform installation oversight of telecommunications and low voltage systems including technical analyses and resolution of engineering problems.

.11 Provide acceptance commissioning of project cabling systems, pathways and spaces.

.12 Random site inspections, testing of copper and fiber will be done at the discretion of the Communications Consultant and or the HSSBC NE Representative and the Manufacturer Representative to ensure standards are being met. Contractor shall provide all necessary support and any/all requested testing documents. Note: This will not remove the responsibility of the RCDD to ensure these standards and all Contractors' Quality Control and Quality Assurance processes are met. The Communications Consultant and or the HSSBC NE Representative may also request to be present during active testing by the Contractor.

.13 Ensure all requirements of Communications documents, drawings, addenda, site instructions, change orders and change directives issued are completed in compliance to their instructions.

.14 Review as-built documentation of communications cabling infrastructure submitted by the cabling contractor and ensure all documentation deficiencies are resolved prior to final submission to the HSSBC NE Representative. Refer to Section 27 05 00 for further details on what is typically included within a standard as-built package.

.15 All AutoCAD infrastructure drawing submissions created by Communications Consultants shall comply with LMFM (Lower Mainland Facilities Management) CAD and CAFM (Computer Aided facilities Management) AutoCAD drawing format and symbol standards. Refer to Appendix D for current LMFM standards.

END OF SECTION 27 01 00

27 01 10 BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Documents
.3 Contractor Responsibilities
.4 Communications Rooms – Dust Containment and Access
.5 Materials
.6 Drawings
.7 Acceptance Conditions
.8 Pre-installation Site Survey

1.2 DOCUMENTS

.1 This section of the specifications forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.3 CONTRACTOR RESPONSIBILITIES

.1 In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor will commit to promptly implement corrective action.

.2 The Contractor will use qualified service personnel to conduct all maintenance/service work and at any time will show manufacturer's certification and/or submit references upon request of the Communications Consultant and or HSSBC NE Representative.

.3 The maintenance on site of one complete set of white prints to be used exclusively for purposes of recording changes, deviations and revisions from the original contract. Care will be taken by directing particular attention to the location of pipes, conduits etc.

.4 Obtain the cost for as-built CAD fees from the Communications Consultant of Record for the project, and include in the tender price. Contractor will not provide CAD services.

.5 Scheduling the Work in a manner acceptable to the Communications Consultant and or the HSSBC NE Representative.

.6 The Contractor has the responsibility to ensure that all provisions of these Standards are met and to specifically advise the Communications Consultant and or the HSSBC NE Representative in writing of any contemplated exceptions and obtain approval in writing for these changes.

.7 The Contractor will obtain and pay all required permit fees in accordance to all local regulatory bodies.

.8 The Communications guideline specifications generally describe the work of the Sub-Contractors, but do not intend to define the responsibility between the General Contractor and its Sub-Contractors.

.9 The complete scope of all work is fully described in Division 27 drawings and technical specifications described herein.

.10 The words "provide, "supply", "furnish", and "install" will imply that the applicable Contractor will provide all necessary labour, materials, and equipment to complete the installation and where applicable, test same to the approval of the Communications Consultant and or the HSSBC NE Representative.

.11 Unless otherwise noted or specified, the Contractor will provide all equipment and / or materials shown on the drawings and defined in the specifications.

.12 Any apparatus, appliances, materials, or work not shown on the drawings, but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, will be furnished, delivered, and installed by the Contractor, without additional expense to the Owner.

.13 Establishment and verification of dimensions, elevations, grades, boundaries shown on drawings and, reporting of any errors or inconsistencies to the Communications Consultant and or the HSSBC NE Representative before starting Work. Starting Work will imply that the Contractor has verified all items and found them to be correct. Additional costs arising out of any subsequent rectifications will be borne by the Contractor.

.14 The maintenance of discipline and general orderliness of work areas throughout the duration of the Project.

.15 Take steps to prevent dust from escaping the immediate work zone and from settling on or contaminating communications equipment and terminal hardware, as well as furniture and equipment.

.16 Contractor will be responsible to adhere to current Infection Control & Risk Assessment policies as it is related to the installation and construction of the Hospital and include all costs associated with the contractor's installation. Ensure that a minimum of one Foreman has completed CSA approved training on infection control.

1.4 COMMUNICATIONS ROOMS – DUST CONTAINMENT AND ACCESS

.1 Dust Containment

.1 ANSI/TIA-569-C Commercial Building Standard for Telecommunications Pathways and Spaces:

.1 To mitigate dust containment, Communications rooms (e.g. main and local telecommunications rooms, exclude data centres which have more stringent requirements) will not be used as storage areas to store cardboard boxes, ladders and other materials as they tend to accumulate dust particles. This ensures Communications rooms are kept generally clean.

.2 Communications rooms will be protected from contaminants and pollutants that affect the operation and material integrity of the installed equipment and connecting hardware.

.3 The Contractor will effectively protect the Communications rooms, equipment, connecting hardware and materials from dust, dirt and damage during construction.

.4 Dust containment measures such as vapour barrier, positive room pressure and absolute filters will be provided.

.5 Precautionary measures will be taken to ensure dust containment measures taken to protect equipment will not cause the equipment to overheat.

.6 Any dust or particulates that may have resulted from the work will be mitigated from spreading by placing the nozzle of a vacuum close to the point of drilling, cutting, grinding, sanding and the like that create dust.

.7 The work area will be cleaned up and vacuumed on a daily basis. Communications rooms, the outside of equipment racks, cabinets and panels, the inside of power panels, connecting hardware, Communications outlets and the like will be vacuumed.

.2 Access and other Conditions

.1 For access to Communications rooms, contact Facilities Maintenance and Operations (FMO) or a HSSBC NE Representative.

.2 Communications room door will be kept closed at all times for cooling, infection control and security reasons.

.3 No Food or beverages of any type.
.4 No Cardboard of any type.
.5 No Styrofoam or packing material.
.6 No wood pallets.
.7 Shoes must be clean before entering the room.
.8 All un-authorized people must have prior approval from HSSBC NE and be granted access by FMO before entering Communications rooms.
.9 All people entering the Communications rooms must sign in and out with FMO.
.10 Vendors/Contractors must display ID at all times.
.11 Equipment cannot be added or removed from the racks unless specifically stated within the project's scope of work or authorized by a HSSBC NE Representative. This includes power cables, network cables and fiber cables.
.12 Failure to comply with these rules will result in the removal of access to the Communications rooms.

1.5 MATERIALS

.1 Materials not approved or not conforming to the Contract Documents will be rejected
.2 The Contractor will identify materials with long delivery times immediately upon submittal of shop drawings and will order such materials as soon the shop drawings are approved by the Communications Consultant and or the HSSBC NE Representative
.3 Materials will be delivered on site in original containers and packages with labels and seals intact. Use in strict accordance with manufacturer's latest printed directions and instructions unless otherwise specified.
.4 Material deliveries to the site will be the responsibility of the Contractor. After delivery, the Contractor will take responsibility to protect material during storage and handling to prevent damage and theft. Do not store equipment or materials where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged material or equipment. Material or equipment damaged during installation will be replaced.

1.6 DRAWINGS

.1 The location of various items indicated in T drawings, are approximate except where specifically mentioned.
.2 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work.
.3 The Contractor is responsible to take field measurements where equipment and material dimensions are dependent upon building dimensions.
.4 The Contractor will coordinate with General, Mechanical and Electrical trades as well as Furniture Layout Designer for final user outlet locations.
.5 If any discrepancies or omissions are found in the drawings, or if the intent is not clear, the Contractor will obtain clarification from the Communications Consultant and or the HSSBC NE Representative

1.7 ACCEPTANCE CONDITIONS

.1 The installed system will be deemed acceptable when the Contractor meets the conditions specified in Section 27 05 00 of this document.

1.8 PRE-INSTALLATION SITE SURVEY

.1 Prior to start of systems installation, the Contractor will meet at the project site with the Communications Consultant and or the HSSBC NE Representative and Representatives of trades performing related work to co-ordinate efforts.

.2 The Contractor will review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with other trades will be necessary to meet critical deadlines for completion of Communications Rooms and Closets.

.3 Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.

END OF SECTION 27 01 10

27 05 00 COMMON WORKS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Contract Drawings and Specifications
.3 Shop Drawings, Submittals and Construction Documents
.4 Review and Approval
.5 Contractor's Foreman
.6 Project Meetings
.7 Coordination on Site
.8 Sequence and Scheduling
.9 Pricing
.10 Permits, Fees, Taxes and Inspections
.11 Coordination, Clarifications and Addenda
.12 Inspections
.13 Substantial Performance
.14 Certification of a Communications System

1.2 CONTRACT DRAWINGS AND SPECIFICATIONS

.1 The Contract drawings and specifications form an integral part of the contract documents. Neither the drawings nor the specifications will be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, or vice versa, will be considered as properly and sufficiently specified and will be provided.

.2 Misinterpretation of any requirements on drawings, or specifications will not relieve the Contractor of his or her responsibility of properly completing the Contract.

.3 Where conflict exists between drawings and specifications, the Contractor will make allowance for provision of the component, system, or installation process in a manner which will provide HSSBC with the highest monetary cost components, systems, or installation process.

.4 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of the Work. The Contractor will not scale the drawings, but rather take field measurements particularly where equipment and material dimensions are dependent on building dimensions.

.5 The Contractor will obtain information from the Communications Consultant and or the NE Representative where exact communications outlet locations are not indicated, but are specified on the plans and or specifications.

.6 The Communications Consultant and or the HSSBC NE Representative has the option of changing the location of Communications outlets to within 3 meters of designed location prior to rough-in stage at no extra cost to the Owner.

1.3 SHOP DRAWINGS, SUBMITTALS AND CONSTRUCTION DOCUMENTS

.1 The Contractor will submit to the Communications Consultant and or the HSSBC NE Representative for approval all product data (including cut sheets and catalogue information) and shop drawings on the complete bill of materials for the project noting long lead-time items and providing samples and mock-ups if required by the Contract Documents.

.2 The Contractor will submit a sample binder and contents of the Manual of Operations for approval at time of shop drawings submission. Refer to Substantial Performance for further details.

.3 The Contractor will also present the following submittals to the Communications Consultant and or the HSSBC NE Representative for review and approval:

.1 Manufacturer's catalogue sheets and specifications for fiber optic field-test instruments including optical loss test sets (OLTS; power meter and source), optical time domain reflectometer (OTDR) and inspection scope.

.2 Sample test reports.

.3 Field-directed changes to cross connect and patching schedule.

.4 Backbone cable routing or location changes.

.5 Fire-stop design, identifying all locations to be fire-stopped, complete with documentation, a list of all fire-stopping materials to be used, and fire-stop systems to be installed.

.4 All above submittals must be forwarded promptly and in such sequence as to cause no delay in the work or in the activities of the other trades.

.5 The Communications Consultant and or the HSSBC NE Representative will indicate approval of shop drawings, product data, and samples submitted by stamping such submittals with the word: "APPROVED".

.6 Submitted shop drawings will be signed by the Contractor, imprinted with the date submitted, and will bear the Contractor's legitimate Company name.

.7 By submitting shop drawings, product data, and samples, the Contractor signifies that he, or she has carefully reviewed and verified materials, quantities, field measurements, and related field construction criteria. It also signifies the Contractor has checked, coordinated, and verified that all information contained in shop drawings, product data, and samples conforms to the requirements of the Work and of the Contract Documents.

.8 The Contractor will perform no portion of the Work requiring submittal and review of shop drawings, product data, or samples until the Communications Consultant and or the HSSBC NE Representative has approved the respective submittal.

.9 The Contractor will submit shop drawings, product data, and samples to the Communications Consultant and or the HSSBC NE Representative as a complete set within fifteen (15) working days subsequent to Award of Contract and prior to start of Work.

.1 For initial and re-submission for approval, the Contractor will submit a soft copy of the proposal that is electronically stamped to the Communications Consultant and or the HSSBC NE Representative

.2 The Communications Consultant and or the HSSBC NE Representative will only return one copy of each submission.

.3 The Contractor will make reproductions as required for his or her own use and distribution to subcontractors.

.4 The Contractor will highlight relevant products on the shop drawings.

.5 The Communications Consultant and or the HSSBC NE Representative will not accept illegible submittals.

.10 The Communications Consultant will provide one copy of each submittal to HSSBC NE Representative for review and approval.

1.4 REVIEW AND APPROVAL

.1 The Communications Consultant's and or the HSSBC NE Representative's approval of the Contractor's shop drawings, product data, and samples submitted will not relieve the Contractor of responsibility for errors, omissions, or deviations from requirements of the Contract Documents, unless the Contractor has specifically informed the Communications Consultant and or the HSSBC NE Representative in writing of such deviation at time of submittal. The Contractor will also receive written approval of the specific deviation from the Communications Consultant and or the HSSBC NE Representative.

.2 The Communications Consultant's and or the HSSBC NE Representative's review and approval of shop drawings, product data, and samples, is for the limited purpose of checking for conformance with information given and design concept expressed in the Contract Documents.

.3 The Communications Consultant's and or the HSSBC NE Representative's review of Contractor's submittals is not conducted for the purpose of determining accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor.

.4 The Communications Consultant's and or the HSSBC NE Representative's review will not constitute approval of safety precautions or of construction means, methods, techniques, sequences or procedures.

.5 The Communications Consultant's and or the HSSBC NE Representative's approval of a specific item will not indicate approval of an assembly of which the item is a component.

1.5 CONTRACTOR'S FOREMAN

.1 The Contractor will designate a Foreman to remain on the job site from the time construction commences until final completion and acceptance of the Work

.2 The Foreman will not be changed unless satisfactory reasons are given in writing to the Communications Consultant and or the HSSBC NE Representative.

1.6 PROJECT MEETINGS

.1 The Cabling Contractor's Project Manager and Foreman will attend all meetings with the General, Mechanical, and Electrical Contractors as requested, as well as meetings that may be requested by the Communications Consultant and or the HSSBC NE Representative.

1.7 COORDINATION ON SITE

.1 The Cabling Contractor will coordinate his work with the General, Mechanical, and Electrical Contractors to ensure that all required supporting structures, such as wall plywood, conduits, trays and cable dropouts, are in place prior to commencing work.

.2 Any conduit, outlet boxes, J-hooks, cable trays or cable dropouts that are installed at locations that contradict instructions on the drawings or in the specifications will be immediately identified and reported to the Communications Consultant and or the HSSBC NE Representative.

.3 The Contractor will promptly advise the Communications Consultant and or the HSSBC NE Representative of any specific equipment, materials or installation that are non-conforming with or in violation of laws, by-laws or regulations of authorities having jurisdiction.

1.8 SEQUENCE AND SCHEDULING

.1 The Contractor will submit a complete Construction Schedule for the installation of equipment (if specified), and cabling within fifteen (15) working days of Awarding of Contract.

.2 The Construction Schedule will indicate delivery, installation, and testing dates for each component of the project. A typical project schedule submitted by the Contractor will provide the following key milestone dates:

- .1 Contract Award.
- .2 Submittal and Approval of Shop Drawings
- .3 Key Material Procurement Dates
- .4 Horizontal Cabling
  - .1 Cable Rough-in
  - .2 Firestopping
  - .3 Cable Termination
  - .4 Testing
  - .5 Labelling
- .5 Backbone Cabling
  - .1 Cable Rough-in
  - .2 Firestopping
  - .3 Cable Termination
  - .4 Testing
  - .5 Labelling
- .6 Telecommunication Grounding Backbone
  - .1 Bonding Conductor Rough-in
  - .2 Busbar Installation
  - .3 Bonding Conductor Termination
  - .4 Labelling
- .7 Communications Room Make Ready
  - .1 Racks/Cabinets/Cable Management Installed
  - .2 Grounding and Bonding Complete
  - .3 Cable Termination Equipment Installed
  - .4 Labelling
  - .5 Final (Equipment Ready) Clean
- .8 Equipment Installation Dates
- .9 Submission of As-Built Documentation Package
- .10 Substantial Performance.
- .11 Communications Consultant and or the HSSBC NE Representative Acceptance.

.3 The Contractor will ensure their schedule aligns to and is coordinated with the General Contractor's overall construction schedule as well as the schedules of other sub-trades (electrical, mechanical, etc.), HSSBC and other third parties whose tasks impact either the start and/or completion of the Contractor's tasks.

.4 The Contractor will submit a separate demolition time schedule with applicable cut-over in areas that have existing users. This applies to any areas where systems will need to be taken off-line.

1.9 PRICING

.1 The Contractor will provide all separate, alternate and unit pricing as specified in this or any other documents relevant to this project.

1.10 PERMITS, FEES, TAXES AND INSPECTIONS

.1 Contractor is fully responsible for compliance with Federal, Provincial and Municipal laws and regulations.
.2 Prior to the start of the project, the Contractor will obtain a low voltage permit. As well, at the end of the project the Contractor will submit a request for final inspection to the Authority Having Jurisdiction (AHJ).
.3 The AHJ is responsible for issuing electrical permits.
.4 The Contractor will pay all associated inspection fees.
.5 The Contractor will be responsible and pay for any additional time and expense occurred if re-inspections are required for deficiencies, which have not been corrected to the Owner's satisfaction.
.6 The Contractor will pay for all associated taxes.
.7 Contractor will obtain and pay for all necessary key deposits, permits and licenses.
.8 Prior to commencement of work, the Contractor will provide a copy of all permits to the Communications Consultant and or the HSSBC NE Representative.
.9 The Communications Consultant will provide drawings and specifications if required by the AHJ. All costs associated with this requirement will be included in the Communications Consultant's fee proposal.
.10 The Communications Consultant will be required to notify the HSSBC NE Representative of changes required by the AHJ prior to making changes.
.11 Upon substantial performance and before final payment, the Contractor will submit a confirmation copy of acceptance for all work, issued by the AHJ, to the Communications Consultant and or the HSSBC NE Representative.

1.11 COORDINATION, CLARIFICATIONS AND ADDENDA

.1 Questions about the meaning and intent of this document that may require clarification will be submitted to the Communications Consultant and or the HSSBC NE Representative.
.2 Replies to tender questions will be issued in writing in the form of Addendum. Replies or modifications made in any other manner will not be binding and have no legal effect.
.3 Addenda issued by the Communications Consultant during the tender period will be incorporated into Contractor's response, will become part of the contract documents, and will be reflected in the Contractor's price.
.4 Site Instructions and Change Orders will be incorporated into the installation drawings.

1.12 INSPECTIONS

.1 The Contractor will request and coordinate representation from the Communications Consultant and or the HSSBC NE Representative for inspection of cabling system during, but not limited to the following stages of construction:
  .1 Communications room construction
    .1 Wall layout of various low voltage systems, entrance copper cables, grounding system, system panels, connecting hardware and GigaBIX wall.
    .2 Floor layout of equipment racks and double-sided finger-type vertical cable managers on both sides of each rack (double-sided means 152mm -305mm wide x 254mm deep front channel for patch cables and 152mm -305mm wide x 254mm deep rear channel for horizontal cables).

.3 Ceiling layout of cable tray, and cable dropouts over side of tray (clip-on Cablofil 115mm deep) into vertical cable managers and GigaBIX wall. This is to provide unrestricted access of cables from the tray into the vertical managers, and to avoid cutting of tray at the bottom.

.4 Proper positioning of lighting and mechanical ducting layout in relation to ceiling tray, racks and sprinkler head.

.5 Layout of equipment on racks – horizontal cable manager, fiber patch panels, analog voice patch panels, horizontal cable patch panels in relation to switches, etc.

.2 Cable rough-in, dressing and termination (workmanship).
.3 Labelling.
.4 Testing and documentation.
.5 Old cable removal and clean up.
.6 Completion and acceptance.

1.13 SUBSTANTIAL PERFORMANCE

.1 The Contractor will advise the Communications Consultant and or the HSSBC NE Representative in writing when Substantial Performance has been achieved. At the same time, the Contractor will request a Deficiencies Inspection to be made.

.2 The Contractor will not issue Substantial Performance and a Deficiencies Inspection request until the following work has been completed and specified documentation forwarded to Communications Consultant and or the HSSBC NE Representative:
.1 As-built record (soft copy) documentation has been provided.
.2 All systems have been tested and are ready for operation.
.3 Record of completed verification of Communications system has been provided.
.4 Fire-stop installation is performed as per Fire-stop Section 27 05 29.
.5 The clean-up is finished in all respects.
.6 All inspection certificates have been furnished including final low voltage and or Electrical inspection certificate.

.3 At Substantial Performance, the Contractor will submit drafts in soft copy soft of the following to the Communications Consultant:
.1 As-Built drawings.
.2 Maintenance Manual

.4 As-built drawing package will confirm location and identification of all:
.1 Communications Outlets and jack numbers with serving Communications Room ID.
.2 Communications Rooms.
.3 Communications Room boundary lines
.4 Backbone Cable Runs.
.5 Communications Room floor and ceiling layouts (rack, GigaBIX wall, wall-mount system panels, vertical & horizontal conduit sleeves, ceiling tray, etc.).
.6 Fiber, Copper and Grounding schematics.

.5 The Maintenance Manual will typically contain the following:
.1 Set of final reviewed Shop Drawings.
.2 A copy of all as-built drawings
.3 Digital photos of all Communications rooms showing each wall and rack elevations
.4 Circuit Spreadsheets for horizontal cabling and fiber backbone (refer to Appendix A)
.5 Manufacturer Warranty documents for equipment and workmanship.
.6 Copper Warranty Certification test result printouts.
.7 Optical fiber power meter/light source test result printouts.
.8 Fire-stop design and records documentation as per section 27 05 29.

.9 Names, addresses, phone numbers and facsimile numbers of Contractor, Communications Consultant, sub-contractors and suppliers used on the Work together with a specification reference of the portion of the Work they undertook.

.6 Upon completion of the project to the Owner's satisfaction, the Contractor will submit final documentation consisting of:

.1 Full size set of As-Built drawings

.2 (3) USB Memory Keys of As-Built drawings. As-Built Drawings are to be provided in:

.1 AutoCad 2015 (bind all x-Refs files)

.2 PDF (all files combined into a single document)

.3 Maintenance Manual in a hard back D-ring commercial binder.

.1 Maintenance Manual will be in a suitably labelled, hard back, D-Ring type commercial binders, each complete with an index and tabbed title sheets for each section. All binder pages will have self-adhesive reinforcing rings at each binder ring.

.2 All maintenance manual data will be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. Drawings will be printed on 11" x 17". Each manual will have a title sheet which is labelled "Operation & Maintenance Manual", and will list the Project name, Contractor's & Communications Consultant's names, date submitted, and a Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.

.4 Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Key

.7 The Communications Consultant will distribute the final project documents to the following departments:

.1 Full size set of As-Built drawings to the site Facilities, Maintenance and Operations (FMO) team.

.2 USB Memory Key of As-Built drawings to FM Support.

.3 USB Memory Key of As-Built drawings to the site FMO team.

.4 USB Memory Key of As-Built drawings to the HSSBC Network Edge Department.

.5 Maintenance Manual in a hard back D-ring commercial binder to the site FMO team.

.6 Soft copy of the Maintenance Manual in PDF format on a separate USB Memory Key to the HSSBC Network Edge Department.

1.14 CERTIFICATION OF A COMMUNICATIONS SYSTEM

.1 The Contractor will ensure that the installed cabling system and the Contractor's Employees working on this project are Certified and Warrantied by the Cable Manufacturer.

.2 The Contractor will only use Certified Personnel who are trained and equipped to properly install a structured cabling system, including but not limited to supporting pathways, cable, termination hardware, bonding and grounding system, equipment cabinets or equivalent, and associated Communications equipment, in order to obtain system acceptance.

END OF SECTION 27 05 00

27 05 26 GROUNDING AND BONDING FOR COMM. SYS.

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 References
.3 Statutory Authority – Electrical Safety
.4 Definitions
.5 System Description

1.2 REFERENCES

.1 CEC, CSA C22.1-15 “Canadian Electrical Code” Part 1
.2 ANSI/TIA J-STD-607-B standard

1.3 STATUTORY AUTHORITY – ELECTRICAL SAFETY

.1 Canadian Electrical Code, Part 1, Twenty-third Edition.
.2 Safety Standard for Electrical Installations.
.3 Canadian Standards Association Standard C22.1-15 is adopted in whole, including any errata and with the changes set out in schedule, as the B.C. Electrical Code Regulation, is in force.

1.4 DEFINITIONS

.1 Define the following list of terms, as used in this specifications as follows:
  .1 “CM”: Circular Mil.
  .2 “MBRGB”: Main Building Reference Grounding Busbar.
  .3 “TBB”: Telecommunications Bonding Backbone.
  .4 “TBC”: Telecommunications Bonding Conductor.
  .5 “TGB”: Telecommunications Grounding Busbar.
  .6 “TMGB”: Telecommunications Main Grounding Busbar.

1.5 SYSTEM DESCRIPTION

.1 Telecommunications Grounding as described C-STD drawings in 27 00 00.01 are to be referred to as a minimum requirement using a dedicated ground, this applies to all new and any existing communications spaces.
.2 The Telecommunications Grounding Backbone system contains grounding bus bars, grounding conductors, bonding conductors, and connecting devices (including but not limited to pressure connectors, lugs, clamps, or exothermic welds). These components provide a low impedance path to ground for stray voltages or spurious signals present on telecommunications media and equipment.
.3 Grounding and bonding practices will comply with all applicable codes.

PART 2 PRODUCTS

2.1 GROUNDING & BONDING CONDUCTORS

.1 TBB
- .1 Conductor: Class I stranded copper.
- .2 Insulation: Flex EPR/Hypalon LS, green in colour.
- .3 The cable will have the insulation grade, the conductor gauge, and applicable UL jacket listings printed on the insulation.
- .4 Where conductors with green insulation are not commercially available, provide a minimum of 100 mm long colour band with green, non-aging, plastic tape in accordance with CEC. This band will occur at both ends of the conductor, and at all connections between.
- .5 Gauge: as noted on Drawings.

.2 TBC:
- .1 Conductor: Class I stranded copper.
- .2 Insulation: Flex EPR/Hypalon LS, green in colour. The cable will have the insulation grade, the conductor gauge, and applicable UL jacket listings printed on the insulation.
- .3 Gauge: #6 AWG.

.3 Cable Tray Bonding Straps
- .1 Conductor: Flexible braided straps with factory terminated connectors.

.4 Cable Runway Bonding Straps
- .1 Conductor: Flexible braided straps with factory terminated connectors.

.5 Bonding conductor will be green jacketed, stranded copper, soft conductor, unless otherwise noted (bare #6 AWG. for cable tray). Unless installed in conduit system, bonding conductor jacket will be CMR/P rated as required by the AHJ.

.6 All bonding conductors and connectors will be approved as defined in CSA C22.1-15.

2.2 GROUNDING BUSBARS

.1 TMGB
- .1 Material: Solid copper
- .2 Minimum dimension of 100 mm wide X 305 mm long X 6 mm thick.
- .3 Holes: Predrilled, with standard NEMA bolt hole sizing & spacing for this type of connectors used.
- .4 Mounting: Utilize insulated standoffs.
- .5 Manufacturer: Panduit or Erico

.2 TGB
- .1 Material: Solid copper.
- .2 Minimum dimension of 50 mm wide X 305 mm long X 6 mm thick
- .3 Holes: Predrilled, with standard NEMA bolt hole sizing & spacing for the type of connectors used.
- .4 Mounting: Utilize insulated standoffs.
- .5 Manufacturer: Panduit or Erico

2.3 CONNECTORS

.1 General: All connectors will be UL listed.

.2 Connectors Types:
- .1 H Compression Taps

.2 Two Hole Compression Lug

PART 3 EXECUTION

3.1 GENERAL

.1 Install a complete, permanent, and continuous bonding and grounding system for Communications infrastructure and, equipment including all necessary conductors, connectors and accessories, as indicated on drawings and this document, in order to conform to requirements of Electrical Inspection Department and Canadian Electrical Code.

3.2 IDENTIFICATION

.1 Refer to Section 27 05 53 Identification for Communications Systems for labelling requirements.

3.3 GROUNDING & BONDING CONDUCTORS

.1 Bonding conductors placed in metallic conduits longer than one metre must be bonded at each end of the conduit with the appropriate bonding bushing.

.2 Where the Communications rooms are stacked, the bonding conductor will be a common riser bonding conductor for connection to the stacked Communications rooms.

.3 Where practicable, all bonding conductors will be installed without a splice. Where a splice is necessary, it will be accessible and located within a Communications room. Conductors will be spliced using irreversible compression-type connectors, exothermic welding, or equivalent. All joints will be adequately supported and protected.

.4 Bonding conductors shall be as short as possible and routed with a minimum of bends. All bends made on the conductor shall be sweeping bends. Minimum bending radius is 200 mm (8”) bonding conductors will be fixed to the walls and neatly formed around the perimeter of the room.

.5 Install a bare #6 AWG copper stranded conductor, in the entire length of surface raceway or cable tray and bond to the telecommunications grounding system.

.6 The cable tray bonding conductor will be bonded to cable tray by a bonding clamp at each straight length of tray regardless of length and each elbow and T-fittings.

.7 All splices of bonding conductors will be outside of the cable trays.

.8 Conduits for individual outlets will be bonded using a #12 AWG stranded insulated copper conductor from the conduit bonding bushing to the cable tray bonding conductor.

.9 The metallic jacket of all inter-building cables will be bonded with a #6 AWG green PVC jacketed stranded copper conductor at the jacket opening at both ends of the cable, using a bonding clamp designed for the cable used.

.10 The metallic jacket of metallic shielded & interlocking armoured backbone cables will be bonded with a #6 AWG green jacketed stranded copper conductor at the jacket opening at both ends of the cable, using a Grounding Bushing on an armoured cable connector designed for the cable being used.

.11 Metallic cable protectors will be bonded with a #6 AWG green jacketed stranded copper bonding conductor.

.12 Equipment racks and Communications equipment will be bonded with a #6 AWG green. Each rack will be bonded with a #6 AWG green directly to the TMGB or TGB (star-wired).

.13 Metal parts in the Communications rooms will be bonded to the appropriate ground busbar.

.14 Power panels in Communications rooms will be bonded to the TMGB or TGB with ground cable sized as per the requirements of the CEC.
.15 All Communications EMT conduit and tray leaving the Communications room will be bonded.
.16 Bond the metal frame of the building to the TMGB/TGB; cable sized as per the CEC.
.17 All Communications outlet boxes will be bonded.
.18 Install #12 AWG insulated stranded copper bonding conductor to metal Wiremold surface raceway, and bond to the building and telecommunications grounding systems for joint-use power and Communications applications. Bond to telecommunications grounding system if the raceway is dedicated only for Communications use.
.19 Protect exposed bonding conductors from mechanical damage.

3.4 GROUNDING BUSBARS

.1 The TMGB will be connected to the building main Electrical ground busbar with a #4/0 AWG green jacketed stranded copper conductor.
.2 The size of the TBB is a minimum size of 4/0 AWG.
.3 All TGB's will be connected to the TMGB with a minimum #4/0 AWG green jacketed copper conductor FT rated as per the AHJ or installed in conduit.
.4 A grounding busbar will be placed below the ceiling cable tray at 2300 mm AFF near the corner of the wall that adjoins another wall where the conduit sleeves are located. It will be mounted to the wall with insulating stand-offs.

3.5 CONNECTORS

.1 All connections to the TBB will be accessible and located in a Communications room.
.2 Bonding connections will be made with star-washers, dual bolts, triple crimp connectors, clamps, or lugs specifically designed for the purpose.
.3 A lug will be crimped to each end of the bonding conductor. Bonding conductors will be bolted on the appropriate ground busbar with a 6 mm copper alloy bolts and nuts.
.4 Leave 6 spare connectors in the MER Communications Room and 4 spare connectors in each TR Communications Room.
.5 Prior to attaching a lug to a painted or galvanized surface, the paint will be scraped off to bare metal, to provide maximum contact. Star washers and lock washers will be used with the bolts.
.6 Install two-hole connectors in accordance with manufacturer's instructions
.7 Compression Taps:
  .1 TBB will bond the TMGB with each TGB (star configuration – individual TBBs) or
  .2 TBB will bond the TMGB to the farthest TGB (riser configuration – one main TBB where TGBs between TMGB and farthest TGB are tapped off).
.8 General: Compression taps will be used as a connection device from TBCs (from the TGB) to the TBB.
  .1 "H" compression tap for #6 AWG bonding conductor to a 4/0 TBB, or approved equivalent.
.9 Compression Connectors
  .1 General: Compression connectors will be used as a connection device from TBCs to TGBs.
  .2 Copper lug for #6 AWG conductor, with two 6 mm bolt holes, or approved equivalent.
  .3 Copper lug for 4/0 AWG conductor, with two 8 mm bolt holes, or approved equivalent.

.10 Connections to Conduits
- .1 Entrance Conduits: For connecting bonding conductor to all 103 mm rigid steel entrance conduits, use threaded insulated throat grounding bushings. Manufacturers:

.11 Connections to Busbar
- .1 General: Compression connectors will be used as a connection device for TBC to TGBs.
  - .1 Standard barrel copper lug for #6 AWG conductor, with two 6 mm bolt hole.
  - .2 Standard barrel copper lug for 4/0 AWG conductor, with two 8 mm bolt holes.
  - .3 Two 8 mm lugholes, for all conductors between #4 AWG to 4/0 AWG conductors.
  - .4 Two 6 mm lugholes, for #6 AWG conductors.

.12 Connections to Communications Racks and Cabinets.
- .1 General: Connectors will be used as a connection device for TBC's to equipment racks. Paint will be removed from the rack location where the connector is attached to ensure metal to metal contact. Star washers will be used.
- .2 Each rack will have a dedicated #6AWG bonding conductor homerun to the busbar. The racks will not be daisy-chained with a single bonding conductor back to the busbar.

.13 Connections to Structural Steel
- .1 Where shown on the Drawings, connect grounding conductors to structural steel using exothermic welds. Each particular type of weld will use a kit unique to that type of weld.

.14 Connections to Interlocking Armoured Fiber Optic Cable
- .1 Bond the armour of the cable at both ends of the cable with armoured flex connector's c/w grounding bushings sized to suit the cable.
  - .1 Provide a #6 AWG green insulated ground cable and bond the TMG or TMGB.

END OF SECTION 27 05 26

27 05 28 PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Documents
.3 References
.4 System Description
.5 Submittals

1.2 DOCUMENTS

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.3 REFERENCES

.1 Refer to section 27 01 00 for Codes and Standards

1.4 SYSTEM DESCRIPTION

.1 The Communications Pathways consist of the following subsystems:
  .1 Cable Tray System – overhead (within the ceiling space) from the building entrance rooms, equipment rooms, and TRs throughout the building space.
  .2 Electrical metallic tubing and fittings.
  .3 Miscellaneous conduit fittings and products.
  .4 Conduit sleeves, Fire Stop sleeves, Conduits and Underground Ducts
  .5 Wall outlet boxes.
  .6 Pull and junction boxes.
  .7 Cable Hangers – overhead (within the ceiling space) from the primary pathways to the device locations.
.2 Pathway design and space assignment will be coordinated with the mechanical, electrical, plumbing, and pneumatic tube systems designs.
.3 The work under this section will also include the planning and coordination with General Contractor (and other trades) of Communications system pathways, the furnishing of necessary materials, and the labour & associated services required to install Communications pathways.

1.5 SUBMITTALS

.1 General: Conform to Submittal requirements as described in Section 27 05 00.

PART 2 PRODUCTS

2.1 CABLE TRAY

.1 Basket
- .1 Application: Suitable for the support & management of Communications cables, either overhead or mounted vertically on a wall.
- .2 Description: Cable basket will be made of steel wires and formed into a standard 50-mm by 100-mm or 50-mm by 50-mm wire mesh pattern. Wire intersections will be welded. Wire ends along sides (flanges) will be rounded during manufacturing for safety of installers and to prevent damage to cables.
- .3 Material: Carbon steel wire, ASTM A510, Grade 1008. Wire welded, bent, and surface treated after manufacture.
- .4 CabloFil or Flextray.is the approved basket tray manufacturer
- .5 Fittings: Field fabricated in accordance with manufacturer's instructions from straight sections.
- .6 Size: The minimum size tray in Acute Care sites is 100 mm x 610 mm unless specifically noted otherwise.
- .7 Accessories
  - .1 Grounding: Terminal support and cable support for attachment on tray of continuous #6 AWG ground conductor fixing system.
  - .2 Electro-plated zinc: Support accessories and miscellaneous hardware will be coated in accordance with ASTM B633 SC3.
  - .3 Cable Label Clips: Mark and identify specific cable runs, electro-zinc plated steel.

.2 Totally Enclosed Cable Tray
- .1 Totally enclosed cable tray will be used inside Parkade and other similar type locations (exposed public spaces).
- .2 Use manufactures radius bends for all directional changes to the cable tray.
- .3 Aluminium Class C1 is the minimum load class for the cable tray.
- .4 Size: The minimum size tray in Acute Care sites is 100 mm x 610 mm unless specifically noted otherwise.

.3 Chatsworth Runway
- .1 For the Entrance facility room, provide 610 mm wide cable runways. Use manufacturer runway corner bracket kits for radius bends for all directional changes to the cable tray.
- .2 Chatsworth is the approved cable runway.

2.2 CABLE HANGERS

.1 Application: Suitable for indoor installation within ceiling space of community sites only for the support of Communications cables.

.2 Approved Product: ERICO Caddy J-Hook. Maximum fill ratio is 28% of J-Hook capacity at substantial completion of project.

2.3 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

.1 Conduit: Will be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication.

.2 Set Screw Steel type couplings: Electroplate steel or cast malleable iron; concrete tight, with insulated throat, using gland.

.3 Compression type connectors: Electroplated steel or cast malleable iron, concrete tight, with insulated throat.

2.4 PULL BOXES

.1 Unless otherwise specified, the minimum size of a pull box will be 310 mm x 310 mm x 150 mm deep. Communications Consultant and or the HSSBC NE Representative will be consulted in all cases. Refer to Section 27 05 53 for labelling requirements.

2.5 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

.1 Conduit: Will be fabricated in continuous lengths from galvanized steel strips, interlocking spirally wound, covered with extruded liquid tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper-bonding conductor wound spirally between the convolutions.

.2 Fittings: Connector body and gland nut will be of cadmium plated steel or cast malleable iron, with tapered, male, threaded; insulated throat and neoprene “O” ring gasket recessed into the face of the stop nut. The clamping gland will be of moulded nylon with an integral brass push-in ferrule.

.3 Application: Suitable for an indoor installation for the support of Communications cables from a feed pathway to furniture systems or similar.

2.6 DUCT PLUGS

.1 Application: Suitable for installation within conduits at termination/end entering into underground maintenance holes/pull boxes and into buildings from underground/exterior, opening into a Communications space. Duct plugs will provide a watertight (up to 20 psi) seal around inner ducts and cables.

.2 Duct plugs will be sized per conduit trade/actual size, per inner duct trade/actual size, and per cable outside diameter – as required per instance.

.3 Duct plugs will be re-enterable and re-usable.

2.7 UNDERGROUND CABLE RACKS

.1 Application: Suitable for support cable / splice cases in underground environment (steam tunnels, vaults).

.2 Hot-dipped galvanized steel, manufactured from 38-mm x 14-mm x 5-mm hot-rolled steel channel, T-slots spaced at 38-mm.

2.8 COMMUNICATIONS SYSTEM OUTLET BOXES

.1 A Communications outlet is the point at which the Communications equipment is connected to the Health Authority’s network. The outlet consists of an outlet box and cover plate, connecting conduit, several jacks, and its connecting cables.

.2 Outlet boxes will be specified on drawing.

.3 Flush-Mount Box

- .1 Provide one-piece die formed or drawn steel, knockout type box of size and configuration as indicated on the Electrical Drawings. No sectional boxes.
- .2 103 mm square by 54 mm deep will be minimum box size.
- .3 Mud ring will be used on top of the electrical box to receive single gang outlet faceplate.

.4 Surface-Mount Box

- .1 Manufacturer:
  - .1 Wiremold
    - .1 V5744-2 (dual-gang for use with conduits).
    - .2 V2144-2 (dual-gang for use with V2100).

.3 V3044-2 (dual-gang for use with V3000).

.2 Hubbell

.1 HWPFSCS/HBLFSCS series c/w cover (surface floor box).

.3 Panduit

.1 JBP2D1W (132 mm x 132 mm x 70 mm dual-gang for use with Panduit).

2.9 COMMUNICATIONS SYSTEM OUTLET PLATES

.1 Unless specified to the contrary, all outlet plates will be plastic or stainless steel with appropriate cut-outs and permanently marked designations, as specified in the outlet specifications of the related sections.

.2 Plastic plates will be the same colour as determined for the power outlets. The architect's decision is final.

.3 Ensure that total depth of raceway and outlet plate is sufficient for terminating Horizontal cable and jacks.

2.10 SURFACE RACEWAYS PRODUCTS

.1 Provide Wiremold or Panduit for Communications outlets.

.2 Where metallic raceway is required it will be as manufactured by Wiremold. The colour will match existing Wiremold installation. Where contradiction exists between colour noted on drawing and on site, the colour on site will take precedence.

.3 For large number of cables and multiple outlets adjacent to each other, use Wiremold V-4000 or V-6000 as appropriate. For Wiremold V-4000, Fiber ready elbow V4011FO will be used for flat 90º bends.

.4 For individual outlets use Wiremold V-3000 or V-2100 raceway as indicated on drawings. For V-3000 fiber ready elbow, V3011F0 will be used for flat 90º bends.

.5 Non-metallic surface raceway will be manufactured by Panduit or approved equal. Except as noted, colour of Panduit will be off-white on painted surfaces and grey on unfinished concrete surfaces or as otherwise architecturally specified.

.6 Surface raceways for Communications systems will be minimum 120 mm X 45 mm deep raceways with cut-outs and hardware for mounting faceplates. When the surface raceway is used to distribute power and Communications cables, a manufactured barrier, separating Communications cables from power cables will be installed in the centre of the raceway.

.7 Non-metallic raceway may be used as per current building codes or as specified on drawings.

PART 3 EXECUTION

3.1 GENERAL

.1 The Contractor will supply and install a system of cable raceways consisting of a combination of cable tray, conduit and any other standards compliant non-contiguous support system such as saddles as required by the local facilities. The cable trays extend horizontally from the Communications Rooms, down the hallways or corridors to become the backbone or main highway to support communications cables.

.2 Each communications outlet will be connected to the nearest cable tray with conduit. Conduit will be used in new construction.

.3 Install conduit and sleeves where required prior to pouring concrete. Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure to keep furring to a minimum.

.4 J-hooks may be used in community sites only.

.5 All raceway and J-hooks (when applicable) will be installed parallel to building lines, keeping cable run length at an absolute minimum.

.6 In open office environments, the preferred method of extending the conduit from the outlet to the cable tray is via perimeter walls. If this is not possible then use Pac poles or run in "pony" walls.

.7 Where raceway size is not specified, the raceway will be sized to not exceed a 28% fill ratio after all the cables are installed.

.8 A Mule tape will be left in all backbone raceways after installation of the cables. Mule tape will be Greenlee 4435 or approved equal for backbone conduits.

.9 The Contractor will ensure adequate support for raceways and cables dropping vertically to equipment where there is no wall support. Do not use wire lashing or perforated strap to support or secure raceways or cables.

.10 Explosive drive pins will not be allowed on the works without prior approval of the Communications Consultant. All fixings to be metal expansion type in pre-drilled holes. The Contractor will not use plastic expansion inserts or fittings. The Contractor will use coach screws, lag screws or wood screws, minimum 25 mm long, in wood construction.

.11 The Contractor will provide supports for equipment and materials supplied. The Contractor will provide all anchor bolts and other fastenings, where shown on or in tile walls or wall inadequate to support the equipment, provide angle or channel iron supports to bear the equipment, independent of the wall or conduit. All hangers, supports and brackets will be provided and installed to be consistent with the requirements of the B.C. Building Code.

.12 The Contractor will provide seismic bracing of tray. Following installation of all equipment and fixings, the Contractors will provide a seismic restraint structural review of the fixings of all devices which form part of the Communications infrastructure installation. The Contractor will provide a structural engineer registered with the APEGBC to sign and seal the report. The Contractor will reinstall, if necessary, supports for the equipment and fixings to the satisfaction of the structural engineer, at no additional cost to the Owner.

.13 Cutting and Coring

- .1 Where floor cutting is necessary for installation of conduits and cable trays, obtain the services of a reputable Ground Penetration Radar" (GPR)/x-ray service company. If GPR is not suitable or approved by Facilities have the floor x-rayed and review for interference. Submit report and detail sketch on proposed infrastructure routing to the Communications Consultant for review prior to cutting.
- .2 It is expected that tradesmen skilled in their trades will do the work of that trade. Electricians performing painting, dry-walling or carpentry work will not be accepted.
- .3 Ensure that all penetrations through floors or walls are patched to match adjoining finish. Penetrations through concrete are to be sealed with approved fire-stop material.
- .4 See local Facilities Asbestos Procedures for cutting methods through asbestos areas.
- .5 It is the contractor's responsibility to investigate existing building conditions for taking X-ray and other activities. Existing drawings and approval / scheduling are available from Facilities Maintenance and Operations (FMO). Coring of holes will take place before new walls in close proximity are installed.
- .6 Cutting and patching are to be done to architectural standards and will be inspected by the architect. Refer to the architectural specifications.
- .7 Refer to Fire Stop Systems Section 27 05 29.

.8 Carpet at core locations is to be carefully cut out with a knife to the exact diameter of the pipe prior to coring if the pipe is to be exposed. Fire-stop from below at these locations

3.2 ENTRANCE DUCTS

.1 Entrance ducts are to be installed to the CEC 23rd edition C22 1-15.
.2 Provide orange tracer warning tape above the duct bank.
.3 Provide drainage on the duct bank prior to entering the structure.
.4 Provide drainage at each manhole and pull-pit.

3.3 DUCT PLUGS

.1 Provide duct plugs at all underground conduit ends. Install plugs per manufacturer's instructions or guidelines.
.2 Provide bushings and gaskets in each used duct port.

3.4 UNDERGROUND CABLE RACKS/ SUPPORTS

.1 Preparation
  .1 Locate cable racks/supports in existing steam tunnel as required to support new/relocated cable installation requirements.
.2 Installation
  .1 Install in accordance with Manufacturer's written instruction.

3.5 BACKBONE CONDUITS AND SLEEVES

.1 Backbone conduits and sleeves in Communications rooms will be positioned against the wall to the left of the connector blocks (CSTD-06). The exact location will be verified with Communications Consultant. The use of a pull pit in the Communications rooms will not be acceptable. (Refer to Section 27 11 00).
.2 Provide a minimum of 4 x 103mm Riser sleeves or ducts. Add one additional 103mm riser sleeve or duct for every additional Communications room serviced from a riser stack. For example: Where there are six Communications rooms in a riser stack, (one on each level where level 1 (MER is the beginning of the riser and level 6 is the end; provide the following communications riser:
  .1 Level 1 - provide 9 x 103 mm riser sleeves or ducts
  .2 Level 2 - provide 8 x 103 mm riser sleeves or ducts
  .3 Level 3 - provide 7 x 103 mm riser sleeves or ducts
  .4 Level 4 - provide 6 x 103 mm riser sleeves or ducts
  .5 Level 5 - provide 5 x 103 mm riser sleeves or ducts
  .6 Level 6 - provide 4 x 103 mm riser sleeves or ducts
.3 Ducts will protrude 100 mm above finished floor level and will be encased in concrete.
.4 Riser ducts connecting vertically stacked Communications rooms may consist of sleeves that protrude 50 mm through the ceiling and or 100 mm through the floor.
.5 After installation of the inter-building cables, the ducts will be closed with an approved re-enterable sealing material.
.6 Refer to Section 3.6 for further details concerning backbone sleeve requirements.

3.6 PATHWAYS THROUGH FIRE-RATED BARRIERS

.1 All communications cable trays that need penetrate through fire rated walls and where there is an accessible ceiling on both sides of the wall; will terminate on both sides of the rated wall and the following rated assembly will be installed:

- .1 Provide a rated assembly through a gypsum wall penetration based on a HILTI Speed Sleeve Gang Plate assembly using 103 mm HILTI Speed sleeves.
  - .1 Provide four (4) speed sleeves for a 305 mm x 100 mm cable tray.
  - .2 Provide six (6) speed sleeves for a 610 mm x 100 mm cable tray.
- .2 Provide a rated assembly through a concrete wall penetration based on a HILTI Speed Sleeve Gang Plate assembly using 103mm HILTI Speed sleeves.
  - .1 Provide four (4) speed sleeves through concrete (cored holes) for a 305 mm x 100 mm cable tray.
  - .2 Provide six (6) speed sleeves through concrete (cored holes) for a 610 mm x 100 mm cable tray.
  - .3 The installation of HILTI Speed sleeves in combination with HILTI Cast-in-place sleeves are acceptable provided a HILTI system drawing is provided during the shop drawing submittal phase.

.2 For communications riser sleeves penetrating a concrete floor inside communication rooms.

- .1 Provide a rated assembly through a concrete floor penetration based on using 103 mm HILTI Speed sleeves through HILTI Cast-in-Place sleeves.

.3 For the installation of all other communication conduit pathways through fire rated barriers, refer to fire stop section 27 05 29.

3.7 CABLE TRAY SYSTEM

.1 Provide cable tray in approximate location and general routing as shown on drawings.

.2 Cable trays are usually installed in the false ceiling space of hallways and located to keep conduit lengths to a minimum. When raceway is not installed in a readily accessible false ceiling space, access hatches will be installed at a nominal spacing of 9m.

.3 Do not route cable tray through Electrical room and Mechanical room spaces.

.4 Locate new cable tray away from existing maintenance openings in the ceiling.

.5 Cable tray may require installation of risers, bends, etc. to adjust tray up or down as well as sideways for the tray routing to fit within limits of space available, and to clear other services, ducts, pipes etc. along the route. Routing may be adjusted somewhat as necessary to enable installation of services under other trades. These field adjustments are to be done at no extra cost to the Owner.

.6 Provide communication cable trays with depth and width as specified. Install 300 mm radius minimum bend kits and all manufacturer fittings required for a complete cable tray system. Provide an allowance for all changes in direction or elevation of the cable tray.

.7 Do not cut the basket tray for cable exit, instead use manufacturer dropout that is designed to be attached to the tray side with the dropout hanging over the tray. Adjust the tray layout such that the dropout enables the cables to be routed directly and fully into entire cross sectional area of the vertical cable managers, GigaBIX cable management modules or false wall. Perimeter basket tray inside the Communications room will be offset at about 250 mm from the wall to the near side of the tray for attachment of tray dropouts to deliver cables into GigaBIX cable management modules and any low voltage wall-mount panels.

.8 Sharp metal edges in cable trays which could cut the cable will be smoothed and the cable dressed away from these edges. Manufacturer surface imperfections will be touched up with a cold galvanizing coating before installing cable.

.9 Connect the new cable tray system to the existing cable tray (if exists). Re-work existing tray ends to suit tie-in.

.10 Cable Tray Installation

.1 The fill ratio for cable tray is 50% at substantial completion of the project. The remaining 50% is reserved for future growth capacity.

.2 Install cable system in accordance with manufacturer's instructions and recognized industry practices, and ensure that the installed system complies with requirements of the "Manufacturer's Cable Tray Installation Guidelines" pertaining to general electrical installation practices. Install cable system using splice connectors, support components, and other accessories by the same manufacturer.

.3 Provide supports for cable tray system at a maximum 1220 mm on centre and at both sides of each tray transition per a given route. Supports will be dual support hangers, trapeze hangers or wall brackets. Trapeze hangers will be supported by structurally approved anchoring system, and will consist of 9.5 mm (maximum size) threaded rod with appropriate hardware (nuts, washers, etc.)

.4 Provide materials necessary to properly support system from existing building constructions per manufacturer's instructions and meeting or exceeding recognized industry practices, and as appropriate for this project. Provide special accessories as required to protect, support and install a cable tray system.

.5 Interface With Other Work:

.1 Field verify route prior to installation.

.2 Coordinate the installation of the cable tray system with other trades.

.3 Do not support from ductwork, piping, or other equipment hangers.

.6 Installation clearances:

.1 Install system a minimum of 1220 mm from any motor.

.2 Install system a minimum of 150 mm from fluorescent light fixtures, or other EMI sources.

.3 Install system a minimum of 250 mm from the adjacent wall, unless otherwise instructed by the Communications Consultant and or the HSSBC NE Representative.

.4 Install system to allow a minimum of 150 mm above, 150 mm in front, and 75mm below of clearance from piping, conduits, ductwork, etc.

.7 Provide cable tray hangers between 150 mm and 305 mm above ceiling grid.

.8 Install tray support hangers between 150 mm and 305 mm above ceiling grid.

3.8 CABLE HANGERS

.1 Install J-Hooks a maximum spacing interval of 1200 mm.

.2 Do not attach the J-Hook to the T-Bar wire support.

3.9 CONDUIT

.1 Zone Conduit System

.1 It is acceptable to install a zoned conduit and pull-box system instead of cable tray in existing and new residential care buildings that do not have a common corridor or accessible ceiling spaces. Consult with the Communications Consultant and or the HSSBC NE Representative to confirm the suitability of a zone conduit system prior to designing and specifying this solution.

.2 When zone conduit is used, install in a minimum 310 mm X 310 mm X 150 mm deep pull-box in each room's ceiling space. Conduit to Communications outlet will be from this pull-box.

.3 A maximum of two (2) outlets may share the same 30 mm conduit of short distribution distance.

.4 Provide pull boxes such that conduit length will not exceed 9m and the number of 90º bends will not exceed two (2).

.2 Unless specified to the contrary in the outlet specification or drawings, each drop conduit or Communications outlet will be connected to the nearest cable tray.

.3 Unless specified to the contrary by the Communications Consultant and or the HSSBC NE Representative, flexible metal and PVC jacketed conduit will can only be used to connect to modular furniture or custom millwork.

.4 All conduits will have sweeping bends with inside radius being no less than six (6) times the internal diameter of the conduit. For conduit 50mm or larger, the bend radius will be no less than ten (10) times the internal conduit diameter. Fittings such as LB type joints are not acceptable.

.5 Provide sweeping 90º bends for conduits where conduits are above cable trays and cables are running from the conduits to cable trays to create a water fall effect to reduce the strain on cables.

.6 When cable trays are used, conduit will be attached to the edge of the tray with a conduit bracket designed for this purpose. If this is not possible, conduit will be stubbed within 150 mm above the tray and terminate in a bonding type bushing.

.7 Install surface conduits on exposed walls where additional outlets are to be installed on existing walls. Install conduits and cables within new walls. In rooms where conduits are exposed, locate them so as not to interfere with the installation of white boards or other obstructions.

.8 All conduit will be fixed to or hung from building structure and will not be fixed to or hung from building services, i.e. ducts, pipes, electrical conduits, sprinkler pipes, etc. Install fastenings and supports at regular intervals as required for each type of equipment, cables and conduits, and in accordance with manufacturer's installation recommendations. Provide and correctly locate all hangers and clips for the installation of all work under this Division. They will be firmly secured to the structure.

.9 The Contractor will use rigid conduit for penetrations through exterior masonry/concrete walls and foundations, concrete floor slabs on grade

.10 Electrical Metallic Tubing (EMT) and Fittings

.1 Electrical metallic tubing (EMT): Will be used to conceal interior low voltage cables where runs are concealed above suspended ceilings, in walls, furred spaces and crawl spaces.

.2 Preparation:

.1 Locations of conduit runs will be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and will not unnecessarily cross other conduits or pipe, nor block access to mechanical or electrical equipment.

.2 Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.

.3 All conduits will be run parallel or at right angles to the centrelines of columns and beams.

.4 Conduits will not be placed closer than 305 mm to a flue, parallel hot water, steam line or other heat producing source or 75 mm from such lines when crossing perpendicular to the runs.

.5 Exposed conduit installation will not encroach into the ceiling height headroom of walkways or doorways. Where possible, install horizontal raceway runs above water and below steam piping.

.6 In long runs of conduit provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 45 m. Support pull boxes from structure independent of conduit supports. These pull boxes are not indicated on the Drawings.

.7 Provide all reasonably inferred standard conduit fittings and products required to complete conduit installation to meet the intended application whether noted, indicated or specified in the Contract Documents or not.

.3 Installation

.1 Install conduit as indicated on Drawings and as specified herein.

.2 Install conduits in complete runs before pulling in cables or wires.

.3 Install conduit free from dents, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.

.4 Conduits will be well protected and tightly covered during construction using metallic bushings and bushing “pennies” to seal open ends.

.5 Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.

.6 Conduit systems will be mechanically and electrically continuous throughout.

.7 Metallic conduit will not be in contact with other dissimilar metal pipes (i.e. plumbing).

.8 Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.

.9 A run of conduit between terminations at wire pulling points will not contain more than the equivalent of two quarter bends (180 deg. total).

.4 Penetrations

.1 Cutting of holes:

.1 Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.

.2 Fire stop: Where conduits pass through fire rated partitions, walls, smoke partitions or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material. Refer to Fire Stop Systems 27 05 29.

.3 Waterproofing: At floor, exterior wall and roof conduit penetrations, completely seal clearances around the conduit and make watertight.

.4 For roof penetrations furnish and install roof flashing, counter flashing and pitch-pockets.

.5 Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane. Conduits that horizontally penetrate a waterproof membrane will fall away from and below the penetration on the exterior side a minimum of two times the conduit diameter.

.5 Terminations and Joints

.1 Use raceway fittings that are of types compatible with the associated raceway and suitable for use at the location.

.2 Raceways will be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.

.3 Conduits will be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to

vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

.4 Conduit terminations exposed at weatherproof enclosures and cast outlet boxes will be made watertight using specified connectors and hubs.

.6 Supports

.1 All raceways systems will be secured to building structures using specified fasteners, clamps and hangers spaced according to the CEC.

.2 Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install “clamp backs” to space conduit off the surface.

.3 Multiple conduit runs will be supported using “trapeze” hangers fabricated from specified construction channel, mounted to 9.5 mm diameter and threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.

.4 Fasteners and supports in solid masonry and concrete:

.1 Use steel or malleable iron concrete inserts set in place prior to placing the concrete.

.5 After concrete installation:

.1 Steel expansion anchors not less than 6 mm bolt size and not less than 28 mm embedment.

.2 Power set fasteners not less than 6 mm diameter with depth of penetration not less than 75 mm.

.3 Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.

.6 Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.

.7 Metal structures: Use stainless steel machine screw fasteners or other devices specifically designed and approved for the application.

3.10 OUTLET BOXES

.1 Preparation

.1 Locate pull boxes and junction boxes in accessible locations.

.2 Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of construction conditions.

.2 Installation

.1 Install boxes as indicated on Drawings and as specified herein.

.2 Do not install outlets back-to-back in wall; and allow a minimum of 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, provided distance does not exceed 3 m, and information is given before installation.

.4 Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.

.5 Install junction or pull boxes where required to limit bends in conduit runs to not more than 180 degrees or where pulling tension achieved will exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.

.6 Leave no unused openings in any box. Install close-up plugs as required to seal openings.

.7 Provide cast metal boxes with gasketed cast metal cover plates where boxes are exposed in damp or wet locations or located in hazardous areas.
.8 Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit directions only. Do not make splices in conduit outlet bodies.
.9 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.
.10 If mounting height of equipment is not specified or indicated, verify with Communications Consultant and or the HSSBC NE Representative before proceeding with the installation.
.11 Communications outlets:
.1 Above finished floors – generally 300 mm, or match mounting height of existing voice/data outlets.
.2 Above counters splash backs - 150 mm.

.3 Supports
.1 Support boxes independently of conduit system.
.2 Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

3.11 PULL BOXES

.1 Pull boxes installed inside accessible ceilings will be within 600 mm of T-bar ceiling grid for ease of access in future.

3.12 SURFACE RACEWAYS INSTALLATION

.1 Install Wiremold raceway where indicated on the drawings for power and Communications outlets.
.2 The surface raceway will parallel building lines and hug ceilings, baseboards, and corners. Raceway length will be kept to a minimum.
.3 The surface raceway base will be mechanically fastened to walls and supporting structures. Use of double-sided tape alone is not acceptable. For non-metallic surface raceway the maximum spacing of fastener is 400 mm. The recommended fasteners are as follow:
.1 Masonry surface – Tapcon masonry type fastener, 6 mm dia.
.2 Dry wall with no stud – Toggler AF “Alligator type” anchor. AF8 or AFG6.
.3 Dry wall with stud – Dry wall screw.
.4 The surface raceway will maintain its integrity when passing through a wall or supporting structure. The raceway cover will be cut 100 mm from either side of the penetration.
.5 Surface raceway extending into the ceiling will connect to the conduit extending from the cable tray with the appropriate fitting or pull box.
.6 When installing surface raceway, manufactured bends and fittings must be used. Installation will be in accordance with the manufacturer's instructions.
.7 Wire clips will be installed in two-piece surface raceway installations at 450 mm centres. Additional wire clips will be used when the raceway is secured to a ceiling or large amounts of cables are installed.
.8 When installing cable in surface raceway, cable fill will not exceed 28%.

END OF SECTION 27 05 28

27 05 29 FIRE STOP SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Requirements
.3 Documents
.4 References
.5 Quality assurance
.6 Training

1.2 REQUIREMENTS

.1 The Contractor will submit to the Communications Consultant and or the HSSBC NE Representative for approval, the following items relating to the fire-stop system:
  .1 HILTI Speed Sleeve manufacturer, or approved alternative, technical data for each product intended to be used on site including product description, specifications and storage requirements.

.2 Firestop design documentation will include a schedule indicating:
  .1 Listed firestop system tested to ULC-S115.
  .2 Number of firestop locations.
  .3 Type of penetration.
  .4 Type of building construction at point of penetration.
  .5 Hourly fire-rating of floors and walls.
  .6 Firestop device or system proposed.
  .7 Installation Procedures and Material Safety Data Sheets will be included with products delivered to the job site.
  .8 Maintenance manuals and maintenance data that may be published by Manufacturer.

1.3 DOCUMENTS

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.4 REFERENCES

.1 CAN/ULC-S115-11, Standard Method of Fire Tests of Through Penetration Fire Stops.
.2 CAN/ULC-S102-M, Standard Test Method for Surface Burning Characteristics of Building Materials.
.3 ASTM E814, Standard Method of Fire Tests of Through-Penetration Fire Stops.
.4 UL 1479, Fire Tests of Through-Penetration Firestops.
.5 UL Fire Resistance Directory: Through Penetration Firestop Devices (XHCR) and Through Penetration Firestop Systems (XNEZ).
.6 ASTM E119, Fire Tests of Building Construction and Materials (for fire-rated architectural barriers).
.7 ASTM G-21, Standard Test for Determining Resistance of Synthetic Polymeric Materials to Fungi.
.8 BICSI - Current Edition, Telecommunications Distribution Methods Manual (TDMM), Chapter 11, Firestopping

.9 Factory Mutual Approval Guide.
.10 ULC List of Equipment and Materials, VOL. II.
.11 Current Canadian Electrical Code
.12 Current BC Building Code
.13 Installed fire stopping systems will meet approval of Local Authorities having jurisdiction.

1.5 QUALITY ASSURANCE

.1 A manufacturer's direct representative (account manager, fire protection specialist, not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
.2 For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's firestop custom detail derived from similar UL system designs or other tests will be submitted to the AHJ for their review and approval prior to installation. Firestop custom detail drawings must follow requirements set forth by the International Firestop Council.
.3 Manufacturer’s fire protection specialist to provide site walk-through report detailing visual review of a random sampling of applications.

1.6 TRAINING

.1 The Contractor must receive training through the Firestop University program offered from HILTI, or approved alternative, and possess current certification prior to installing firestop products.

PART 2 PRODUCTS

2.1 GENERAL

.1 Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  .1 F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
.2 Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  .1 F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  .2 T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  .3 W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
.3 Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
.4 Mould Resistance: Provide penetration firestopping with mould and mildew resistance rating of 0 as determined by ASTM G21.

Hilti Canada

Sealants Firestop products such as FS-One, CP606. CFS-S SIL GG, and CFS-S SIL SL used to seal openings	
Cast in Place **CP 680 M (metal) & P (plastic)** Simple cast-in place device and adaptor for firestopping pipes	
Mortar CP 637 Item No.: 340645 Quick-setting compound for firestopping a wide variety of applications including large penetration openings in floors or walls. **"This is approved for Conduit Penetrations Only"**	
Putty Pads, Sticks & Wraps Firestop sticks, pads and wrap strips used in cable and pipe applications	
Cable Collar CFS-CC 4" Item No.: 2065421 Surface mounted repenetrable solution for cables through walls and floors	
Collars Collars used for firestopping combustible pipes	
Speed Sleeve CP 653-4" Firestop sleeve: Item No.: 00236324 Ready-to-use, one-step cable management firestop device.	

FS 657 Fire Blocks Item No: 2030020 Ready-to-use, Intumescent Flexible Block Based on a Two-Component Polyurethane Foam	
Firestop Plugs **CFS-PL** **Reusable intumescent firestop plug used for small round openings**	

2.2 SPECIFIC REQUIREMENT

.1 For communications rooms, provide the Hilti CP-653-4" speed sleeves in the walls. For riser sleeves, use a combination of Hilti CP 680 cast-in-place firestop devices c/w CP-653-4" speed sleeves inserted into them. Refer to the Hilti Systems drawing.

.2 Refer to Hilti FL3060 system drawing and C-STD-033.3 Cast-in place/Speed sleeve fire stop drawing.

.3 Use the Hilti ganging wall plate when installing 2 or more Hilti Speed sleeves.

2.3 ACCEPTABLE MANUFACTURERS

.1 Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

.1 Hilti, Inc., Tulsa, Oklahoma
800-879-8000
www.us.hilti.com

.2 Provide products from the above acceptable manufacturer; only reviewed and approved alternates can be used as substitutions.

2.4 MATERIALS

.1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

.2 Use only firestop products that have been UL 1479 or ASTM E 814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

.3 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:

.1 Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
.2 Hilti Firestop Sleeve (CFS-SL SK)
.3 Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
.4 Hilti Cable Collar (CFS-CC)
.5 Hilti Gang plate (CFS-SL GP) for use with multiple cable management devices.
.6 Hilti Gang plate Cap (CFS-SL GP CAP) for use at blank openings in gang plate for future penetrations.

.4 Pre-formed, round firestop devices with integrated intumescent strips for use with non-combustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
- .1 Hilti Cast-In Place Firestop Device (CP 680-P) for use with combustible penetrants.
- .2 Hilti Cast-In Place Firestop Device (CP 680-M) for use with non-combustible penetrants.
- .3 Hilti Speed Sleeve (CP 653) for use with cable penetrations.
- .4 Hilti Firestop Drop-In Device (CFS-DID) for use with non-combustible and combustible penetrants.

.5 Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
- .1 Hilti Intumescent Firestop Sealant (FS-ONE)
- .2 Hilti Fire Foam (CP 620)
- .3 Hilti Flexible Firestop Sealant (CP 606)
- .4 Hilti Elastomeric Firestop Sealant (CFS-S SIL GG)

.6 Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles, and plastic pipe, the following products are acceptable:
- .1 Hilti Intumescent Firestop Sealant (FS-ONE)

.7 Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
- .1 Hilti Intumescent Firestop Sealant (FS-ONE)
- .2 Hilti Fire Foam (CP 620)
- .3 Hilti Flexible Firestop Sealant (CP 606)
- .4 Hilti Elastomeric Firestop Sealant (CFS-S SIL GG)

.8 Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
- .1 Hilti Firestop Putty Stick (CP 618)
- .2 Hilti Firestop Plug (CFS-PL)

.9 Wall opening protective materials for use with U.L. listed metallic and specified non-metallic outlet boxes, the following products are acceptable:
- .1 Hilti Firestop Putty Pad (CFS-P PA)
- .2 Hilti Firestop Box Insert

.10 Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
- .1 Hilti Firestop Mortar (CP 637)
- .2 Hilti Firestop Block (CFS-BL)
- .3 Hilti Fire Foam (CP 620)
- .4 Hilti Firestop Board (CP 675T)

.11 Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
- .1 Hilti Firestop Block (CFS-BL)
- .2 Hilti Firestop Board (CP 675T)

.12 For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
- .1 Hilti Firestop Block (CFS-BL)
- .2 Hilti Firestop Plug (CFS-PL)

.13 The Contractor will use firestop materials that have no irritating or objectionable odours, when firestopping occupied areas of existing buildings.

.14 Firestop products used in cross-sectional areas of pathway such as inside sleeves, or cable tray penetrations of fire barriers will be of re-enterable and reusable type to enable future Moves, Additions, or Changes.

PART 3 EXECUTION

3.1 COORDINATION

.1 Firestop systems installed by the Contractor will meet the requirements of all applicable codes and ULC standards.

.2 The Contractor will firestop new Communication pathway and/or cable penetrations of building fire barriers with an approved firestop system, following cable installation.

.3 The Contractor will firestop with an approved firestop system, any holes created by the Work of this Contract.

.4 The Contractor will coordinate all Work with Division 26 and the site's Facilities Maintenance and Operations department.

.5 The Contractor will obtain inspection approval from local Authority Having Jurisdiction (AHJ) and the site's Facilities Maintenance and Operations department and will be responsible for all associated costs.

.6 The Contractor will provide equipment, materials, labour, and services not specifically mentioned or shown which may be necessary to complete or perfect all parts of this installation and in compliance with requirements stated or reasonably inferred by the Contract Documents

3.2 INSTALLATION

.1 The Contractor will select appropriate firestop assembly to suit the type of penetration, and base the selection on criteria specified herein.

.2 Selected firestop systems will not be less than the hourly fire-ratings indicated in the Contract Documents for each respective penetration through fire-rated floor, wall, or other partition of building construction.

.3 Firestop for each type of penetration will conform to manufacturer's firestop design drawings or approved modifications, and meet requirements of an independent testing laboratory.

.4 The Contractor will perform all necessary coordination with trades constructing floors, walls, or other partitions with respect to size and shape of each opening, device, or firestop system approved for use in each instance. Also, the Contractor will resolve any feasibility or obstruction issues.

.5 In areas accessible to public and other "finished" areas, the Contractor will prepare the surface area surrounding firestop penetrations to match finished quality of adjoining surfaces.

.6 The Contractor will provide damming materials, plates, wires, restricting collars, and devices necessary for proper installation of a firestop system.

.7 The Contractor will remove combustible installation aids after firestopping material has cured.

.8 All Firestop assemblies will be installed in accordance with the manufacturer instructions in order to maintain the specific rating assigned by the independent testing laboratory.

.9 The Contractor will remove excess materials and debris and clean adjacent surfaces immediately after application.

3.3 EXISTING PENETRATIONS

.1 In existing buildings, the Contractor will firestop any gaps or cavities between penetrating cable tray, ducts, or sleeves and surrounding surface area.

.2 The Contractor will firestop with an approved firestop system, the following existing penetrations of building fire barriers:

- .1 Existing Communication pathway, cables, or holes that are not firestopped and are within 1 m (3') of new Communication pathway, or cable penetrations of fire barriers.
- .2 Existing Communication cables abandoned by the Work of this Contract.

.3 Firestop assemblies consisting of wrap around individual steel collar sections complete with intumescent putty material that completely surround penetrations, will be used for non-metallic pipes.

3.4 MASONRY POINTING PATTERN

.1 Where firestop systems penetrate masonry barriers, the Contractor will make good surrounding area by replicating original pointing pattern and matching in quality of workmanship.

3.5 INSPECTING AUTHORITIES

.1 The Contractor will remove and expose firestop systems to the extent directed by Inspecting Authority for the purpose of carrying out the inspection.

.2 The Contractor will re-install firestop system and restore any affected building components removed for inspection, at no cost to the Owner.

END OF SECTION 27 05 29

27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 General

1.2 GENERAL

.1 Documents
  .1 This section of the Specification is to be read, interpreted, and coordinated with all other parts of HSSBC Communications Specifications.
.2 Overview
  .1 Before commencing the labelling, the Contractor will supply samples of methods of labelling and materials used for approval by Communications Consultant and or the HSSBC NE Representative.

PART 2 PRODUCTS

2.1 LABELS

.1 Labels for GigaBIX termination hardware.
  .1 Labels are supplied in sheets:

White	LAN, PBX, Multiplexer
Green label	Entry connect
Blue label	Horizontal
Purple label	1st level Backbone
Grey label	2nd level Backbone
Brown label	Inter-building

SUBSTITUTES ARE NOT ACCEPTED

  .2 Colour scheme for jacks: Black.
  .3 Colour scheme for faceplates: match colour of electrical faceplate.

.2 Cable label for indoor cable and indoor/outdoor Interlocking armoured type fiber optic cables,
  .1 Label type for cable labels: Labels will be pre-cut for quick and easy application.
  .2 Labels will be in self-adhesive polyester or non-adhesive polyester (depending on label type).
.3 Fiber Optic Cable label for marking cables inside outdoor pull-boxes and manholes.
  .1 Self-Laminating Rigid Vinyl equal to: Panduit Part # PST-FO

PART 3 EXECUTION

3.1 INSTALLATION

.1 All Communications rooms will be assigned a unique alpha-numeric ID number. The number will be displayed in the form of a lamacoid label supplied by the Contractor. Each character will be 50 mm high x 40mm wide permanent Blue digits on a Yellow background. The Contractor will install the lamacoid. The exact placement will be highly visible on top of cable termination wall in the Communications rooms.

.2 Unless specified otherwise, designation labels on outlet plates will be machine-printed on tape and inserted in the top and bottom label windows of faceplates, as detailed in these and related specifications. Alternate methods must be submitted to the Communications Consultant and or the HSSBC NE representative for approval. Lamacoid labels will not be accepted.

.3 After terminating and identifying a Communications cable, each cable will be identified with a unique cable number, as detailed in these and related specifications. A sample database sheet for cable identification is included in Appendix A. The Contractor will use the sample database format to populate cable information without any modification and provide one database file in same format for each building.

.4 All backbone fiber optic cables after exiting conduits will be labelled every 3 meters along the exposed section as well as within 1 meter of each side of a wall or floor slab the cable passes through. Identify destination and originating Communications room number on each wrap around cable label.

.5 Labelling will conform to standard faceplate drawing. Refer to C-STD drawings in 27 00 00.

.6 AMP Netconnect or Belden label strips or equal will be approved by the Communications Consultant and or the HSSBC NE Representative. The Contractor will label each outlet with 9 mm high black on white mechanical label.

.7 Unless specified otherwise, all labels will be machine-printed. Brother "P-touch" electronic labelling system, or equal approved by the Communications Consultant and or the HSSBC NE Representative. Hand-lettered labels will not be accepted.

.8 Distribution terminals will use standard TIA colour coding on all terminations as follows:
Green = Termination of network connection on the customer side of the demarcation point.
White/Silver = Termination of cables originating from common equipment (PBXs, computers, LANs and multiplexers).
Brown = Inter-building Backbone.
Purple = First-level Backbone. Riser/Backbone and between Communications rooms.
Blue = Stations served directly from closets, i.e. horizontal wiring.
Grey = Second-level Backbone.

.1 Faceplate Work Area (see attached)

.2 Faceplates will have the following labels:

.1 Alpha-numeric ID of Communications room at top label window of faceplate e.g. NCC-01A.

.2 Architectural room number of Communications room at bottom of faceplate e.g. 1008.

.3 Jack ID directly above or below jack e.g. R1P1-01, R1P1-02.

.9 Communications Rooms

.1 EF/MER/TR Communications Room ID Assignments

.2 All Communications rooms will have unique alpha numeric numbers assigned, example - “NCC-01A”. The numbers and not the background will be 50 mm high x 40 mm wide engraved on lamacoid in permanent Blue on Yellow background. It will be placed on a visible location at the top of the GigaBIX wall whenever feasible and secured with screws at four corners. Contractor will label Communications room in

consultation with NE and Facilities Maintenance and Operations and in accordance with the following format:

B1A will be basement level – representing 1st Communications room.
01A will be 1st floor level – representing 1st Communications room.
02A will be 2nd floor level – representing 1st Communications room.
03A will be 3rd floor level – representing 1st Communications room.
03B will then be the 3rd floor level – representing 2nd Communications room.

Label the MER with the appropriate floor number and the letter A. Then assign letters B, C etc. to the TR Communications rooms on the same floor starting at the MER and moving in sequence. On each successive floor, label the Communications room located directly above the MER with the letter A and then label the remaining local Communications rooms on that floor in sequence accordingly to the established flow.

.10 Patch Cable and Icon Colours
- .1 All Copper patch cables will be Grey.
- .2 Black is avoided as they get mixed up with power cords and are tough to see in the black cabinets.

.11 Communications Racks
- .1 Communications racks will be labelled at the top middle of the rack frame on the front as R1. The second rack will be labelled as R2 and so on.
- .2 The numbers and not the background will be 50 mm high x 40 mm wide engraved on lamacoid in permanent White on Black background.

.12 UTP Horizontal Cable
- .1 Communications horizontal cables will be identified at each termination end with a unique number at the faceplate (outlet jack), at the patch panel and on both ends of the cable jacket.

  Patch Panel in TR (originating end)

  i.e. NCC-01A-R1P1-01

  NCC Represents combined site/building code in campus setting or standalone building code only.

  NCC-01A Represents MER 1st floor Communications room A.

  R1 Represents Rack #1.

  P1 Represents Panel #1.

  01 Represents Port #1.

  Note:

  The Architectural number of the destination room will be added to the associated port on the front of the patch panel.

.13 Backbone Cabling
- .1 Provide a cable label every 10 m along the entire run of backbone cable as well as within 1 m of both sides of any wall and floor penetrations. Use wrap around labels inside a building. Note: This also applies to the inner duct for fiber when it is exposed inside a building.
  - .1 Label can be arranged in two lines with the following format example: SBBL-01A - SBAL-01A
  - .2 Size of Font is to be as maximum possible, depending on the diameter of the cable.
- .2 Voice Riser Copper
  - .1 The first GigaBIX mount on the lower half of the GigaBIX field will be reserved for Entrance cables.

.2 When the Contractor has been instructed to install multiples of 25 pair CAT. 3 UTP cable in the Riser/Backbone from MER to each of the TR's, these Backbone cables will be identified at both ends and on the GigaBIX designation strips.

.1 On the GigaBIX designation strip, the Riser/Backbone cable number will appear sequentially starting at "V1-001" at the top left-hand corner of the second GigaBIX mount (lower half of the GigaBIX wall). Next mount will continue the sequence. A spare mount will be installed for growth.

i.e. NCC-01A/NCC-02A-V1(1-100).

NCC-01A	Represents from MER 1st floor Communications room A.
NCC-02A	Represents to TR 2nd floor Communications room A.
V1	Represents first voice Backbone cable.
1–100	Represents cable pairs 1 to 100 within cable V1.

.3 Voice tie cables (25 pair bundles) from the rack to the GigaBIX will be terminated on 24-port patch panels and label as VP1, VP2, etc. in the rack and will appear sequentially starting at the top left-hand corner of the first mount (upper half of the GigaBIX wall). Next mount will continue the sequence. A spare GigaBIX mount will be reserved for growth.

.4 Voice Patch Panel label

i.e. NCC-01A-R1VP1-01

NCC-01A	Represents MER 1st floor Communications room A.
R1	Represents Rack #1.
VP1	Represents Voice Panel #1.
01	Represents Port #1.

GigaBIX Designation Strip Label

i.e. NCC-01A-R1VP1(1-25)
NCC-01A-R1VP2(1-25)
NCC-01A-R2VP1(1-25)
NCC-01A-R2VP2(1-25)

.3 Fiber

.1 When the Contractor has been instructed to install OM4 Multimode fiber cable from the MER to each TR, each end of the cable and termination panel will be labelled with a unique number. For example:

Fiber Cable Label

i.e. NCC-01A-R1FP1-F1/NCC-02A-R1FP1-F1(OM4)

NCC-01A-R1FP1	Represents from MER 1st floor Communications room A, Rack1, Fiber Panel 1.
NCC-02A-R1FP1	Represents to TR 2nd floor Communications room A, Rack1, Fiber Panel 1.
F1	Represents Fiber cable #1.
(OM4)	Represents OM4 fiber.

Fiber Panel Label

i.e. NCC-01A-R1FP1

NCC-01A	Represents MER 1st floor Communications room A.
R1	Represents Rack 1.
FP1	Represents Fiber Panel 1.

.14 Telecommunications Ground

.1 Bonding conductors will be identified on both ends of the conductors, with data plate cable marker completed with double straps, to indicate where the destination end of the conductor is located.
TBB Cable Label
SBBL-01A-TMGB/SBBL-04A-TGB
Bonding Conductor from Busbar to and Object
SBBL-01A-TMGB/Object e.g. building steel, cable trays, etc. at both ends prior to conductor routed into its termination.

.2 Label TBB every 6 m and within 1 m of both sides of any wall and floor penetrations with the description: “Communications Ground Only” The lettering size is 6 mm white on green background.

.3 Examples of Telecommunications Ground Bar Labelling
TMGB Busbar Label
SBBL-01A-TMGB
TGB Busbar Label
SBBL-01B-TGB

.15 Communications Conduits, Pull Boxes and Junction Boxes

.1 Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme will be determined by the Authority at a later date. Provide all power and communication systems with unique colours in accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands (using either spray paint or coloured duct tape) at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway).

.2 Colour-code all junction boxes using spray paint on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations.

END OF SECTION 27 05 53

27 08 11 TESTING FOR COMMUNICATIONS FIBER, CATEGORY 3

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Overview
.3 Testing
.4 Test Results Documentation
.5 Work Included
.6 Fiber Quality Assurance

1.2 OVERVIEW

.1 Test equipment will be approved by the Communications Consultant and or the HSSBC NE Representative in writing before it can be used to test the structured cabling systems.
.2 Final details of all test parameters, scope, and methodology to be performed by the Contractor, as described in this section, will be verified with the Communications Consultant and or the HSSBC NE Representative.
.3 All terminations will be completed and all Communications equipment installed before the tests are performed.
.4 The installation will be tested in the presence of the Communications Consultant and or the HSSBC NE Representative when requested.

1.3 TESTING

.1 The maximum fiber optic connector loss allowable is 0.5 dB
.2 Measured results will be within HSSBC's maximum loss budget calculations. Correct improper splices and replace damaged cables or connectors at no cost to the Owner.

1.4 TEST RESULTS DOCUMENTATION

.1 Test results saved within the field-test instrument will be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records will be uploaded to the PC unaltered, i.e., "as saved in the field-test instrument". For the purposes of review only, the contractor will transfer field test results into a spreadsheet. The connector loss at both ends of the fiber link along with the fiber strand loss will be used by the Communications Consultant and or the HSSBC NE Representative to determine pass or fail. The OTDR test results will be used to determine whether each connector of a fiber link is within the maximum of 0.5 dB loss level.
.2 The database for the complete project, including twisted-pair copper cabling links, if applicable, will be stored and delivered on USB key prior to Owner acceptance of the building. This USB key will include the software tools required to view, inspect, and print any selection of the test reports.
.3 Circuit IDs reported by the test instrument will match the specified label ID.
.4 The detailed test results documentation data is to be provided in an electronic database for each tested optical fiber and will contain the following information:
  .1 The identification of the customer site as specified by the end-user.
  .2 The name of the test limit selected to execute the stored test results.

.3 The name of the personnel performing the test.
.4 The date and time the test results were saved in the tester's memory.
.5 The manufacturer, model and serial number of the field-test instrument.
.6 The version of the test software and the version of the test limit database held within the test instrument.
.7 The fiber identification number.
.8 The length for each optical fiber.
.9 Optionally the index of refraction used for length calculation when using a length capable OLTS.
.10 Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).
.11 Test results to include OTDR link and channel traces, tables at the appropriate wavelength(s).
.12 The length for each optical fiber as calculated by the OTDR.
.13 The overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements.

1.5 WORK INCLUDED

.1 Provide all labour, materials, tools; field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
.2 In order to conform to the overall project event schedule, the cabling contractor will monitor work progress and coordinate cable testing with other applicable trades.
.3 In addition to the tests detailed in this document, the contractor will notify the Communications Consultant and or the HSSBC NE Representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor will carry out and record any additional test results at no additional charge.

1.6 FIBER QUALITY ASSURANCE

.1 All testing procedures and field-test instruments will comply with applicable requirements of:
.1 ANSI Z136.2, ANS for Safe Use of Optical Fiber Communications Systems Utilizing Laser Diode and LED Sources.
.2 ANSI/TIA-455 50B, Light Launch Conditions for Long-Length Graded-Index Optical Fiber Spectral Attenuation Measurements.
.3 ANSI/TIA-455-59A, Measurement of Fiber Point Discontinuities Using an OTDR.
.4 ANSI/TIA-455 60A, Measurement of Fiber or Cable Length Using an OTDR.
.5 ANSI/TIA-455 61A, Measurement of Fiber or Cable Attenuation Using an OTDR.
.6 ANSI/TIA-526-7, Optical Power Loss Measurements of Installed Single-mode Fiber Cable Plant.
.7 ANSI/TIA-526-14A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
.8 ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard, Part 1, General Requirements.
.9 ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard.
.10 ANSI/TIA-TSB-140, Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
.11 ANSI/TIA-606B, Administration Standard for Commercial Telecommunications Infrastructure, including labelling requirements specified by HSSBC.

.2 Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof will be allowed to execute the tests. These must be issued by any of the following organizations or an equivalent organization:
  .1 Manufacturer of the Fiber optic cable and/or the Fiber optic connectors.
  .2 Manufacturer of the test equipment used for the field certification.
  .3 BICSI and its authorized training partners.

.3 The Communications Consultant and or the HSSBC NE representative will be invited to witness and/or review field-testing.
  .1 The Communications Consultant and or HSSBC NE representative will be notified of the start date of the testing phase five (5) business days before testing commences.
  .2 The Communications Consultant and or HSSBC NE representative will select a random sample of 5% of the installed links. The Communications Consultant and or the HSSBC NE Representative will witness the testing of these randomly selected links and the results are to be stored in accordance with this document. The results obtained will be compared to the original data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the Communications Consultant and or the HSSBC NE Representative will repeat 100% testing at no cost to the Owner.

PART 2 PRODUCTS

2.1 OPTICAL FIBER CABLE TESTERS

.1 The field-test instrument will be within the calibration period (12 months) recommended by the manufacturer.

.2 Optical loss test set (OLTS).
  .1 Multimode optical fiber light source
    .1 Provide dual LED light sources with central wavelengths of 850 nm (±30 nm) and 1300 nm (±20 nm).
    .2 Output power of –20 dBm minimum.
    .3 The light source will meet the launch requirements of ANSI/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause E.7 of ANSI/TIA-568-C.0) with a Category 1 light source.
    .4 Acceptable manufacturers
      .1 Fluke Networks.
  .2 Singlemode optical fiber light source
    .1 Provide dual laser light sources with central wavelengths of 1310 nm (±20 nm) and 1550 nm (±20 nm).
    .2 Output power of –10 dBm minimum.
    .3 Acceptable manufacturers
      .1 Fluke Networks.
  .3 Power Meter
    .1 Provide 850 nm, 1300/1310 nm, and 1550 nm wavelength test capability.
    .2 Power measurement uncertainty of ± 0.25 dB.
    .3 Store reference power measurement.
    .4 Save at least 100 results in internal memory.
    .5 PC interface (serial or USB).

.6 Acceptable manufacturers
.1 Fluke Networks.

2.2 OPTICAL TIME DOMAIN REFLECTOMETER (OTDR)

.1 Multimode OTDR
.1 Wavelengths of 850 nm (± 10 nm) and 1300 nm (± 15 nm).
.2 Event dead zones of 0.5 m typical at 850 nm and 0.7 m typical at 1300 nm.
.3 Attenuation dead zones of 2.2 m typical at 850 nm and 4 m typical at 1300 nm.
.4 Distance range not less than 8 km at 850 nm and 35 km at 1300 nm.
.5 Dynamic range 28 dB typical at 850 nm and 1300 nm.

.2 Singlemode OTDR
.1 Wavelengths of 1310 nm (± 25 nm) and 1550 nm (± 30 nm).
.2 Event dead zones of 0.6 m maximum at 1310 nm and 1550 nm.
.3 Attenuation dead zones of 4 m typical at 1310 nm and 1550 nm.
.4 Distance range not less than 130 km at 1550 nm and 80 km at 1310 nm.
.5 Dynamic range 30 dB typical at 1310 nm and 1550 nm.
.6 Acceptable manufacturers
.1 Fluke Networks.

.3 Fiber Microscope
.1 Magnification of 200X or 400X for end-face inspection
.2 Acceptable manufacturers
.1 Fluke Networks.

PART 3 EXECUTION

3.1 FIBER TESTING SCOPE

.1 Initially test every fiber strand within the Fiber optic cable with a light source and power-meter utilizing procedures as stated in ANSI/TIA -526-14-B, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant, and ANSI/TIA-526-7 (currently Standard Proposal Number 2974-B): OFSTP-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant. Measured results will be within manufacturers' cable and HSSBC's loss budget calculations. If loss figures are outside this range, test cable again with Optical Time Domain Reflectometer (OTDR) to determine cause of variation. Correct improper splices and replace damaged cables or connectors at no cost to the Owner.
.1 This includes testing the attenuation and polarity of the installed cable plant with an optical loss test set (OLTS) and the installed condition of the cabling system and its components with an optical time domain reflectometer (OTDR). The condition of the fiber end faces will also be verified.

.2 Testing will be performed on each cabling link (connector to connector).

.3 Testing will be performed on each cabling channel (equipment to equipment) that is identified by the Communications Consultant and or the HSSBC NE Representative where required.

.4 Testing will not include any active devices or passive devices within the link or channel other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

.5 All tests will be documented including OLTS dual wavelength attenuation measurements for multimode and singlemode links and channels and OTDR traces and tables for multimode and singlemode links and channels.

.6 Field-test instruments will have the latest software and firmware installed.

.7 Link and channel test results from the OLTS and OTDR will be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative (reports) may be generated.

.8 Fiber end faces will be inspected at 250X or 400 X magnifications. 250X magnification will be used for inspecting multimode and single-mode fibers. 400X magnification will be used for detailed examination of single-mode fibers. Scratched, pitted or dirty connectors will be diagnosed and replaced at no cost to the Owner.

.9 It is mandatory that the end face images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.

.10 Testing of the cabling will be performed using high-quality test cords of the same Fiber type as the cabling under test. The test cords for OLTS testing will be between 1 m and 5 m length. The test cords for OTDR testing will be approximately 100 m for the launch cable and at least 25 m for the receive cable.

.11 All tests performed on optical fiber cabling that use a laser or LED in a test set will be carried out with safety precautions in accordance with ANSI Z136.2.

.12 All outlets, cables, patch panels and associated components will be fully assembled and labelled prior to field-testing. Any testing performed on incomplete systems will be redone on completion of the work. The following test parameters will be adhered to:

- .1 Multimode fiber optic cables will be tested at 850 nm and 1300 nm.
- .2 Single-mode fiber optic cables will be tested at 1310 nm and 1550 nm.
- .3 Testing procedures will utilize “Method B” – one jumper reference.
- .4 Bi-directional testing of optical Fibers is required.
- .5 Test every strand of fiber with an OTDR.
- .6 Fiber links will be tested with test equipment based on laser light sources categorized by a Coupled Power Ratio (CPR) of Category 2, under filled, as per IEC 60825-2.
- .7 This rule will be followed to support Gigabit Ethernet applications. Gigabit
- .8 Ethernet only specifies laser light sources and not LED (light emitting diode) light sources. Field test equipment based on LED light sources is a Category 1 device as per IEC 60825-2 and typically yields high attenuation results.
- .9 For Gigabit Ethernet compliant certification (IEEE std 802.3z application), use Test equipment which uses a VCSEL (Vertical Cavity Surface Emitting Laser) at 850 nm (compliant with 1000BASE-SX) and an FP laser at 1310 nm (compliant with 1000BASELX).

3.2 TESTING CAT 3 INSTALLATION

.1 Multi-pair Category 3 backbone cable testing will consist of testing each cable pair for opens, shorts, grounds, crosses and pair reversal. Examine any faulty pairs and correct the problem if it is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets. Replace any damaged or faulty cables, or connectors at no cost to the Owner.

.2 Category 3 Intra and Inter backbone cable testing will consist of testing each cable pair for opens, shorts, grounds and pair reversal. Examine any open and shorted pairs to determine if the problem is caused by improper termination. If termination is improper, tag bad pairs at both ends and note on termination sheets.

.3 The test results will be submitted to Communications Consultant and or the HSSBC NE Representative upon completion of testing the installed cables.

3.3 ACCEPTANCE OF FIBER TEST RESULTS

.1 Unless otherwise specified by the Communications Consultant and or HSSBC NE Representative, each cabling link will be in compliance with the following test limits:
- .1 Optical loss testing
  - .1 Multimode and Singlemode links
    - .1 The link attenuation will be calculated by the following formulas as specified in ANSI/TIA-568-C.0.
      - .1 Link Attenuation (dB) = Cable_Attn (dB) + Connector_Attn (dB) + Splice_Attn (dB)
      - .2 Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)
      - .3 Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
      - .4 Maximum allowable connector loss = 0.50 dB
      - .5 Splice_Attn (dB) = number_of_splices * splice_loss (dB)
      - .6 Maximum allowable splice_loss = 0.3 dB
      - .7 The values for the Attenuation_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5	1300	1.5
Multimode 50/125 µm	850	3.5	1300	1.5
Single-mode (Inside plant)	1310	1.0	1550	1.0
Single-mode (Outside plant)	1310	0.5	1550	0.5

.2 OTDR testing
- .1 Reflective events (connections) will not exceed 0.5 dB.
- .2 Non-reflective events (splices) will not exceed 0.3 dB.
- .3 Fiber links will be tested at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
- .4 Multimode: 850 nm and 1300 nm
- .5 Singlemode: 1310 nm and 1550 nm
- .6 Each fiber link and channel will be tested in both directions.
- .7 A launch cord will be installed between the OTDR and the first link connection.
- .8 A tail cord will be installed after the last link connection

.3 Magnified end-face inspection
- .1 Fiber connections will be visually inspected for end-face quality.
- .2 Scratched, pitted or dirty connectors will be diagnosed and corrected.

.4 All installed cabling links and channels will be field-tested and pass the test requirements and analysis. Any link or channel that fails these requirements will be diagnosed and corrected. Any corrective action that must take place will be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels will be provided in the test results documentation.

.5 Acceptance of the test results will be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Communications Consultant and or the HSSBC NE Representative.

END OF SECTION 27 08 11

27 08 11.01 TESTING FOR HORIZONTAL CATEGORY 6 AND 6A

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Work included
.3 Scope
.4 Quality assurance
.5 Submittals
.6 Acceptance of test results

1.2 WORK INCLUDED

.1 Provide all labour, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of a Horizontal Category 6 or 6A cabling system.
.2 The cabling contractor will survey the work areas and coordinate cabling testing with other applicable trades.
.3 In addition to the tests detailed in this document, the contractor will notify the Communications Consultant and or the HSSBC NE Representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor will carry out and record any additional measurement results at no additional charge.

1.3 SCOPE

.1 This Section includes the minimum requirements for the test certification of horizontal Category 6 and 6A balanced twisted pair cabling.
.2 This Section includes minimum requirements for:
  .1 Copper cabling test instruments
  .2 Copper cabling testing
  .3 Administration
    .1 Test results documentation
    .2 As-built drawings
.3 Testing will be carried out in accordance with this document.
.4 Testing will be performed on each cabling link. (100% testing)
.5 All tests will be documented.

1.4 QUALITY ASSURANCE

.1 All testing procedures and field-test instruments will comply with applicable requirements of:
  .1 ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  .2 ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.
  .3 ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
  .4 ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
  .5 ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by HSSBC.

.2 Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof will execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
- .1 Manufacturer of the connectors or cable.
- .2 Manufacturer of the test equipment used for the field certification.
- .3 Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas).

.3 The Communications Consultant and or the HSSBC NE representative will be invited to witness and/or review field-testing.
- .1 The Communications Consultant and or HSSBC NE representative will be notified of the start date of the testing phase five (5) business days before testing commences.
- .2 The Communications Consultant and or the HSSBC NE representative will select a random sample of 5% of the installed links. The Communications Consultant and or the HSSBC NE Representative will witness the testing of these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained will be compared to the original data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the Communications Consultant and or the HSSBC NE Representative will repeat 100% testing at no cost to the Owner.

1.5 SUBMITTALS

.1 Refer to Section 27 05 00.

1.6 ACCEPTANCE OF TEST RESULTS

.1 Unless otherwise specified by the Owner or the Owners representative, each Category 6Acabling link will be in tested for:
- .1 Wire Map
- .2 Length
- .3 Propagation Delay
- .4 Delay Skew
- .5 DC Loop Resistance – recorded for information only
- .6 DC Resistance Unbalance – recorded for information only
- .7 Insertion Loss
- .8 NEXT (Near-End Crosstalk)
- .9 PS NEXT (Power Sum Near-End Crosstalk)
- .10 ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
- .11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
- .12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
- .13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
- .14 Return Loss
- .15 TCL (Transverse Conversion Loss) – recorded for information only
- .16 ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only
- .17 PS ANEXT (Power Sum Alien Near-End Crosstalk) – sampled per section 3.2
- .18 Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk) – sampled per section 3.2

.19 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) – sampled per section 3.2
.20 Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End) – sampled per section 3.2

.2 Unless otherwise specified by the Owner or the Owners representative, each Category 6 cabling link will be in tested for:
.1 Wire Map
.2 Length
.3 Propagation Delay
.4 Delay Skew
.5 DC Loop Resistance – recorded for information only
.6 DC Resistance Unbalance – recorded for information only
.7 Insertion Loss
.8 NEXT (Near-End Crosstalk)
.9 PS NEXT (Power Sum Near-End Crosstalk)
.10 ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
.11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
.12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
.13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
.14 Return Loss
.15 TCL (Transverse Conversion Loss) – recorded for information only
.16 ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only

.3 All installed cabling Permanent Links will be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements will be diagnosed and corrected. Any corrective action that must take place will be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links will be provided in the test results documentation in accordance with Part 3.

.4 Acceptance of the test results will be given in writing after the project is fully completed and tested to the satisfaction of the Owner.

PART 2 PRODUCTS

2.1 PRODUCTS

.1 Balanced twisted-pair CABLE Testers
.1 The field-test instrument will be within the calibration period recommended by the manufacturer, typically 12 months.
.2 Certification tester
.1 Accuracy
.1 Level IIIe accuracy in accordance with ANSI/TIA-1152
.2 Independent verification of accuracy
.3 Acceptable manufacturers
.1 Fluke Networks
.2 Permanent Link Adapters
.1 RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568-C.2 Annex C

.2 Twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures

.3 Results Storage

.1 Must be capable of storing > 10,000 results for all measurements found in 2.1.B.4 below

.4 Measurement capabilities

.1 Wire Map
.2 Length
.3 Propagation Delay
.4 Delay Skew
.5 DC Loop Resistance
.6 DC Resistance Unbalance
.7 Insertion Loss
.8 NEXT (Near-End Crosstalk)
.9 PS NEXT (Power Sum Near-End Crosstalk)
.10 ACR-N (Attenuation to Crosstalk Ratio Near-End)
.11 PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
.12 ACR-F (Attenuation to Crosstalk Ratio Far-End)
.13 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
.14 Return Loss
.15 TCL (Transverse Conversion Loss)
.16 ELTCTL (Equal Level Transverse Conversion Transfer Loss)
.17 Time Domain Reflectometer
.18 Time Domain Xtalk Analyser
.19 PS ANEXT (Power Sum Alien Near-End Crosstalk)
.20 Average PS ANEXT (Average Power Sum Alien Near-End Crosstalk)
.21 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End)
.22 Average PS AACR-F (Average Power Sum Alien Attenuation to Crosstalk Ratio Far-End)

.3 PC Software

.1 Windows® based.
.2 Must show when 3 dB and 4 dB rules are applied
.3 Re-certification capability, where results must have their Cable IDs suffixed with (RC).
.4 Built in PDF export – no additional third party software permitted.
.5 Built-in statistical analysis.

PART 3 EXECUTION

3.1 GENERAL

.1 All outlets, cables, patch panels and associated components shall be fully assembled and labelled prior to field-testing. Any testing performed on incomplete systems will be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

.1 Field-test instruments will have the latest software and firmware installed.

.2 Permanent Link test results including the individual frequency measurements from the tester will be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.

.3 Permanent Link testing will be performed on each cabling segment (connector to connector). Sampling is not acceptable.

.4 Alien Crosstalk testing will be performed using a sampling plan. An acceptance quality level (AQL) of 0,4 %, normal inspection, general inspection level I as defined in ISO 2859-1 for populations of up to 500,000 links will be used. The following table represents this sampling level.

Installation size (No. of total links)	Sample size (No. of links to test)
3 – 33	100%
34 – 3,200	33
3,201 – 35,000	126
35,001 – 150,000	201
150,001 – 500,000	315

Disturbed (Victim) links chosen for Alien Crosstalk testing will be an equal combination of short, medium and long links.

.5 Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

.6 The installer will build a reference link. All components will be anchored so it is not possible to disturb them. The technician is to conduct a Category 6A Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.

.7 Wire Map Measurement

.1 The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:

.1 Continuity to the remote end
.2 Shorts between any two or more conductors
.3 Reversed pairs
.4 Split pairs
.5 Transposed pairs
.6 Distance to open on shield
.7 Any other miss-wiring

.2 The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568-C.2. T568A will be used. The field tester will use this colour scheme.

.8 Length Measurement

.1 The length of each balanced twisted pair will be recorded.

.2 Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay will be reported and used for making the pass or fail determination.

.3 The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568-C.2 plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

.9 Propagation Delay measurement is the time it takes for a signal to reach the end of the link.
- .1 The measurement will be made at 10 MHz per ANSI/TIA-1152.
- .2 The propagation delay of each balanced twisted pair will be recorded.
- .3 Is not to exceed 498 ns per ANSI/TIA-568-C.2 Section 6.3.18.

.10 Delay Skew measurement is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
- .1 The delay skew of each balanced twisted pair will be recorded.
- .2 Is not to exceed 44 ns per ANSI/TIA-568-C.2 Section 6.3.19.

.11 DC Resistance
- .1 Often reported as Resistance, is the loop resistance of both conductors in the pair.
- .2 Is not specified in ANSI/TIA-1152, but will be recorded for all four pairs.

.12 DC Resistance Unbalance
- .1 Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
- .2 Is not specified in ANSI/TIA-1152 for a Permanent Link, but will be recorded for all four pairs.

.13 Insertion Loss is the loss of signal strength over the cabling (in dB).
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .2 Worst case will be reported for all four pairs in one direction only.
- .3 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).
- .4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.7.

.14 NEXT (Near-End Crosstalk) is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
  - .5 Will be measured in both directions. (12 pair to pair possible combinations)
  - .6 Both worst case and worst margins will be reported.
  - .7 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.8.
  - .8 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).
  - .9 The Time Domain Xtalk data will be stored for any marginal or failing NEXT results.

.15 PS NEXT (Power Sum Near-End Crosstalk) is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .2 Will be measured in both directions. (8 pair possible combinations)
- .3 Both worst case and worst margins will be reported.

.4 Is not to exceed the Category 6 and 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.9.
.5 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).
.6 The Time Domain Xtalk data will be stored for any marginal or failing PS NEXT results.

.16 ACR-N (Attenuation Crosstalk Ratio Near-End) is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
.1 The frequency resolution will be:
.1 1 – 31.25 MHz: 150 kHz
.2 31.25 – 100 MHz: 250 kHz
.3 100 – 250 MHz: 500 kHz
.4 250 – 500 MHz: 1000 kHz
.2 Will be calculated in both directions.
.3 Is not specified in ANSI/TIA-1152, but will be recorded for all 12 possible combinations.

.17 PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End) is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
.1 The frequency resolution will be:
.1 1 – 31.25 MHz: 150 kHz
.2 31.25 – 100 MHz: 250 kHz
.3 100 – 250 MHz: 500 kHz
.4 250 – 500 MHz: 1000 kHz
.2 Will be calculated in both directions.
.3 Is not specified in ANSI/TIA-1152, but will be recorded for all 8 possible combinations.

.18 ACR-F (Attenuation Crosstalk Ratio Far-End) is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
.1 The frequency resolution will be:
.1 1 – 31.25 MHz: 150 kHz
.2 31.25 – 100 MHz: 250 kHz
.3 100 – 250 MHz: 500 kHz
.4 250 – 500 MHz: 1000 kHz
.2 Will be measured in both directions. (24 pair to pair possible combinations)
.3 Both worst case and worst margins will be reported.
.4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.11.
.5 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).

.19 PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End) is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.
.1 The frequency resolution will be:
.1 1 – 31.25 MHz: 150 kHz
.2 31.25 – 100 MHz: 250 kHz
.3 100 – 250 MHz: 500 kHz
.4 250 – 500 MHz: 1000 kHz
.2 Will be measured in both directions. (8 pair possible combinations)
.3 Both worst case and worst margins will be reported.
.4 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.13.
.5 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).

.20 Return Loss is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .2 Will be measured in both directions. (8 pair possible combinations)
- .3 Both worst case and worst margins will be reported.
- .4 Will be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
- .5 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.6.
- .6 Reported margins found to be within the accuracy of the field tester will be marked with an asterisk (*).
- .7 The Time Domain Reflectometer data will be stored for any marginal or failing Return Loss results.

.21 TCL (Transverse Conversion Loss) is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .2 Will be measured in both directions.
- .3 Is not specified in ANSI/TIA-1152 for a Permanent Link, but will be recorded for all 8 possible combinations.

.22 ELTCTL (Equal Level Transverse Conversion Transfer Loss) is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
- .1 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .2 Will be measured in both directions.
- .3 Is not specified in ANSI/TIA-1152 for a Permanent Link, but will be recorded for all 8 possible combinations.

.23 PS ANEXT (Power Sum Alien Near-End Crosstalk) (Category 6A)
- .1 Takes into account the combined alien crosstalk (statistical) on a receive pair from all external near-end disturbers operating simultaneously.
- .2 The frequency resolution will be:
  - .1 1 – 31.25 MHz: 150 kHz
  - .2 31.25 – 100 MHz: 250 kHz
  - .3 100 – 250 MHz: 500 kHz
  - .4 250 – 500 MHz: 1000 kHz
- .3 The disturbed (victim) link will have links to the left and right of it and if present, links above and below it.
- .4 Disturber cables will include all links within the same bundle as the disturbed (victim) link and adjacent links

.5 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it will be measured from the patch panel end only.

.6 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.21.

.24 Average PS ANEXT (Power Sum Alien Near-End Crosstalk) (Category 6A) is calculated by averaging the individual PSANEXT loss values, in dB, for all four pairs in the disturbed (victim) link.

.1 The frequency resolution will be:

.1 1 – 31.25 MHz: 150 kHz

.2 31.25 – 100 MHz: 250 kHz

.3 100 – 250 MHz: 500 kHz

.4 250 – 500 MHz: 1000 kHz

.2 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.22.

.25 PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) (Category 6A)

.1 AFEXT loss is the coupling of crosstalk at the far-end from external link pairs into a disturbed (victim) pair of the 4-pair link under test. PS AACR-F is the calculated power sum from all external pairs into the disturbed (victim) pair.

.2 The frequency resolution will be:

.1 1 – 31.25 MHz: 150 kHz

.2 31.25 – 100 MHz: 250 kHz

.3 100 – 250 MHz: 500 kHz

.4 250 – 500 MHz: 1000 kHz

.3 The disturbed (victim) link will have links to the left and right of it and if present, links above and below it.

.4 Disturber cables will include all links within the same bundle as the disturbed (victim) link and adjacent links

.5 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it will be measured from the patch panel end only.

.6 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.25.

.26 Average PS AACR-F (Power Sum Alien Attenuation to Crosstalk Ratio Far-End) (Category 6A) is calculated by averaging the individual PS AACR-F values, in dB, for all four pairs in the disturbed (victim) link.

.1 The frequency resolution will be:

.1 1 – 31.25 MHz: 150 kHz

.2 31.25 – 100 MHz: 250 kHz

.3 100 – 250 MHz: 500 kHz

.4 250 – 500 MHz: 1000 kHz

.2 The disturbed (victim) link will have links to the left and right of it and if present, links above and below it.

.3 Disturber cables will include all links within the same bundle as the disturbed (victim) link and adjacent links

.4 Should be measured in both directions if the link is patch panel to patch panel. If the link is patch panel to telecommunications outlet, then it will be measured from the patch panel end only.

.5 Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.26.

3.3 ADMINISTRATION

.1 Test results documentation

.1 Test results saved within the field-test instrument will be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records will be uploaded to the PC unaltered, i.e., "as saved in the field-test instrument". The file format, CSV (comma separated value), does not provide adequate protection of these records and will not be used.

.2 Alien Crosstalk measurements will be stored to a PC upon completion of the test.

.3 The test results documentation will be available for inspection by the Communications Consultant and or the HSSBC NE Representative during the installation period and will be passed to the Communications Consultant and or the HSSBC NE Representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer will retain a copy to aid preparation of as-built information.

.4 The database for the complete project, including twisted-pair copper cabling links, if applicable, will be stored and delivered on a USB thumb drive prior to Owner acceptance of the building. This USB thumb drive will include the software tools required to view, inspect, and print any selection of the test reports.

.5 Circuit IDs reported by the test instrument shall match the specified label ID. For Permanent Link testing, the detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and will contain the following information:

.1 The overall Pass/Fail evaluation of the link-under-test
.2 The date and time the test results were saved in the memory of the tester
.3 The identification of the customer site as specified by the end-user
.4 The name of the test limit selected to execute the stored test results
.5 The name of the personnel performing the test
.6 The version of the test software and the version of the test limit database held within the test instrument
.7 The manufacturer, model and serial number of the field-test instrument
.8 The adapters used
.9 The factory calibration date
.10 Wire Map
.11 Propagation Delay values, for all four pairs
.12 Delay Skew values, for all four pairs
.13 DC Resistance values, for all four pairs
.14 DC Resistance Unbalance, values for all four pairs
.15 Insertion Loss, worst case values for all four pairs
.16 NEXT, worst case margin and worst case values, both directions
.17 PS NEXT, worst case margin and worst case values, both directions
.18 ACR-F, worst case margin and worst case values, both directions
.19 PS ACR-F, worst case margin and worst case values, both directions
.20 Return Loss, worst case margin and worst case values, both directions
.21 TCL, worst case values both directions
.22 ELTCTL, worst case values, both directions.
.23 Time Domain Crosstalk data if the link is marginal or fails
.24 Time Domain Reflectometer data if the link is marginal or fails

.6 For Alien Crosstalk testing, the detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and will contain the following information

.1 The overall Pass/Fail evaluation of the link-under-test

.2 The date and time the measurements were made
.3 The identification of the customer site as specified by the end-user
.4 The name of the test limit selected to execute the stored test results
.5 The name of the personnel performing the test
.6 The version of the test software
.7 PS ANEXT, worst case margin for all four pairs
.8 Average PS ANEXT, worst case margin
.9 PS AACR-F, worst case margin for all four pairs
.10 Average PS AACR-F, worst case margin

END OF SECTION 27 08 11.01

27 11 00 COMMUNICATIONS ROOM FITTINGS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Communications Rooms Overview
.3 Communications Room Design

1.2 COMMMUNICATIONS ROOMS OVERVIEW

.1 EF (Entrance Facilities) – The EF is an environmentally controlled space consisting of the pathways(s), space(s), cables, connecting hardware, protection devices and other passive and active equipment that support the access and service provider. For Acute Hospitals, multiple entrance points and route diversity will be provided. Entrance points will be established distant from each other with a minimum separation of 20m, entering the building from two or more different streets. The functions of the EF are:
  .1 Demarcation point between the access and service provider cabling and equipment and the hospital's network infrastructure.
  .2 Electrical protection for inter-building campus backbone and access and service provider cabling. Electrical protection is governed by local electrical codes.
  .3 Connection point between outside plant cabling and building cabling that is accomplished by splicing or other means.

.2 MER (Main Equipment Room) – The MER is to be considered distinct from Telecommunication Rooms (TR) and Telecommunications Enclosures (TE) because of the complexity of the equipment they contain. An MER may alternatively provide any or all of the functions of a TR or TE. The main cross-connect (MC) of a healthcare facility is located in the MER. Intermediate cross-connects (IC), horizontal cross-connects (HC), or both, of a healthcare facility may also be located in the MER. For Acute Hospitals, a minimum of two diverse pathways will be provided between the MER and the EF. The MER is an environmentally controlled space whose functions are to:
  .1 House core telecommunications equipment (determined at the discretion of HSSBC NE based on specific site requirements), connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection apparatus. The MER may also house horizontal terminations for a portion of the facility.
  .2 Contain either the MC or the IC used in the backbone cabling hierarchy.
  .3 Provide for the administration and routing of the equipment cabling, and or cords, from the MC or IC to the telecommunications equipment.

.3 TR (local Telecommunications Room) – The TR is an environmentally controlled space that provides a common access point for pathways, backbone cabling and horizontal cabling. The TR may also contain cabling used for cross-connection. The horizontal cross-connect (HC) is located in the TR. The intermediate cross-connects (IC) may also be located in a TR. The functions of a TR are to:
  .1 House horizontal and backbone cables to connecting hardware.
  .2 House telecommunication equipment, connecting hardware and splice closures serving a portion of the building. The TR will not house PABX, Servers, Core Equipment, Network Storage equipment, etc.

.3 Provide for the administration and routing of equipment cords from the HC to the telecommunications equipment.

1.3 COMMUNICATIONS ROOM DESIGN

.1 Healthcare facilities have many types of electronic systems sharing same pathways and spaces. A sampling of these systems include voice, data, overhead paging, CCTV, CATV, Security Systems (ex. access control, intrusion and staff duress), audio visual, video conferencing, distributed antenna systems, nurse call systems, intercom systems, clinical systems (ex. patient monitoring) and patient education and entertainment systems. Each of these and related systems will have specific space requirements for maintainability that must be considered when designing all communications rooms.

.2 General Requirements and Restrictions

.1 Communications rooms will only contain low voltage wiring, terminations and distribution equipment. Fire alarm, BMS and Lighting Control wiring and panels are not permitted in any type of Communications Room. Network switches required to provide IP connectivity to BAS and Lighting Control Systems may be permitted within Communications Rooms.

.2 Any equipment, material, or service located in Communications Rooms which requires access by the Building Occupant will be restricted to authorized Building Personnel. Non-authorized Maintenance Personnel, or outside Agencies are prohibited.

.3 HVAC, electrical, plumbing, heating, sprinkler, medical gases, fluids, pneumatic tubes and any other non-telecommunications building service will not be routed through Communications Rooms.

.4 Communications rooms or adjoining walls will not have drain pipes, plumbing pipes or water-cooled fan-coil units located in the ceiling space.

.5 Communications rooms will be vertically stacked on all floors throughout the height of the building. If an additional TR is required on any floor, spatially separate the rooms on the plan and position these in different architectural fire-compartments.

.6 Triangle, L-shaped, curved or any other odd shaped room is not acceptable for use as a Communications Room.

.7 If the space required to support all the electronic or low voltage systems required in the facility exceeds the minimum sizes and or growth factor requirements specified herein, Communications Rooms will be increased in size to provide adequate space for these systems.

.8 Room sizing will take into consideration the wall mounting area required for each system.

.9 All aspects of the installation of Communications Rooms will be reviewed and approved by the Communications Consultant and or the HSSBC NE Representative.

.3 Acute Hospitals

.1 The Communications Consultant in consultation with the HSSBC NE Representative will provide a communications room design based on ANSI/TIA 1179 Healthcare Facility telecommunications cabling standard and best practices, and ANSI/BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities.

.2 Entrance Facilities (EF):
  .1 The minimum design and installation standard for an EF is ANSI/TIA-569-D.
  .2 If the EF is support additional access and service provider systems such as Carrier Node B cellular equipment to provide input into an in-building DAS system or CATV, the EF will be increased in size to provide adequate space for these systems.
  .3 When multiple EF's are used, they will have a minimum separation of 20 m to maintain diversity.
  .4 Must be located above the 200-year flood plain.
.3 Main Equipment Room (MER):
  .1 Minimum sizing specification for an MER is 3.66m x 7.62m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
  .2 A growth factor of 100% will be considered when determining room size. This growth can be accommodated by dedicating space adjacent to the MER that can be claimed in the future if so required (e.g. storage room).
  .3 Must be located above the 200-year flood plain.
.4 Telecommunications Rooms (TRs):
  .1 Determined by the size of the building, 80-meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application-specific work areas and spaces.
  .2 A TR is permitted to serve a maximum floor area of 2000m^2.
  .3 The TR will be located on the same floor as the work areas served.
  .4 A growth factor of 50% will be included when determining the room size.
  .5 The minimum sizing specifications for a TR is 3.66m x 4.88m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.

.4 Community Sites
.1 The Communications Consultant in consultation with the HSSBC NE Representative will provide a communications room design based on ANSI/TIA 569-D Commercial Building Telecommunications Cabling Standard,
.2 Entrance Facilities (EF):
  .1 If the EF is support additional access and service provider systems such as Carrier Node B cellular equipment to provide input into an in-building DAS system or CATV, the EF will be increased in size to provide adequate space for these systems.
.3 Main Equipment Room (MER):
  .1 Minimum sizing specification for an MER is 3.66m x 4.88m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.
.4 Telecommunications Rooms (TRs):
  .1 Determined by the size of the building, 80-meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application-specific work areas and spaces.
  .2 The TR will be located on the same floor as the work areas served.
  .3 A growth factor of 50% will be included when determining the room size. Maximum number of horizontal cables per rack/cabinet will be 240 at the time when a new facility becomes operational.
  .4 The minimum sizing specifications for a TR is 3.66m x 3.05m. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations.

.5 For standalone buildings dedicated to office use situated outside an Acute Hospital campus, the following definitions are provided to help clarify the planning requirements for each space:

.1 Buildings larger than 100 m² and smaller than 500m² may be served by a large Communications closet. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations applicable to the design of the large Communications closet. The Communications closet will have the following clear dimensions: 3658 mm x 1220 mm with a minimum height of 3048 mm.

.2 Buildings less than 100 m², a small Communications closet may be considered. Refer to C-STD drawings in 27 00 00.01 for typical layouts and elevations applicable to the design of the small Communications closet. The Communications closet will have the following clear dimensions: 2150 mm x 1220 mm with a minimum height of 3048 mm.

.3 Where the data and voice equipment or the service providers' demarcation points are installed in the Communications closet, a detailed design must be completed of the closet to determine the space requirements and the layout of the closet. The detailed design will follow the same intent as the HSSBC standardized designs and must be submitted for HSSBC NE Representative for approval.

PART 2 PRODUCTS

2.1 EQUIPMENT RACKS / CABINETS

.1 Four Post Equipment Rack

.1 Free standing 2133.6 mm high rack units, gang-able.

.2 4-post racks c/w RU markings (RU1 at top & RU44 at bottom) on front and rear posts and rails.

.3 Uniform Building Code 1997 Zone 4 certified.

.4 Must provide 482.6 mm (19") rack mount capability for rack mountable components.

.5 Must provide 1955.8 mm of vertical mounting space. (44U)

.6 Must have 10-32 tapped mounting holes front and rear.

.7 Will be black in colour.

.8 Racks will be 610 mm wide x 914.4 mm deep.

.9 Accepted Manufacturer: Belden

.2 MER Server Cabinet

.1 Cabinets will be open type; (915 mm wide x 1066 mm deep c/w integrated wire managers front and rear.

.2 Server cabinets c/w RU markings (RU1 at top & RU44 at bottom) on front and rear posts and rails.

.3 Uniform Building Code 1997 Zone 4 certified.

.4 Cabinets with 4 sets of mounting rails, 2 sets are adjustable.

.5 Loaded with 10-32 cage nuts.

.6 Accepted Manufacturer: Belden

.3 Wall Mount Totally Enclosed Cabinet

.1 Cabinets will be enclosed type; (1130 mm high x 762 mm deep x 762 mm wide c/w integrated vertical wire managers: 75mm wide on both sides of front (finger style) and lacing bars on both sides of the rear.

.2 Removable side panels with c/w two (2) 310mm square ventilated knockouts. If required the knockouts can be removed in lieu of 310mm square filter kits.

.3 The bottom panel is solid.

.4 The top panel is vented with (4) 102 mm fan mounting provisions and (2) 75 mm

.5 Wall cabinets c/w RU markings (RU1 at top & RU22 at bottom) on front and rear posts and rails.
.6 Four (4) 102 mm cabinet fans and thermostat kit
.7 Cabinets with 3 sets of adjustable mounting rails. (c/w RU markings)
.8 Loaded with 10-32 cage nuts.
.9 Accepted Manufacturer: Belden
.10 Filter kits for the side panels

2.2 CABLE MANAGEMENT SYSTEMS (CMS)

.1 Vertical Cable Management System
- .1 Double sided
- .2 Front Channel
  - .1 152mm- 305mm wide x 254mm deep (refer to detail drawing).
- .3 Rear Channel
  - .1 152mm- 305mm wide x 254mm deep (refer to detail drawing).
  - .2 305mm wide between racks; 152mm wide at end unit.
- .4 Acceptable Manufacturers: Belden
- .5 Vertical cable management will be from the same Manufacturer as the racks / cabinets.
- .6 Must be equipped with removable doors and straps, removable side fingers,
- .7 access cut-outs at the back, and 2 sets of removable spools per front channel to take up patch cable slacks.
- .8 The back of the cable trough must have stances to provide fastening for
- .9 Horizontal cabling to the back of the trough.
- .10 CMS must be gang-able.
- .11 Will be black in colour.

.2 Horizontal Cable Management.
- .1 Horizontal cable manager at the top of each rack will be a newest released 2U finger-type horizontal manager compatible with the finger-type vertical manager (Refer to C-STD drawings in 27 00 00.01).
- .2 Acceptable Manufacturers: Belden

2.3 UTP PATCH PANELS

.1 Patch panels for UTP horizontal cabling will be a newest released flat 1U modular 24-port unit or 2U modular 48-port unit, suitable for mounting on 482.6mm (19”) racks. Refer to rack elevation drawings.
.2 Patch panels for UTP 25-pair voice tie cabling will be a newest released flat 1U modular 24-port unit, Category 6, suitable for mounting on 482.6mm (19”) racks.
.3 IDC RJ45 discreet modular jacks will be used on the patch panel.
.4 Acceptable Manufacturers: Belden or AMP NetConnect.

2.4 OPTICAL FIBER PATCH PANELS

.1 Patch panels for Fiber Optic cabling will be a newest released 1U modular unit.
.2 If additional capacity is required substitute with newest released 4U panels.
.3 The specified Fiber Patch Panel will have the ability to house Single Mode / Multi Mode fiber, fusion splice, pre-terminated fiber assemblies with MPO cassettes / bulkhead terminations simultaneously.
.4 Equip with 24-fiber or 36-fiber Duplex LC adapter Plates/Frames.

.5 Equip with 24-fiber or 36-fiber Duplex LC MPO cassettes.
.6 Acceptable Manufacturers: Belden or AMP NetConnect.

2.5 IDC TERMINATION BLOCKS

.1 Will be Belden, GigaBIX Mount, GigaBIX Connector, 25-pair, to terminate voice multi pair (25 pair) backbone cables.
.2 Belden GigaBIX Wire Guard.
.3 Belden GigaBIX Designation Strip,
.4 Belden GigaBIX Management Ring
.5 Belden GigaBIX cable management module (installed behind GigaBIX mount to facilitate cable routing).
.6 Belden GigaBIX horizontal channel plate.

2.6 UNINTERRUPTABLE POWER SUPPLY (REFER TO APPENDIX B & C ON UPS)

.1 General Guidelines for Centralized Network Dedicated 3 Phase UPS.
  .1 The following are the key requirements for a Centralized Network Dedicated UPS system:
    .1 Powerware Model: Power Xpert 9395 Series in an N+1 configuration
    .2 High Efficiency Mode
    .3 ESS: Energy Saver System
    .4 boosts efficiency to 99% across all load ranges
    .5 less than 2ms transition time
    .6 inherent surge protection, non-degenerative filtering for lighting strikes
    .7 load fault detection and clearing, with a fault at source or load
  .2 Multi Module Management:
    .1 VMMS: Variable Module Management System
    .2 Automatically scale the UPS to match demand, loading required modules to gain efficiency
    .3 Automatically rotates through the power modules to increase MTBF by spreading load evenly across the system
  .3 Centralized UPS will be configured in an N+1 configuration.
  .4 UPS Batteries to be Flame Retardant and carry a full 3-year replacement warranty directly with UPS manufacturer.
  .5 Inherent battery system that eliminates float charging and predicts pending battery failure.
  .6 UPS to be supported directly by manufacturer, with 4 (or at least 3) UPS dedicated service technicians resident in BC.

.2 General Guidelines for rack mount for existing acute sites and community sites.
  .1 The local UPS for this configuration will be:
    .1 Powerware 5PX and 9PX models. Refer to Appendix C for guidelines.
    .2 Four post rack mount kit
    .3 Temperature Probe
    .4 Network Card, patched by Div.27 directly into a network switch
    .5 Monitoring software and licensing

.3 General Guidelines for Remotes sites with low drop count (< or = 96 drops).
.1 The local UPS for this configuration will be:
.1 Powerware 1500VA (0-48 drops) or 3000VA (49-96 drops). Refer to Appendix C for guidelines.
.1 Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. Refer to C-STD drawings in 27 00 00.01 for receptacle locations.
.2 Four post rack mount kit.
.3 Network Management Card.
.4 Temperature Probe.
.5 Network Card.
.6 Monitoring software and licensing.

2.7 METERED POWER BARS (EPDU)

.1 Refer to Appendix C for approved vertical and horizontal metered power bars (ePDUs).
.2 Provision for additional power bar to the work scope on an as needed basis to power clinical and vendor equipment.

PART 3 EXECUTION

3.1 COMMUNICATIONS ROOM FINISHES

.1 All types of Communication Rooms require a minimum one-hour fire rating.
.2 Penetrations through walls, floors and ceilings will be fire-stopped using products based on the requirements of Fire Stop Systems 27 05 29 and in accordance with Section 27 05 28 Pathways for Communications Systems.
.3 All walls will be to underside of slab. All walls will be lined with rigidly installed 20 mm (3/4"), AAA G1S plywood painted with two coats of light coloured fire resistant paint applied to all sides. Sanding between coats is mandatory. The plywood panels will extend from floor level to a height of 2438mm. Expose certified stamped mark.
.4 There will be no suspended ceiling installed in a Communications Room
.5 The only access from adjacent ceiling spaces will be by cable tray via Hilti Speed Sleeves or conduit in accordance with Section 27 05 28 Pathways for Communications Systems to allow connection to the horizontal and backbone pathways. Hallway cable tray will access the Communications room on the same floor by cable tray only.
.6 Unless specified to the contrary, a minimum of one equipment rack will be supplied and installed in each Communications room.
.7 The use of a pull pit in Communications Rooms will not be acceptable.

3.2 DOORS

.1 All doors will be commercial grade and fitted with a auto closer and card access system.
.2 Where the Communications Room is directly accessible from the building's exterior or from parkade areas, door hinges are to be recessed or hiddent with a full length astragal installed.
.3 Lockset to be store room function.
The door will swing 180^{o} out to gain valuable floor and wall spaces inside the room for equipment and cable installs, and to provide working space for pulling entrance and riser cables. If the door must swing into the room, then the room will be increased in size by the width of the door to compensate for lost space.

.4 Communications rooms will be accessible from corridor with minimum door opening of 1066mm wide and 2133mm high.

.5 Provide a door sweep.

3.3 SECURITY

.1 Access Control:

.1 The Contractor will coordinate and arrange for installation of Communications Room's card access system prior to the installation of network equipment, with Communications Consultant and Integrated Protection Services.

.2 Only the main entry door will be equipped with a network access control card reader. Supplementary doors will be for exit only.

.3 Manual punch code locks are not permited on any Communications Room doors.

.2 Keys:

.1 Key will be cut to fit all the Communications Rooms within the same building.

.2 A copy of the key will be given to Facilities Maintenance and Operations (FMO).

.3 If the Communications Room is equipped with a supplementary door, no keys will be issued for these doors in order to ensure the audit trail through the access control system remains intact. Keys issued for the main entry doors that bypass the card reader should be limited for emergency access only.

.3 Intrusion Alarm:

.1 An intrusion alarm will be provided when the Communications Room is directly accessible from the building's exterior or from parkade areas.

.2 Alarm will consist of door contacts on all doors, dual tech motion detector(s) and keypad.

.3 Control panel is to be located within a secure space.

.4 Intrusion system is not to be integrated with access control to arm or disarm the alarm.

.4 All Communications Rooms will be equipped with CCTV camera(s). CCTV camera(s) will be used to identify people entering the room and general activity within the room. CCTV camera footage to be recorded on base building security systems and stored for a minimum of 30 days.

3.4 FINISHES

.1 Wall and floor finishes will be light in colour to enhance the brightness of the room.

3.5 FLOORING

.1 New Communications Room floor coverings will be linoleum composite sheeting (i.e. "Marmolium") or as noted on drawings. Vinyl tiles or sheeting are not acceptable.

3.6 FLOOR LOADING

.1 Floor loading (static and dynamic) capacity in the space will be sufficient to bear both the distributed and concentrated load of the installed equipment. A structural engineer will be consulted during the design to specify the floor loading limit. If equipment that exceeds these limits is anticipated, the areas of the floors where the equipment will be moved and installed will be appropriately reinforced.

.2 The minimum floor load capacity will be 50 lbs/square foot in TRs and 150 lbs/square foot in EF and main ER Rooms.

3.7 SIGNAGE

.1 For communications room signage, refer to Section 27 05 53.

3.8 SMOKE DETECTOR, HEAT DETECTOR, SPRINKLER SYSTEM

.1 If local code permits, it is preferred that communication spaces are separated from the remainder of the building by rated fire barriers and equipped with fire (smoke/heat) detection system. If sprinkler system is required, then a dry pre-action sprinkler system will be installed for all communications rooms.

.2 For existing “wet” sprinkler systems in Communication spaces, replace existing sprinkler head with high temperature type and provide drip tray under sprinkler head if sprinkler head is over equipment racks and cabinets.

.3 Provide cage to sprinkler heads for mechanical protection in all cases.

3.9 LIGHTING

.1 Lighting fixture will be mounted at a minimum of 2.8 m AFF.

.2 The minimum light levels will be 500 LUX in the horizontal plane and 200 LUX in the vertical plane @ 1 m above the finished floor.

.3 Lighting inside the communication rooms will be on the building emergency generator system or battery packs where generator system is not available.

.4 Provide an occupancy sensor to control the lights in each communication room

3.10 HVAC

.1 The HVAC requirements for Communications Rooms are as follows:

.1 Operating environment will be 20^{o} Celsius to 25^{o} Celsius (dry bulb temperature) with 40% to 55% Relative Humidity (non-condensing). Anything outside of these ranges will generate an alarm.

.2 HVAC systems for Communications Rooms will be dedicated, scalable, reliable, redundant and operate without interruption (24/7, 365 days per year) while being efficient to operate, both in terms of energy consumption and from a maintenance perspective.

.3 The HVAC system will be powered from the Emergency Generator Power system.

.4 The MER will be equipped with a minimum of two dedicated HVAC units to share the total forecasted cooling load.

.5 Provide separate, in room controls for the heating, ventilation and air conditioning systems servicing all Communications Rooms.

.6 The air pressure inside the room will be positive to force the air out of the room to mitigate dust accumulation. Provide a minimum of 1 complete air change per hour.

.7 The forecasted maximum cooling load of the room will be determined by the Communications Consultant in consultation with the HSSBC NE Representative during the design stage of the project. This information will be provided to the Mechanical Engineer to design the appropriate cooling solution to meet the forecasted heat load for the room.

3.11 EQUIPMENT RACKS / CABINETS (REFER TO DRAWINGS FOR SIZING)

.1 Each rack / cabinet will be plumbed and levelled, and solidly bolted to the floor with bolts, washers and brackets. Bonding of rack to ground per TIA -J-STD-607B and Section 27 05 26.

.2 Equipment racks / cabinets will be seismically restrained and approved per Seismic Engineer of record.

.3 Where two or more racks are mounted side by side, the racks will have a double sided 12 wide vertical manager installed in between and ganged with metal bolts and washers.

.4 Provide access clearance of 1m in the front, the side and the rear of the racks. Where several rows of racks are located side by side, the row spacing will be a minimum of 1 m. A minimum clearance of 50 mm will be maintained between one side of the rack vertical manager and the wall. All clearances are to be measured from the face of any equipment mounted to the wall and from the front of vertical cable managers.

.5 Typical rack / cabinet data port capacity will be 240 horizontal cables at the time when the facility becomes operational.

.6 The number of Racks in a communication room is based on the horizontal cable count of the floor area being served and the spare space requirements in each room. This along with the 3rd party rack requirements as identified in the Communications Standard Drawings determines the rack count in each communication room.

3.12 BACK-UP POWER AND POWER OUTLETS

.1 Electrical Engineer will coordinate with Communications Consultant and or the HSSBC NE Representative to design power and UPS requirements for all network and low voltage equipment in every type of communication space.

.2 The Contractor will provide a minimum of (2) dedicated 20A, 120V AC on Emergency Generator power circuits. These circuits are to appear in double gang duplex (5-20RA) convenience outlets located at not more than 6ft intervals around perimeter walls of EF, MER and each TR. Convenience outlets will be set flush-mounted and centred at 305 mm AFF (or match mounting height of existing receptacles) and be identified and marked (Refer to C-STD drawings in 27 00 00.01). They will not appear under GigaBIX wall.

.3 In Community sites, use Emergency Generator power whenever available. Otherwise utility power is an acceptable alternative for convenience and equipment rack receptacles.

.4 Minimum Network UPS runtime where the input power source is from an Emergency Generator is ten minutes. Minimum runtime for Network UPS is increased to 30 minutes when utility power is used as the input power source. If the required runtimes cannot be maintained by the UPS internal batteries, engage the Communications Consultant and or the HSSBC NE Representative regarding the installation of additional battery modules.

.5 Power distribution to and inside an Entrance Facility (EF) room will vary from site to site based on the specific needs of the facility. Establishing specific requirements above each equipment rack will need to be coordinated with service providers and the Communications Consultant and or the HSSBC NE Representative.

.6 For a summary of Rack and/or Cabinet Power Requirements and a list of acceptable products refer to:

APPENDIX B – HSSBC COMMUNICATIONS STANDARD – POWER DISTRIBUTION FOR ALL COMMUNICATIONS SPACES

APPENDIX C – HSSBC COMMUNICATIONS STANDARD – UPS & ePDU

.7 Rack Mount UPS Power

.1 The installation of rack mount UPS units is acceptable in the following scenarios:

.1 Existing communication rooms in existing Acute and Community sites.

.2 New communication rooms in existing Acute and Community sites.

.3 New communication rooms in new Community sites.

.4 Remote Sites

.2 Within existing sites, the application of the specifications and guidelines detailed within this section are subject to specific site conditions. If existing site conditions prevent the design and implementation of the specifications and guidelines as detailed within this section, the Electrical Engineer must work with the Communications Consultant and or the HSSBC NE Representative to find a suitable solution.

.3 If a rack mount UPS system is being provisioned for an MER room; the Communications Consultant and or the HSSBC NE Representative will be consulted for specific UPS requirements.

.4 Specifications and Guidelines are based on Eaton Powerware 5PX and 9PX UPS products.

.5 All UPS systems and ePDUs are to be physically connected by the Division 27 Contractor to a network switch port designated by a HSSBC NE Representative.

.6 Telecommunication Room consisting of a single rack serving a wiring space with 0-240 horizontal drops:

.1 Provide two (2) L6-30R receptacles and one (1) L5-15R, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. One L6-30R will be used to provide input power into the UPS and the other will be used for a back-up ePDU. The L5-15R is intended to distribute 120V Emergency Generator power for third party equipment in the rack. The L5-15R can be used to connect to a horizontal PDU or 1500VA UPS.

.2 Provide a rack mount 5000VA UPS c/w

.1 L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings in 27 00 00.01 for receptacle locations)

.2 2 x L6-20R and 2 x L6-30R output receptacles

.3 Four post rack mount kit

.4 Temperature Probe

.5 Network Card

.6 Monitoring software and licensing.
If 1500VA UPS system is required to distribute 120V UPS Protected Power to the equipment rack refer to Appendix C for appropriate model number.

.3 Provide two monitored/metered ePDUs, c/w L6-30P input cords (3.05m /10 feet)

.1 Zero U ePDUs

.2 ePDU #1 plugs directly into the 5000VA UPS unit

.3 ePDU #2 plugs into the L6-30R receptacle located above the Rack

.4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

.7 Telecommunication Room consisting of two racks serving a wiring space with 0-240 horizontal drops:

.1 Rack 1 - Provide one (1) L6-30R and one (1) L5-15R receptacle on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU. The L5-150R is intended to distribute 120V Emergency Generator power for third party equipment in the rack. The L5-15R can be used to connect to a horizontal PDU or 1500VA UPS.

.2 Rack 2 - Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. One L6-30R will be used to provide input power into the UPS and the other will be used for a back-up ePDU.

.3 Provide a rack mount 5000VA UPS in Rack 2 c/w

.1 L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings in 27 00 00.01 for receptacle locations)

.2 2 x L6-20R and 2 x L6-30R output receptacles

.3 Four post rack mount kit

.4 Temperature Probe

.5 Network Card

.6 Monitoring software and licensing.

* If 1500VA UPS system is required to distribute 120V UPS Protected Power to the equipment rack, refer to Appendix C for appropriate model number.

.4 Rack 1 - Provide two monitored/metered ePDUs, c/w L6-30P input cords (3.05m/10 feet)

.1 Two (2) Zero U ePDUs

.2 ePDU #1 plugs directly into the 5000VA UPS unit

.3 ePDU #2 plugs into the L6-30R receptacle located above the Rack

.4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

.5 Rack 2 - Provide two monitored/metered ePDUs, c/w L6-30P input cords (3.05m/10 feet)

.1 Zero U ePDUs

.2 ePDU #1 plugs directly into the 5000VA UPS unit

.3 ePDU #2 plugs into the L6-30R receptacle located above the Rack

.4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

.8 Telecommunication Room consisting of four racks serving a wiring space with 0-480 horizontal drops:

.1 Rack 1 - Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L5-30Rs are intended to distribute 120V Emergency Generator power for third party equipment in the rack. One L5-30R can be used to connect to a vertical PDU and the other can be used to connect to a 3000VA UPS.

.2 Rack 2, 3 & 4 - Provide one (1) L6-30R receptacles on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU.

.3 Provide a rack mount 8KVA UPS in Rack 3 c/w

.1 Direct feed or hardwired connection to the UPS from Emergency Generator or Utility power.

.2 Three (3) L6-30R output receptacles

.3 Four post rack mount kit

.4 Temperature Probe

.5 Network Card

.6 Monitoring software and licensing

* If 3KVA UPS system(s) are required to distribute 120V UPS Protected Power to the equipment rack, refer to Appendix C for appropriate model number.

.4 Rack 2, 3 & 4 - Provide two monitored/metered ePDUs per rack, c/w L6-30P input cords (3.05m/10 feet)
- .1 Zero U ePDUs
- .2 ePDU #1 plugs directly into the 8000VA UPS unit
- .3 ePDU #2 plugs into the L6-30R receptacle located above the Rack
- .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

.9 Telecommunication Room consisting of four racks serving a wiring space with more than 480 horizontal drops:

.1 Rack 1 - Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L5-30Rs are intended to distribute 120V Generator Protected power for third party equipment in the rack. One L5-30R can be used to connect to a vertical PDU and the other can be used to connect to a 3000VA UPS.

.2 Rack 2, 3 & 4 - Provide one (1) L6-30R receptacles on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU.

.3 Provide a rack mount 11KVA UPS in Rack 3 c/w
- .1 Direct feed or hardwired connection to the UPS from Emergency Generator or Utility power.
- .2 Three (3) L6-30R output receptacles
- .3 Four post rack mount kit
- .4 Temperature Probe
- .5 Network Card
- .6 Monitoring software and licensing

  * If 3KVA UPS system(s) are required to distribute 120V UPS Protected Power to the equipment rack, refer to Appendix C for appropriate model number.

.4 Rack 2, 3 & 4 - Provide two monitored/metered ePDUs per rack, c/w L6-30P input cords (3.05m/10 feet)
- .1 Zero U ePDUs
- .2 ePDU #1 plugs directly into the 11KVA UPS unit
- .3 ePDU #2 plugs into the L6-30R receptacle located above the Rack
- .4 All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

.8 General Guidelines for Remotes Sites with low drop count (96 drops or less) equipped with a wall or floor mount equipment rack. The local UPS for this configuration will be:

.1 Depending on UPS size (see below), provide either two (2) L5-15R receptacles or two (2) L5-30R receptacles, each on dedicated circuits above the rack or on the wall on Emergency Generator or Utility Power. Utility Power is acceptable in Remote Sites where Generator is not available.

.2 Powerware 1500VA (0-48 drops) or 3000VA (49-96 drops). Refer to Appendix C for guidelines.

.3 Two zero U ePDUs. Horizontal ePDUs can be used for wall mount racks. Refer to Appendix C for guidelines.

.4 Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings in 27 00 00.01 for receptacle locations.
.5 Rack mount kit.
.6 Network Management Card.
.7 Temperature Probe.
.8 Monitoring software and licensing.

.9 Centralized Network Dedicated UPS Power
.1 The installation of Centralized Network Dedicated UPS Power is acceptable in the following scenarios:
.1 Existing communication rooms in an existing Acute Hospital site (undergoing a wholesale power retrofit).
.2 New communication rooms in a new Acute Site.
.2 Centralized Network Dedicated UPS & UPS Distribution will support all the network and low voltage equipment located within Communication Room Spaces within a given building or buildings. In a campus environment, it is permissible to install multiple Centralized Network Dedicated UPS systems to feed individual or groups of buildings if it is not feasible to extend the UPS power distribution to all buildings from a single central location.
.3 Centralized UPS will be configured in an N+1 configuration
.4 All Centralized Network Dedicated UPS systems will be equipped with an external wrap around maintenance by-pass.
.5 Centralized Network Dedicated UPS will be located in their own dedicated room or within the facility's Main Electrical Room.
.6 Zone 4 certified seismic installation is required on all installations of a Centralized Network Dedicated UPS System.
.7 All Centralized Network Dedicated UPS systems must undergo a load bank test as part of the commissioning process.
.8 Centralized Network Dedicated UPS and associated ePDUs are to be physically connected by the Division 27 Contractor to a network switch port designated by a HSSBC NE Representative.
.9 The selection of the make and model of the Centralized Network Dedicated UPS system and its associated capacity, efficiency, features, configuration and extended (support and maintenance) warranties will be done in consultation with the Communications Consultant and or the HSSBC NE Representative. Remote management and monitoring capabilities are to be determined in consultation with Facilities Maintenance and Operations as well as the Communications Consultant and or the HSSBC NE Representative,
.10 In new Acute Sites and in Existing Acute Sites where the power distribution systems are being retrofitted, all UPS and Emergency Generator power distribution panels servicing communication rooms must be dedicated and located inside the communication room. Refer to C-STD drawings in 27 00 00.01 for panel locations.
.11 Standard Configuration for MER and TR Communications Rooms:
.1 Vendor or Third Party Equipment Rack - Provide two (2) dedicated circuits L21-30R receptacles above the rack; one (1) L21-30R on Centralized Network Dedicated UPS power and one (1) L21-30R on Vital Generator Power.
.2 Health Authority Equipment Racks - Provide two (2) dedicated circuits L21-30R receptacles above the rack; one (1) L21-30R on Centralized Network Dedicated UPS power and one (1) L21-30R on Vital Generator Power.

.3 Provide two monitored/metered ePDUs, c/w L21-30P input cords (3.05m/10 feet) per rack. Equip one ePDU in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

END OF SECTION 27 11 00

27 13 13 COMMUNICATIONS COPPER BACKBONE CABLING

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 List of Terms as Used in this Specification
.3 Communications Copper Backbone Cabling

1.2 LIST OF TERMS AS USED IN THIS SPECIFICATION

.1 “ISP”: Inside Plant [cabling]
.2 “OSP” Outside Plant [cabling]
.3 “PIC”: Plastic Insulated Conductor
.4 “PVC”: Polyvinyl Chloride
.5 “PE”: Polyethylene
.6 “CMP”: Communications Media Plenum [plenum rating]
.7 “CMR”: Communications Media Riser [riser rating]

1.3 COMMUNICATIONS MULTIPAIR COPPER BACKBONE CABLING

.1 Overview
  .1 The backbone configuration will be a hierarchical star structure with separate dedicated cables from the MER Communications Room to each Telecommunications Room. The second level of backbone when required is used between buildings only, connecting the MER of each building to the campus Entrance room or a PABX room.
  .2 In a MER, Entrance and Intra Building Backbone cables will be bundled separately from Horizontal cables.
  .3 In a TR Communications Room, Horizontal cables will be bundled separately from Intra Building Backbone cables.
  .4 No backbone cables will be left un-terminated in a Communications Room.
.2 Category 3 Voice Intra-Building Backbone Cables
  .1 Voice backbone cabling consisting of multiples of 25, 50 or 100 pair Category 3 unshielded twisted-pair will be installed by the Contractor, from the MER to each zone TR as directed by the Communications Consultant and or the HSSBC NE Representative. The voice riser will be sized by allocating 50 pairs per 929 m^2 (10,000 square feet). The pair count will be rounded to the next 25 pair multiple. Example: 1022 m^2 (11,000 square feet) is 75 pairs.
  .2 Multi-pair cable bundles entering GigaBIX mounts and the hinging of connectors will be on the jumper side of the mount.
  .3 Backbone 25, 50 or 100-pair UTP cables from the same Communications room must be grouped together and terminated sequentially on the GigaBIX connectors; group the cables from each Communications room together. Once the first riser is terminated and numbered, every other riser in its group continues the number sequence. (Refer to Standard Drawing C-STD in 27 00 00.01).
  .4 Space for the protectors will be provided to the left of the GigaBIX mounts. (Refer to Standard Drawing C-STD in in 27 00 00.01).

.3 Category 3 Voice Inter-Building Backbone Cables
.1 Install and terminate a multi pair, UTP, 24 AWG outside plant cable between buildings for voice. The number of multi pair to be used varies depending on factors such as if it is to be used for PBX connection and or direct business lines from Service Provider. **The minimum number of multi pair to be used is 100**. The cable will have a gel-filled core. Provide primary protection on both ends as required by the AJH. If the cable is routed underground, it will be installed in conduit. The conduit will be sized with 100 % spare cable capacity based on a fill of 40%. Terminate the cable on GigaBIX terminations.

PART 2 PRODUCTS

2.1 MULTIPAIR INSIDE UNSHIELDED TWISTED PAIR CABLE

.1 Intra-building Application:
.1 Cable suitable for indoor installation, between floors in vertical riser system, utility tunnels, under access flooring, and through overhead ceiling space (in cable tray, conduit & hangers).
.2 Each and every cable run will have a continuous single cable, homogenous in nature. Splices are not permitted anywhere.
.3 Twisted pair PIC type, air core cable for intra-building cabling.
.4 Accepted Manufacturers: Belden and AMP NetConnect.
.2 Conductors:
.1 Conductors of 24 AWG annealed solid copper.
.2 Conductors fully insulated, consisting of an inner layer of expanded polyolefin, covered with an outer layer (skin) of solid PVC.
.3 Twisted pair conductors, stranded into 25-pair bundles and into units.
.4 Colour Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publications S-80-576, and TIA-230).
.3 Core & Sheath
.1 Cable sheath consisting of an overall flame-retardant PVDF or equivalent jacket.
.2 Cable that is CEC rated as CMP or CMR as required by the authority having jurisdiction, and UL listed as such.
.4 Performance:
.1 Electrical performance of the twisted pairs and overall cable that complies with TIA-568-C requirements for Category 3 UTP cabling.

2.2 SEALPIC-F CORE MULTIPAIR BACKBONE CABLE

.1 Inter-building Application:
.1 Cable suitable for outdoor duct bank installation
.2 Each and every cable run will have a continuous single cable, homogenous in nature. Splices are not permitted anywhere
.2 Conductors:
.1 Conductors of 24 AWG annealed solid copper.
.2 Twisted pair conductors, stranded into 25-pair bundles and into units.
.3 Colour Coding: Twisted pairs and units individually color-coded to industry standards (ANSI/ICEA Publications S-80-576, and TIA-230).
.3 Core & Sheath
.1 All outdoor duct bank copper backbone cabling will be SEALPIC-F backbone cabling, with solid copper conductors.
.2 The cable will be CSA certified and stamped CMR rating.

.4 Performance:
.1 Electrical performance of the twisted pairs and overall cable that complies with TIA-568-C requirements for Category 3 UTP cabling.

2.3 TERMINATION EQUIPMENT

.1 GigaBIX suitable for installation within a telecommunications facility for the termination of the backbone twisted pair cables and suitable for either wall or rack installations, vertically oriented for a wall mounted column configuration.
.2 "GigaBIX" type.
.3 GigaBIX accompanied by the quantity of management equipment, for both horizontal and vertical routing of cords and cross connect wires.
.1 GigaBIX kit, 300 pair, 5-pair based.
.2 Vertical management panel.
.3 Cable management module will be provided behind each GigaBIX mount.

2.4 CROSSCONNECT WIRE

.1 Cross connect Wire, 1-Pair
.1 Cross connect wire suitable for installation within a telecommunications facility and fully compatible with the GigaBIX. Each and every cross connect wire manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere.
.2 Factory splices of insulated conductors are expressly prohibited.
.3 Conductors:
.1 Insulated Conductors: 24 AWG conductors of solid copper. Fully insulated conductors with a flame retardant thermoplastic material (such as PVC, or equivalent).
.2 Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted pair), individually color-coded.

2.5 MISCELLANEOUS MATERIALS

.1 ISP Backbone Cable Labels
.1 General: Machine printable labels with a laser printer, thermal transfer printer, or hand-held printer and adhesive backed and having a self-laminating feature.
.2 Printable Area: 50mm (2") x 12mm (0.5") minimum.
.3 Colour: White
.1 Laser labels for cable diameters 4.06mm – 8.13mm white.
.2 Labels for cable diameters 7.87mm – 17.5mm, white.
.3 Labels for cable diameters 7.87mm – 36mm white.
.2 GigaBIX Labels
.1 General: Machine printable labels with a laser printer, thermal transfer printer, or hand-held printer, and having an adhesive backing.
.2 Colour: Purple for 1st level backbone termination field; grey for 2nd level backbone termination field.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Backbone Cable
- .1 Cable runs will have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
- .2 Maximum cable length of 500 meters from the termination point within the Entrance Facility to the termination point in Communications Rooms.
- .3 Placement
  - .1 Maintain a minimum bend radius of 20 times the cable diameter and 10 times the cable diameter after installation.
  - .2 Maintain pulling tension within manufacturer's limits.
  - .3 Place cables within designated pathways.
  - .4 Place and suspend cables in a manner to protect them from physical interferences or damage. Replace cables if damaged during installation.
  - .5 Place cables with no kinks, twists, or impact damage to the sheath.
  - .6 Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of the pull rope.
- .4 Routing
  - .1 When routing horizontally within Communications rooms, utilize the overhead cable support. When routing vertically within Communications rooms, utilize the vertical cable support (vertical basket tray) and provide cable ties every 610mm (24") on centre.
  - .2 Route cables a minimum of 150mm (6") away from power sources to reduce interferences from EMI.
  - .3 Provide minimum 7.62 meters (25') sheathed cable slack loop at each end of the run. Coil and place the slack on wall outside and above the overhead cable tray.
- .5 Termination
  - .1 Properly strain-relieve cables at termination points per manufacturer's instructions.
  - .2 Terminate twisted pairs onto the GigaBIX in accordance with manufacturer's latest instructions and TIA-568C standard installation practices.
  - .3 Perform post-installation testing as described in the Testing for Communications specification.

.2 GigaBIX
- .1 Provide accessories required for a complete installation.
- .2 Install cable management module layout such that the 1st cable management module starts at 203mm (8") from the wall and 457mm (18") from the floor.
- .3 Mount GigaBIX plumb and square.

.3 GigaBIX Distribution for Voice Tie Cables
- .1 Install patch panels in data rack as per CSTD -10 series drawings. Label front of voice tie patch panel as VP1, VP2, etc.
- .2 Provide minimum 2x25 pair per rack or as specified from the rack Voice Tie Distribution panel to GigaBIX wall mount.

.4 Cross connects
- .1 At the Main Cross-connect, provide one 1-pair cross connect to length from the equipment field to the backbone field based on the records from the TR cross connections.
- .2 Utilize the horizontal and vertical management components to properly route the cross connect wire.

.5 Splices in cross connect wire are prohibited.

.6 Rack-mount Phone System

.1 Where there's a rack-mount phone system, it will be installed and tied with several 25-pair Category 3 Amphenol cables to the GigaBIX wall to access the voice backbone cables. The Amphenol connector end of the cable will be terminated on each phone media gateway. The other loose end of the cable will be terminated on GigaBIX 25-pair connector on a new column of GigaBIX blocks positioned in sequence to the last column for the regular voice tie cables. The termination area of the voice tie cables will be on the upper half of the GigaBIX wall.

END OF SECTION 27 13 13

27 13 23 COMMUNICATIONS FIBER BACKBONE CABLING

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 List of terms as used in this specification
.3 Communications Fiber Backbone Cabling

1.2 LIST OF TERMS AS USED IN THIS SPECIFICATION

.1 In addition, define the following list of terms as used in this specification as follows:
- .1 "MM": Multimode (Fiber type OM4 or better).
- .2 "OFNP": Optical Fiber Non-conductive, plenum rated.
- .3 "OFNR": Optical Fiber Non-conductive, riser rated.
- .4 "OFCP": Optical Fiber Conductive, plenum rated.
- .5 "OFCR": Optical Fiber Conductive, riser rated.
- .6 "PVC": PolyVinyl Chloride.
- .7 "SM": Singlemode (fiber type OS2 or better).

PART 2 PRODUCTS

2.1 FIBER BACKBONE CABLING

.1 Fiber Optic Intra-building (Indoor) Backbone Cables (Refer to Standard Drawing C-STD in 27 00 00.01)
- .1 Intra-building Backbone (SM)
  - .1 Transmission requirements will meet or exceed all applicable requirements of TIA-568-C.3 & C.3.1 Specifications:
    - .1 OS2 SM distribution fiber, tight buffer, all dielectric.
    - .2 Will be FT6 CMP plenum-rated (OFNP/OFCP) or FT4 CMR riser rated (OFNR/OFCR) as required by the AHJ.
    - .3 Cables will be mechanically protected along their entire length using either interlocking armoured type or inner duct w/non-armoured tight buffered cable.
- .2 Intra-building Backbone (MM)
  - .1 OM4 laser optimized Multimode distribution fiber, tight buffer, all dielectric.
  - .2 Will be FT6 CMP plenum-rated (OFNP/OFCP) or FT4 CMR riser rated (OFNR/OFCR) as required by the AHJ.
  - .3 The fiber will support 10 GIGABIT ETHERNET @ 450 meters. Operating at wavelength of 850 nm, it will have maximum attenuation of 3.0dB/km for tight buffered fiber, and effective Modal Bandwidth of 4700 MHz/km.
  - .4 Cables will be mechanically protected along their entire length using either interlocking armoured type or inner duct w/non-armoured tight buffered cable.

.3 Fiber Backbone Count (MM/SM)
.1 Fiber backbone cabling consisting of OM4 multi-mode and or OS2 single mode optical cables will be installed through physically diverse paths from MER to each TR. Minimum strand count per cable will be 24. Termination type will be LC. For community sites, contact the HSSBC NE Representative to determine specific requirements as it relates to intra-building fiber type, strand count and diversity requirements.
.2 Fiber strand count will be provided by HSSBC.

.2 Fiber Optic Inter-building Backbone Cables
.1 Acute Site
.1 Inter-building Backbone (SM)
.1 Transmission requirements will meet or exceed all applicable requirements of TIA-568-C.3 & C.3.1 Specifications:
.1 OS2 SM OSP fiber, indoor/outdoor, OFCP/OFCR (as required by the AHJ), all dielectric c/w yellow overall jacket and inner cable jacket
.2 The fiber will support 100 GIGABIT ETHERNET (100GBASE-LR4). It will have maximum attenuation of 0.7 dB/km at 1310 nm and 0.7 dB/km at 1550 nm wavelengths.
.3 Cables will be interlocking armoured type.
.2 Inter-building Backbone (MM)
.1 OM4 laser optimized Multimode OSP fiber, indoor/outdoor, OFCP/OFCR (as required by the AHJ), all dielectric.
.2 The fiber will support 10 GIGABIT ETHERNET (10G BASE-SR) @ 450 meters. Operating at wavelength of 850 nm, it will have an effective Modal Bandwidth of 4700 MHz/km.
.3 Cables will be interlocking armoured type.
.3 Fiber Backbone Count (MM/SM)
.1 Fiber backbone cabling consisting of OM4 multi mode and or OS2 single mode optical cables will be installed from the MERs in each building to each of the site's Network Core switches. Termination type will be LC.
.2 Fiber backbone cabling consisting of OM4 multi mode and or OS2 single mode optical cables will be installed through physically diverse paths from the MERs in each building to each of the site's Network Core switches.
.3 Fiber strand count will be provided by HSSBC.
.2 Community Site
.1 Contact the HSSBC NE Representative to determine specific requirements as it relates to inter-building fiber type, strand count and diversity requirements.

2.2 FIBER OPTIC CABLE CONSTRUCTION

.1 Application:
.1 Cable will be suitable for indoor and or indoor/outdoor installation between buildings, floors, in vertical riser system, under access flooring, and through overhead ceiling space (in basket cable tray, conduit, and/or inner duct).
.2 Optical transmission performance will not be significantly affected by environmental fluctuations, installation, or aging.

.2 Singlemode fiber strands will meet or exceed the following geometry criteria:
- .1 Core diameter = 8.3 um.
- .2 Mode field diameter = 8.8 um, +/- 0.5 um.
- .3 Cladding diameter = 125 um, +/- 1.0 um.
- .4 Core/Cladding Concentricity = <0.8 um.
- .5 Minimum Tensile Strength = 100,000 psi.

.3 Singlemode fiber strands will meet or exceed the following performance criteria:
- .1 Attenuation = 0.7 dB/km at 1310 nm and 0.7 dB/km at 1550 nm wavelengths, maximum.
- .2 Cutoff wavelength = 1260 nm.
- .3 Dispersion = 3.5 pa/nm – km at 1550 nm.

.4 Primary Coating:
- .1 Each fiber will be completely covered with a “primary coating” (acrylate material).
- .2 Coating diameter = 250 um, +/- 5um.

.5 Buffering
- .1 Each coated fiber will be fully covered with a material extruded over and directly onto the coating. This will be the tight buffer. Tight buffer diameter = 900um, +/- 5 um. Material = PVC, or equivalent flame retardant thermoplastic.
- .2 Buffered strands will be individually color-coded to meet the requirements of ANSI/TIA-598-A-1995. (Also, ref. ANSI/ICEA S-83-596-1994, and TIA-230)

.6 Interlocking Armour:
- .1 Strength Element: The cable will have an internal strength element such as aramid yarn (e.g. Kevlar).
- .2 Inner Jacket: The cable will have a seamless inner jacket material (plenum rated thermoplastic) applied to and completely covering the internal components (fiber strands, strength element, other).
- .3 Armour: The cable will have an interlocking metallic armour applied spirally and longitudinally to and completely covering the cable.
- .4 Outer Jacket: The cable will have a seamless outer jacket material (FT4 or FT6 plenum rated thermoplastic) applied to and completely covering the armour.
- .5 Tensile Strength: The cable will have a 150 lb, minimum, rated load.
- .6 Colours for armoured cables:
  - .1 OM4 Colours: The following colours will be used on OM4 (inner/outer interlocking armoured jacket) and for inner duct containing OM4 without exception to differentiate from Aqua-coloured OM3:
    - .1 AMP NetConnect Violet;
    - .2 Belden Erika Violet.
  - .2 Singlemode: Yellow will be used on all armoured singlemode cable (inner/outer interlocking jacket) and for inner duct containing singlemode cable without exception.
- .7 Where the fiber optic cable is non-armored, it will be protected in inner duct.
- .8 Inner Duct colour
  - .1 Violet will be used for inner duct containing OM4 without exception.
  - .2 Yellow will be used for inner duct containing singlemode cable without exception.
- .9 Inner duct size:
  - .1 Minimum size is 25mm (1 inch)
  - .2 FT4 or FT6 rated as required by the AHJ

2.3 TERMINATION EQUIPMENT

.1 High Density Optical Fiber Patch Panels
- .1 Patch panels for Fiber Optic cabling will be AMP NetConnect or Belden newest released high density 1U modular unit. If additional capacity is required substitute with newest released 4U panels.
- .2 Patch panels are to come complete with cover, frames, adapters and LC connectors at each end.
  - .1 Equip with 12-fiber, 24-fiber or 36-fiber Duplex LC adapter Plates/Frames
- .3 If wall mount unit is required due to rack or equipment mounting restrictions then AMP NetConnect or Belden wall mount enclosure/panel will be used.
- .4 Splice tray kits integral to the fiber patch panel

2.4 CONNECTORS

.1 Multimode / Singlemode Fiber Optic Connectors – LC Type.
- .1 Materials:
  - .1 Ferrule: ceramic (zirconia or alumina) with pre-radiuses finish/face.
  - .2 Connector housing: plastic.
  - .3 Connector will meet or exceed Ultra PC performance (LC-UPC).
  - .4 Connector will have an integral strain relief feature, including a bend limiting rear boot.
  - .5 Connector will be installable via fusion splice or mechanical connectors for multimode
  - .6 Connector will be installable via fusion spliced pigtails for singlemode

.2 Different connectors may need to be applied to tie cables in order to extend Carrier services to the MER. Consult with the Communications Consultant and or the HSSBC NE Representative regarding the termination requirements for Carrier services.

2.5 FIBER MANAGEMENT COMPONENTS

.1 Polygon Fiber Slack Storage Reel
- .1 Fiber slack storage reel for supporting of fiber optic service loops at both ends.
- .2 One 610mm reel per cable.
- .3 Refer to C-STD Drawings in 27.00.00.01 for the mounting method for slack storage reel.

.2 Velcro Cable Ties
- .1 Width: 19mm (0.75”)

PART 3 EXECUTION

3.1 INSTALLATION

.1 Fiber Optic Installation
- .1 All fiber optic cable system work completed by the Contractor must meet quality approval as stipulated by the Communications Consultant and or the HSSBC NE Representative. The following requirements must be met to gain system acceptance.
  - .1 Run the cable along the route identified on the plan drawings
  - .2 Install materials and equipment in accordance with applicable standards, codes, requirements and recommendations of national, provincial and local authorities having jurisdiction and with manufacturer’s printed instructions.

.3 Adhere to manufacturers' published specifications for pulling tension, minimum bend radii and sidewall pressure when installing cables.

.4 Any scoring or pitting within the fiber core (regardless of test result) will result in re-termination by the Contractor using a new connector. Any re-termination will be done at no cost to the Owner.

.5 Provide 7 meters of fiber optic cable slack at both ends of all cables.

.6 All single-mode fiber will be fusion spliced utilizing 900 micron pigtails supplied by the Contractor. The fusion splicer used must be fully automated with full X and Y alignment and will employ fusion splice loss estimation. Fiber splice protection will be via 3M heat shrink sleeves. Any splice as estimated by the splicing equipment must not exceed 0.075 dB. If test results show attenuation out of specification limits then the Contractor is responsible to troubleshoot the link and determine corrective procedures. Any re-splicing or pigtail replacement will be at no cost to the Owner.

.7 No manual fusion splicing will be performed.

.8 Fiber cable preparation, pigtail routing, and forming within the splice or distribution panel will be as per manufacturer's training and printed instructions.

.2 Inner Ducts.

.1 Where the fiber optic cable is non-armored in intra-building applications, it will be protected in inner duct.

.2 Innerduct is installed along the entire cable route when installed in cable tray, backbone EMT conduits and risers between communication rooms.

END OF SECTION 27 13 23

27 15 00 HORIZONTAL CABLING

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Documents

1.2 DOCUMENTS

.1 This section forms part of the HSSBC Communications Infrastructure Standards and Specifications and is to be read, interpreted, and coordinated with all other parts of HSSBC Communications Infrastructure Standards and Specifications.

PART 2 PRODUCTS

2.1 CATEGORY 6 HORIZONTAL CABLE

.1 Approved cable will be AMP NetConnect or Belden Category 6 UTP, 23AWG, 100-ohm solid copper, CMR or CMP rated as required by the AHJ. To enhance operational supportability, the two manufacturers will not be mixed in a new or an existing building.
.2 For Community buildings and renovations in Acute sites, all horizontal cable and associated jacks, connectors, patch panels and faceplates will be Category 6 and manufactured by AMP NetConnect or Belden.
.3 Approved cable jacket colour is blue.

2.2 CATEGORY 6A HORIZONTAL CABLE

.1 Approved cable will be the latest AMP NetConnect or Belden Category 6A, UTP, 23AWG, 100-ohm solid copper, CMR or CMP rated as required by the AHJ. To enhance operational supportability, the two manufacturers will not be mixed in a new or an existing building.
.2 For new Acute sites, all horizontal cable and associated jacks, connectors, patch panels and faceplates will be Category 6A and manufactured by AMP NetConnect or Belden.
.3 Approved cable jacket colour is blue.

2.3 COMMUNICATIONS CONNECTORS

.1 Category 6 and Category 6A UTP connectors shall be 8-pin modular jacks (RJ-45-style) terminated in T568A Wire Map configuration. The Jacks must accept RJ-45 modular plugs without causing any damage or degradation to the connectors or pins.

.2 Approved colour for 8-pin modular jacks is black.

PART 3 EXECUTION

3.1 OVERVIEW

.1 The horizontal configuration will be a star structure with separate dedicated continuous cables run from the servicing zone Communications Rooms to the outlets on the same floor.

.2 The maximum length of horizontal cable will not exceed 80 m.

.3 Where there is more than one Communications room on the same floor, Communications boundary lines will be established so that horizontal cables will not cross the lines to another zone to be served by another Communications room.

.4 In a Communications Room, horizontal cables will be bundled separately from Inter and Intra backbone cables.

.5 All horizontal cables will be terminated at both ends. CMR-CMP rated Velcro straps will be used to support the cables depending on location. The straps will be loosely tightened in such a manner that it can slide around cable bundle.

.6 The use of Consolidation Points will not be allowed.

.7 Each cable will be terminated at workstation outlets on eight-position modular jacks with pin/pair assignment wired to T568A.

.8 The Contractor will leave slack in the cable at the outlet box following termination. Too much slack at the point of termination may result in testing failures and too little slack can compromise future maintenance.

.9 The Contractor will neatly dress all cables within the Communications room to follow building lines, the objective being to provide a reasonable amount of slack into each cable run, while at the same time provide neatness and promote order as the cables migrate from the point-of-entry to the termination point.

.10 The cable pair twist must be maintained as per the Manufacturer specifications at the point of termination.

.11 Refer to the following documents for guidelines on installation:

- .1 Manufacturer Installation Guideline Documentation.
- .2 TIA-568-C and C.1, as well as C-STD Drawings in 27 00 00.01 for installation.

3.2 HORIZONTAL CABLE INSTALLATION

.1 Faceplate Configuration (Reference C-STD Drawings in 27 00 00.01))

- .1 Communications Outlet
  - .1 A standard Communications outlet will have two 4-pair cables (Jacks 1 and 2 on a 4-port faceplate) terminated on rack mount patch panel.
  - .2 Two more 4-pair cables (Jacks 3 and 4) will be pulled together at the same time to the 4-port faceplate on an as needed basis (cost effective).
  - .3 Jack 1, Jack 2, Jack 3 and Jack 4 can be used for any application (PC/VOIP/data services, analogue, PBX, business lines, ADSL, fax, alarm, security, access control, elevator, etc.).

.2 All UTP cable system work completed by the Contractor must be inspected by the Communications Consultant and or the HSSBC NE Representative.

.3 Install materials in accordance with applicable standards, codes, requirements and recommendations of national, provincial and local authorities having jurisdiction and with manufacturer printed instructions.

.4 Adhere to manufacturer published specifications for pulling tension, minimum bend radii and sidewall pressure when installing cables.

.5 When installing, ensure cable is not subjected to stress due to contact with tray/conduit support mechanisms, bonding lugs or any metal burrs within the support structure. Particular care must be taken when working around corners and offsets. Pulling lubrication must be used at all times to ensure a stress-free installation.

.6 Cable dressing and termination procedures will confirm to the following requirements:

.1 All cable installation will be done in a neat and tidy fashion. All cable dressing within the EF, MER and TR will follow building lines.

.2 Cable will be neatly dressed with no crossovers within the bundle. The Communications Consultant and or the HSSBC NE Representative will have final approval of cable dressing quality and any workmanship issues. Bundles will be dressed using Velcro fasteners. Cables must not exhibit sheath deformation due to poor installation or bundle over-tightening. If cable dressing is not performed to the satisfaction of the Communications Consultant and or the HSSBC NE Representative, the Contractor will be responsible to re-install or re-dress the bundles at no cost to the Owner. Termination practices must strictly comply with manufacturer recommendations and all referenced wiring installation standards. Particular care must be taken to limit sheath removal length and pair untwisting at point of termination.

.3 Cables will be terminated in sequential order.

.4 At each Communications outlet follow the same termination practices as stipulated for the Communications Room.

.5 In Communications Rooms, horizontal cables will be bundled and terminated on patch panels. Refer to C-STD Drawings in 27 00 00.01.

.6 In existing buildings where the GigaBix method of termination is used and will be maintained for horizontal cabling, the use of patch panels is not permitted.

.7 Horizontal distribution cables will be loosely bundled in no more than 48 cables.

.8 Any cable damaged or exceeding recommended installation parameters during installation will be replaced by the contractor prior to final acceptance at no cost to the Owner.

.9 All cables will be terminated in Communications Rooms and at Communications outlets. Leave no cables un-terminated unless specified in T drawings or as directed by the Communications Consultant and or the HSSBC NE Representative.

.7 Patch Cables (within the Rack)

.1 Only 310mm (12”) standard patch cable (based grey) will be used to patch between the panel jacks and the switch ports.

.2 Where clinical and vendor equipment resides near the bottom of the rack (provided rack space is available below the switch cluster) for patching to the horizontal cables that connect to their end devices, longer patch cables will be used to route neatly through the horizontal and vertical cable managers based on shortest path.

.8 Patch Cable Lengths

.1 Patch cables for data switches will be 310mm (12”) long (within the same rack).

.2 Patch cables for analog services, clinical and vendor equipment typically range from 914mm (3’), 152mm (5’), to 1828mm (7’) (within the same rack).

.3 Patch cables for all workstations will be 3m (10’) long.

.4 Patch cables for wireless access points will be 7.6m (25’) long.

.9 Harness Cables, Cross Connect Cables and Patch Cords

.1 In existing buildings where Category 6 horizontal cable is being installed and the GigaBIX method of termination is used, the Contractor will install harness cables and cross connects.

.2 Harness cables will be maintained for horizontal cabling, Harness Cables are installed from the GigaBIX cross-connect in the Communications Room to the Owner's equipment installed on the racks and bundled per individual switch in groups of 48 and breakout into bundles of 24 for accessing the switch from the left and right vertical cable management channels. Where there are 24 port switches, the harness cables will be bundled in groups of 24 and breakout into bundles of 12 for accessing the switch from the left and right vertical cable management channels. Cable tie bar for supporting the harness cables will be 150 mm (6") deep.

.3 The harness cables shall be 4-pair Category 6 of the same colour and will meet the requirements of TIA 568-C.

.4 For Acute site, the quantity of harness cables to be supplied will be equal to 100% of the total quantity of horizontal data cables installed raised to the next increment of 48. For example, if 100 horizontal data cables are installed then 100 harness cables raised to the next increment of 48 will require 144 harness cables.

.5 For Community sites, the quantity of harness cables to be supplied will be equal to the number of horizontal data and spare cables installed raised to the next increment of 48. The harness cables shall be all the same colour. One end of the patch cord shall have an 8 Position Modular Plug (RJ45 plug) with a boot installed. The other end shall be terminated on the GigaBIX wall.

.6 Copper harness cables shall be provided as part of the structured cabling system.

.7 If the Owner does not supply the rack mount equipment during cable installation, the cabling contractor is to coordinate with the Communications Consultant and or the HSSBC NE Representative regarding the placement of the harness cables on the rack.

.8 Data cross-connect jumpers will be GigaBIX Cross-Connect Category 6 jumper wires or better.

.9 The installation of the data jumper wire is part of this scope of work.

3.3 ACCESSIBILITY

.1 Install all work in a manner that allows easy access for adjustment, operation and maintenance. Provide access panels where required to allow access to junction boxes and devices for maintenance purpose.

.2 Locate access panels in service areas wherever possible. Do not locate in finished walls.

3.4 MISCELLANEOUS CABLES

.1 HSSBC does not accept hybrid or under-carpet cabling.

3.5 LIGHTNING PROTECTION

.1 Primary Protectors for PoE equipment installed inside Communication Rooms:

.1 Provide Surge protectors (Porta Systems equal or better 4–Pair Category 6 PoE Protector with 65V Solid State Protector) on each Horizontal cable run entering the building.

.2 Provide a #6 AWG Green Insulated Bonding Conductor from either the Electrical Grounding Bus bar or the Telecommunications Grounding Bus bar (whichever is closer).

.3 Daisy Chain the #6 ground between each Horizontal Protector.
.4 Bond the metallic conduit used for running the Horizontal 4-pair Circuits.
.5 Note: the 65V Solid State modules are necessary for pass-through of PoE+ voltage. Surge Protector Installation is based on current CEC Code Section 60 and EIA/TIA 607-C.

END OF SECTION 27 15 00

27 15 00.01 MODULAR FURNITURE

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Documents
.3 Overview

1.2 DOCUMENTS

.1 This section forms part of the HSSBC Communications Infrastructure Standards and Specifications and is to be read, interpreted, and coordinated with all other parts of HSSBC Communications Infrastructure Standards and Specifications.

1.3 OVERVIEW

.1 Unless specified otherwise, modular furniture system and custom millwork will be designed to Commercial Building Standard for Telecommunications Pathways and Spaces, TIA-569-D. This defines the furniture pathways and spaces contained in work areas.

PART 2 PRODUCTS

2.1 FURNITURE PRODUCT

.1 The modular furniture system and custom millwork must be functional, flexible, durable, replaceable and proven for cable infrastructure.
.2 The quality of the Communications cutouts will be robust in design to hold the Communications faceplate firmly in place to prevent it from being knocked out easily.
.3 Belden and AMP NetConnect standard compliant modular furniture faceplates are specified to be used.
.4 The Communications faceplate cutouts will meet the following dimensions:
  .1 Belden faceplate cutout is 69 mm x 35.5 mm.
  .2 AMP NetConnect faceplate cutout is 67.56 mm - 69.95 mm x 34.04 mm - 35.56 mm.
.5 The wiring channels (raceways) will not have sharp / abrasive corners that can potentially damage Communications cables or power whips particularly at corners where cables make the bend.
.6 The wiring channels will be constructed of metal to hold the power and Communications outlets firmly in place. PVC raceway will not be accepted.
.7 The modular furniture will have a versatile layout to enable a number of connected workstations in a cluster to be supported via top feed (system's pac pole), bottom feed or wall feed.
.8 The wall panels will be interchangeable. 610 mm or 1220 mm panels are more versatile than 914 mm or 1524 mm panels.
.9 All custom and modular millwork furniture structured cabling wiring channels will be sized according the BICSI standards max. 40% fill ratio after all the cabling is installed.

PART 3 EXECUTION

3.1 INSTALLATION

.1 The maximum furniture pathway fill will be 40%. It is calculated by dividing the sum of the cross-sectional area of all cables by the most restricted cross-sectional area of the pathway. Cable fill capacity takes into consideration that there is unusable space between cables and that cables may take independent paths.

.2 Where the raceway is joint-used, the power system will be isolated from the Communications system by a metallic shield within the power cable or a metallic barrier separating the two.

.3 Where ergonomic consideration ranks high, the power and Communications cut-outs and outlets will be located on the wiring channel above the desk.

.4 Where any furniture is placed against the wall, it will have a back wall clearance at the bottom 457 mm AFF to access wall mount Communications and power outlets.

END OF SECTION 27 15 00.01

27 16 00 CONNECTING CORDS, DEVICES AND ADAPTORS

PART 1 GENERAL

1.1 SUMMARY

.1 This section describes any cords, cross-connect wire, devices, and adapters required to connect the OSP, riser, and horizontal cabling as called for in these specifications and related drawings.

PART 2 PRODUCTS

2.1 COMMUNICATIONS ROOM COPPER PATCH CORDS

.1 Provide one patch cable per horizontal cable installed. Use Cat6A cords on Cat6A projects.

.2 For voice analogue services, provide 24 patch cords for each voice panel in a rack, 50% will be 2.1m (7') and the other 50% will be 3m (10') to patch between panel jacks lower down the rack to voice panel jacks near the top of the rack.

2.2 WORK AREA COPPER CONNECTING CORDS

.1 Provide one patch cable per horizontal cable installed. Use Cat6 cords on Cat6 projects. Use Cat6A cords on Cat6A projects.

.2 Patch cables for all workstations will be 3m (10') long.

2.3 COPPER CONNECTING CORDS FOR WIRELESS ACCESS POINTS

.1 Refer to Section 27 21 33.

2.4 COMMUNICATIONS ROOM FIBER PATCH CORDS

.1 Fiber Optic Patch Cord –LC Duplex.
- .1 Fiber patch cord suitable for indoor installation within a fiber patch panel.
- .2 Cord assembled from a single, continuous length of cordage, homogenous in nature; Splices are not permitted.
- .3 Cords terminated at both ends via specified connector type.
- .4 Colours
  - .1 The following cable sheath colours shall be used on OM4 without exceptions to differentiate from Aqua-coloured OM3:
    - .1 Amp NetConnect - Violet
    - .2 Belden - Erika Violet.
  - .2 For singlemode patch cords, a yellow sheath colour shall be used.
- .5 Fiber Patch Cords shall be Amp NetConnect or Belden MM/SM, LC/LC Duplex.

.6 Typical MM/SM patch cord lengths and quantity will be:
  .1 A mixture of 1.5m (5'), 2.1 m (7'), 3m (10'), and 4.6m (15'), 6.1m (20') and shall be verified with Communications Consultant and or the HSSBC NE Representative.
  .2 Communications closet requirements: 240 horizontal copper cables require 8 fiber patch cords. Verify quantities with the HSSBC NE Representative.

2.5 CROSS-CONNECT WIRE

.1 Where IDC blocks are used, Contractor will supply and install cross connection wires. All voice cross connections will be neatly routed via D-rings and bundled with Velcro wraps.

.2 Wires will be 24 AWG solid tinned copper, 1-pair Category 3. Conductors will be insulated with semi-rigid PVC. One insulated conductor in a pair will be white and the other in visibly distinct solid colour. Pair-untwist will not exceed 75mm from the point of termination.

.3 The quantity of cross connection wires will be 24 pairs per 24 port voice tie cable patch panel, plus 10% spare.

PART 3 EXECUTION

3.1 DUPLEX FIBER POLARITY GUIDELINES FOR SC/LC CONNECTORS

.1 Introduction, refer to TSB-125 Reserve Pair Positioning
  .1 Most fiber systems today are based on transmission along fiber pairs, using one fiber for one direction of signal propagation and the other fiber for the opposite direction. When installing and maintaining these systems, it is important to make sure that the signals are kept on the correct fibers, so that the transmit-to-receive polarity is always maintained.
  .2 Duplex crossover cords and pair-wise crossover backbone wiring greatly simplify cable administration for this type of optical fiber network. When installed correctly, these systems automatically ensure proper signal polarity, so end users do not need to worry about maintaining transmit and receive signal integrity at connection points.

.2 General Principles
  .1 All duplex opto-electronic transceivers within the same application (Ethernet for example) have the same transmit and receive port positions. When looking into the ports of the transceiver with the keyways of the receptacle facing up, the transmitter is on left and the receiver on the right.
  .2 When connecting transceivers together, the signals must cross over. The crossover connects the transmitter of one device to the receiver of the second device.
  .3 <u>All individual elements of a channel will provide a crossover. Channel elements include every patch cord, every adapter (coupling), and every cable segment between patch panels.</u>
  .4 There are always an odd number of elements in a channel, whether the channel is made from a single patch cord or a concatenation of many cables and cords.
  .5 The net effect of an odd number of crossovers is a single crossover.

3.2 HSSBC PATCHING METHODOLOGY

.1 Patch Cables (within the Rack)
- .1 Only 310mm (12”) standard patch cable (based grey) will be used to patch between the panel jacks and the switch ports.
- .2 Where clinical and vendor equipment resides near the bottom of the rack (provided rack space is available below the switch cluster) for patching to the horizontal cables that connect to their end devices, longer patch cables will be used to route neatly through the horizontal and vertical cable managers based on shortest path.

.2 Patch Cable Lengths
- .1 Patch cables for data switches will be 310mm (12”) long (within the same rack).
- .2 Patch cables for analogue services, clinical and vendor equipment typically range from 914mm (3’), 152mm (5’), to 1828mm (7’) (within the same rack).
- .3 Patch cables for all workstations will be 3m (10’) long.
- .4 Patch cables for wireless access points will be 7.6m (25’) and up to 13m (42’) in length.

END OF SECTION 27 16 00

27 21 33 DATA COMMUNICATIONS WIRELESS ACCESS POINTS

PART 1 GENERAL

1.1 SUMMARY

.1 Summary
.2 Cabling for Wireless
.3 Wireless Installation

1.2 CABLING FOR WIRELESS

.1 TSB-162-A provides guidelines for pre-cabling a building using a grid approach. The pre-cabled grid makes the building ready for a wireless infrastructure at any time simply by plugging into a wireless access point. The square cell structure helps designers determine how much cabling will be required for the WLAN and it allows for flexibility for coverage (AP density), capacity and growth in the wireless infrastructure.

.2 A grid is a collection of uniform cells where each cell is a square. The size for a square will be 10.0m x 10.0mfor seamless wireless access point coverage for both 5 Ghz frequency range and 2.4 GHz. Note: this cell size has been deemed appropriate for a Healthcare setting. For underground parking and parkades, it may be permissible to increase the cell size to 15m x 15m with approval from the HSSBC NE Representative.

.3 In large medical educational spaces with high occupancy such as classrooms, conference rooms and auditoriums, requirements for higher than average access point density to support a larger number of wireless devices may drive the need for additional outlets over and above what the 10m x 10m grid will allow for. Refer to Table 3 in TIA PN-4966 and contact the HSSBC NE Representative for specific direction.

.4 The ceiling Communications outlet is to be located at the centre of the square cell.

.1 Patch cords to be provided that allow an access point to be installed anywhere within the cell.

.2 A ceiling Communications outlet is required for any partial cell.

.5 To ensure contiguous and ubiquitous wireless coverage, the wireless cabling grid will cover all areas within the deployment scope including utility spaces (mechanical, electrical, elevator machine, communication rooms), stairwells, parking levels, service links and tunnels.

.6 If required, Communication outlets will be installed in exterior locations (lamp posts, exterior walls, etc.) so that wireless coverage can be provided outside the building. The location and quantity of exterior Communication outlets for wireless coverage will be determined in consultation with the Communications Consultant and or the HSSBC NE Representative. If the cabling length between the nearest Telecommunication Room and the exterior wireless communication outlet exceeds 80m, fiber and power will be provided to each access point location identified by the HSSBC NE Representative.

.7 Power will typically be delivered through the horizontal cabling.

PART 2 PRODUCTS

2.1 SEE HORIZONTAL CABLING SECTION 27 15 00

PART 3 EXECUTION

3.1 WIRELESS INSTALLATION

.1 HSSBC is responsible for:
- .1 The design of the facility's wireless (WIFI) network and the procurement, configuration and commissioning of all wireless and wired network hardware including access points, antennas, switches and controllers.
- .2 The procurement, configuration and commissioning of all hardware and software related to wireless network management systems and tools.
- .3 Providing centralized authentication and security appliances or latest equivalent to support the wireless network within the Facility.
- .4 The procurement of all standard vendor supplied access point mounting brackets, lighting arrestors and accessories required to install wireless hardware.
- .5 Conducting all predictive, active and passive wireless RF surveys necessary to determine access point placement and to validate and calibrate the wireless network to ensure all required technical parameters (coverage, SNR, etc.) are met.
- .6 Identifying the mounting locations for all wireless hardware. To assist in the correct installation of wireless hardware, HSSBC will provide drawings, written instructions and or pictures detailing mounting locations and, where possible, will also identify access point and antenna locations on site.
- .7 Labelling and supplying the wireless access points, antennas, mounting brackets and other standardized hardware based upon a mutually agreed to schedule.

.2 In general, the responsibility of the builder, project consultants and the Division 27 Contractor in the deployment of a wireless infrastructure are as follows:
- .1 Furnishing HSSBC with all documentation required to accurately complete a software based predictive wireless survey. This includes, but is not restricted to floor plans, reflective ceiling plans, elevations and section drawings, furniture and equipment layouts and information on building materials and finishes. The Builder and or the project consultants are required to keep the HSSBC NE Representative appraised of all changes to this documentation throughout the course of constructing or renovating the Facility.
- .2 Designing the Facility including equipment locations (e.g., microwave ovens) in a manner that does not introduce interference beyond the noise floor and impact signal strength requirements (SNR) of the wireless network. The resulting RF environment in the Facility must be consistent with the strictest specifications of the wireless end-use equipment.
- .3 Providing HSSBC and its representatives with access to the site during construction to conduct wireless RF surveys and testing.
- .4 Supplying, installing, testing and certifying a horizontal cabling grid throughout the facility's ceiling spaces to connect wireless access points.

.5 Installing all access points, antennas and associated accessories and hardware as prescribed by HSSBC's wireless design.
   .1 Wireless network hardware provided to the Contractor for the interior of the Facility will not be installed until the building is enclosed, weather tight, temperature and humidity conditions are approximately the same as final conditions expected, wireless cabling grid is installed and tested, most construction activities are complete and surfaces have been swept and treated for dust control. The Contractor will not be allowed to install wireless and wired network hardware until HSSBC has inspected the interior building conditions and provided written approval to proceed with the installation.
   .2 Prior to receipt of wireless network hardware and components for installation, the Contractor is required to provide HSSBC with as-built documentation of the wireless cabling grid identifying the cable IDs associated with each wireless communication outlet.
   .3 Upon receipt of wireless and wired network hardware and components, the Contractor will be financially responsible for any damage or disappearance of HSSBC provided material due to improper handling and storage, negligence, fire, theft and environmental conditions during construction.

.6 Moving and or adding wireless network hardware as prescribed by HSSBC after completion of pre and post occupancy wireless surveys. In addition to labour and equipment, the Contractor is required to cover all costs associated with moving access points such as replacement of ceiling tiles and the installation of sleeves through walls.

.7 Installing two patch cords between each access point and its designated wireless outlet as specified in HSSBC's design. If required due to the ceiling type, the Contractor will install conduit to run the patch cords between the wireless communication outlet and the access point. In the Communications Room, the Contractor must also install two patch cords to connect the access point to the switch ports designated by HSSBC.

.8 Installing lightening arrestors and associated grounding on all outdoor access point locations where specified by HSSBC. The Contractor will also be required to supply and install surge protectors in Communications Rooms for each horizontal cable run entering the building.

.9 If the mounting of wireless hardware requires the procurement of non-standard or specialty mounts, brackets, vanity skins or covers or the fabrication of custom solutions, the Contractor will be expected to bear all associated design, fabrication, procurement and installation costs. Furthermore, if alterations in the design, fabrication and installation of components provided by others are needed to install any aspect of the wireless infrastructure then the Contractor will be expected to bear the full cost of all such customization.

.10 For the safety of patients and staff, the Contractor will be required to supply, install and label ceiling (hard cap and tile) enclosures to house wireless hardware in areas of the Facility specified by the Communications Consultant and or the HSSBC NE Representative. These enclosures will hide wireless hardware from view and or prevent unauthorized access to the access point and the connecting cabling. The enclosures provided must allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour. Prior to purchase of the enclosures, the Contractor will submit shop drawings to the Communications Consultants and or the HSSBC NE Representative for approval and, if required, provide samples for RF testing purposes and to check for interoperability with wireless hardware.

.11 To protect wireless hardware from the environment, theft or vandalism, the Contractor will be required to supply, install and label indoor/outdoor NEMA rated access point enclosures in certain areas within and outside the Facility as specified by the Communications Consultant and or the HSSBC NE Representative. The enclosures must be able to protect wireless hardware from wet and dirty environments, UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, lockable and work with all variations of provided wireless hardware. Prior to purchase of the enclosures, the Contractor will submit shop drawings to the Communications Consultants and or the NE Representative for approval and, if required, provide samples to HSSBC for RF testing purposes and to check for interoperability with wireless hardware.

3.2 INSTALLATION (INDOOR)

.1 Regardless of the location and mounting method of the wireless access point, maximum permanent link length is 80 meters.

.2 Two horizontal cables will be installed to each wireless Communications outlet. Terminate two horizontal cables on Belden or Amp NetConnect jack.

.3 Mounting Scenarios for different ceiling types:

.1 Solid (drywall) ceiling:

.1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray.

.2 Patch cords are to be fished across solid ceilings between the ceiling Communications outlet box and the wireless access point location.

.3 The standard patch cord length used to connect to the wireless access point is 25’ / 7.62m. Store and support any slack length in the ceiling above the access point.

.4 The ceiling Communications outlet box to be mounted above ceiling for the termination of horizontal runs.

.1 Ceiling Communications outlet box is ~~a~~ 100mm x 100mm x 54mm with a 100mm x 100mm shoe box steel cover for a decora strap.

.2 The ceiling Communications outlet box will be fastened directly to the ceiling’s structural support member with a Caddy clip and/or screws no more than 305mm above the access hatch opening.

.5 An access panel (305mm x 305mm) will be installed at the ceiling Communications outlet box location (painting is by the contractor).

.6 Wireless access point installation (directly) to ceiling using vendor supplied mounting bracket.

.7 All access points must be seismically restrained.

.8 Label the wireless access point, faceplate, patch cords and the access hatch.

.2 Exposed ceiling (Parkade, utility spaces, stairwells, etc.):

.1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray. If it is determined after completion of the survey that the ceiling Communications outlet box is to be used in the initial deployment, a 27mm conduit will also be installed for the patch cords to the access point location.

.2 Use a standard patch cord length that closely matches to the length of the conduit between the ceiling Communications outlet box and the wireless access point. Store any slack length in the ceiling Communication outlet box and/or electrical box supporting the wireless access point.

.3 Ceiling Communications outlet box to be mounted to the ceiling for the termination of horizontal runs.
.1 Ceiling Communications outlet box is a 150mm x 150mm x 100mm with a solid cover plate. Locate a 2-port Surface jack Assembly inside the JB.
.4 Install wireless access point to a 100mm x 100mm x 54mm electrical box using supplied mounting bracket or alternatively inside a wireless enclosure or to specialty mount as required
.5 All access points must be seismically restrained.
.6 Label the wireless access point, ceiling Communications outlet box, surface jack assembly and patch cords.

.3 Accessible (T-bar) Ceiling:
.1 The dual horizontal cable runs are to be installed in conduit between the ceiling Communications outlet box and the nearest cable tray.
.2 Patch cords are to be fished across ceilings between the ceiling Communications outlet box and the wireless access point location.
.3 The standard patch cord length used to connect to the wireless access point is 25' / 7.62m. Store and support any slack length in the ceiling above the access point.
.4 The ceiling Communications outlet box to be mounted above ceiling for the termination of horizontal runs.
.1 Ceiling Communications outlet box is a 100mm x 100mm x 54mm with a 100mm x 100mm shoe box steel cover for a decora strap.
.2 The ceiling Communications outlet box will be fastened directly to the ceiling's structural support member with a Caddy clip
.5 Wireless access point installation (directly) to ceiling Main Tee using vendor supplied mounting bracket.
.6 All access points must be seismically restrained.
.7 Label the wireless access point, faceplate and patch cords.

.4 In mounting scenarios that don't meet with the examples above, the Communications Consultant and or the HSSBC NE representative is to be consulted.

.5 Wireless Access Point Enclosures:
.1 In a Mental Health setting with an anti-ligature requirement, hard cap and/or tile ceiling enclosures may be required to house wireless hardware in specific areas. These enclosures will hide wireless hardware from view and or prevent unauthorized access to the wireless access points and the connecting patch cords.
.2 To protect wireless hardware from the environment, theft and vandalism, NEMA rated indoor/outdoor enclosures will be required in certain areas within and outside a facility. These enclosures will protect wireless hardware from wet and dirty environments and will be UV stabilized, virtually transparent to wireless signals and lockable.
.3 All types of wireless access point enclosures will be supplied by the Division 27 Contractor.
.4 Division 27 Contractor to label the exterior of the Wireless Access Point Enclosure.

.6 At the communications room end, the wireless cabling from the same drop location and distributed evenly across patch panels (odd numbers P1, P3, P5, etc.) for patching to different switches within each rack.

.7 Two horizontal patch cords will be plugged into each wireless outlet. The maximum length of the patch cords allowed is 7.62m (25'), The use of patch cords between the Communications outlet and the AP enables moving the AP around within the cell for specialized coverage. If a larger cell size is approved in underground parking levels and parkades, the patch cord length may be as long as 13m as specified in TSB-162-A.

.8 The method of mounting the outlet will suit the level of security at each location. HSSBC to be consulted for security detail.

.9 For all outdoor wireless access point installation, the applicable CEC and BC codes will govern the location, mounting, grounding and type of service cable and enclosures used. Reference “Outdoor Cabling” in Horizontal Section.

.10 Staircases must be included in cabling infrastructure. AP deployment will be based on a wireless outlet per landing starting at the first landing.

END OF SECTION 27 21 33

27 00 00.01 COMMUNICATIONS STANDARD – DRAWINGS

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Drawing No.	Drawing Title	Rev.
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2 ▶	NEW WALL MOUNTED VOICE DATA OUTLET (MOUNTED AT 305mm AFF)
2 ▶	EXISTING WALL MOUNTED DATA OUTLET
2 ▶	NEW FLOOR MOUNTED DATA OUTLET
2 ▶	EXISTING FLOOR MOUNTED DATA OUTLET
1 ▷	NEW WALL MOUNTED TELEPHONE
1 ▷	EXISTING WALL MOUNTED TELEPHONE
2 ▶ AP	WIRELESS ACCESS POINT
	NEW CONDUIT (SIZE AS SHOWN ON DRAWING)
	NEW RACEWAY (SIZE AS SHOWN ON DRAWING)
	HORIZONTAL SLEEVE
o	VERTICAL SLEEVE
	EXISTING CONDUIT (SIZE AS SHOWN ON DRAWING)
	EXISTING RACEWAY (SIZE AS SHOWN ON DRAWING)
P	PULLBOX (SIZE AS SHOWN ON DRAWING)
J	JUNCTION PULLBOX
	FLOOR MOUNT DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE
J	CEILING J–HOOKS
WM	WIREMOLD
T	TERMINATION LOCATION
	IP CAMERA
CR	CARD READER

NOTE:

1. STANDARD OUTLETS LOCATED IN SURFACE RACEWAY OR MODULAR FURNITURE SHALL BE SHOWN ON THE DRAWINGS WITH ONE SINGLE SYMBOL.
2. THE SYMBOL FOR STANDARD OUTLETS INDICATES A COMBINATION VOICE–DATA OUTLET.

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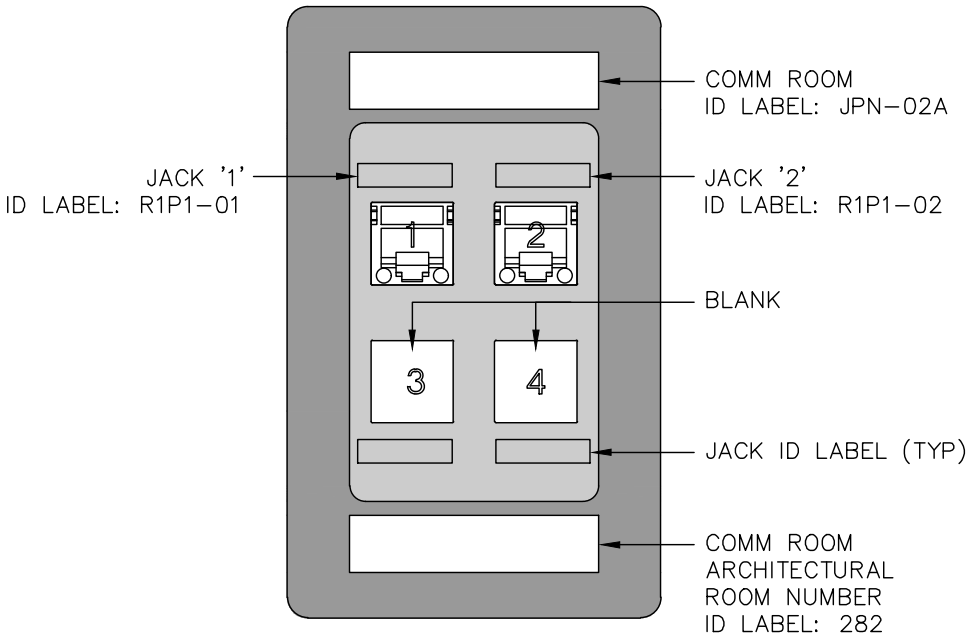
COMMUNICATIONS VOICE–DATA OUTLET DRAWING SYMBOLS

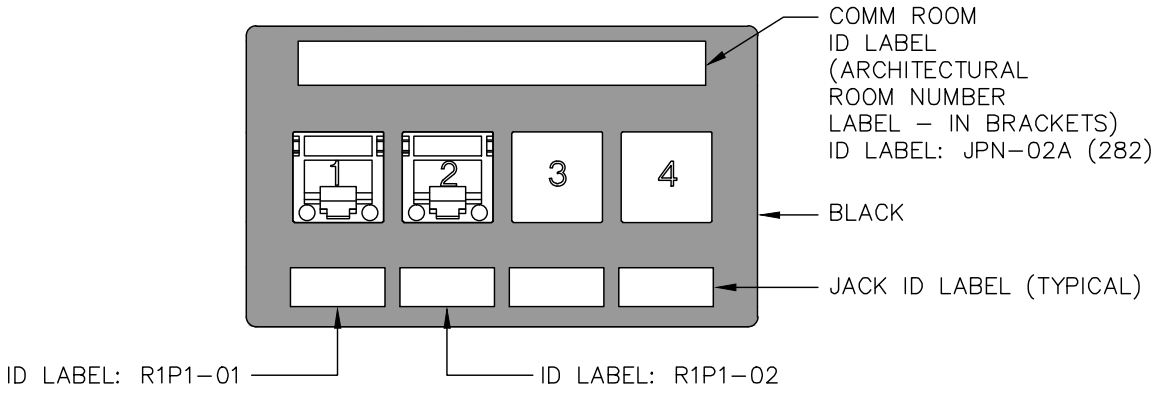
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–001.1

Rev. 1



EXAMPLE: 4–PORT WALL PLATE



EXAMPLE: 4–PORT FURNITURE PLATE

2 ▶ 2 NEW HORIZONTAL JACKS

NOTE: WALL MOUNT PHONE WITH 1 JACK

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COMMUNICATIONS VOICE–DATA OUTLET

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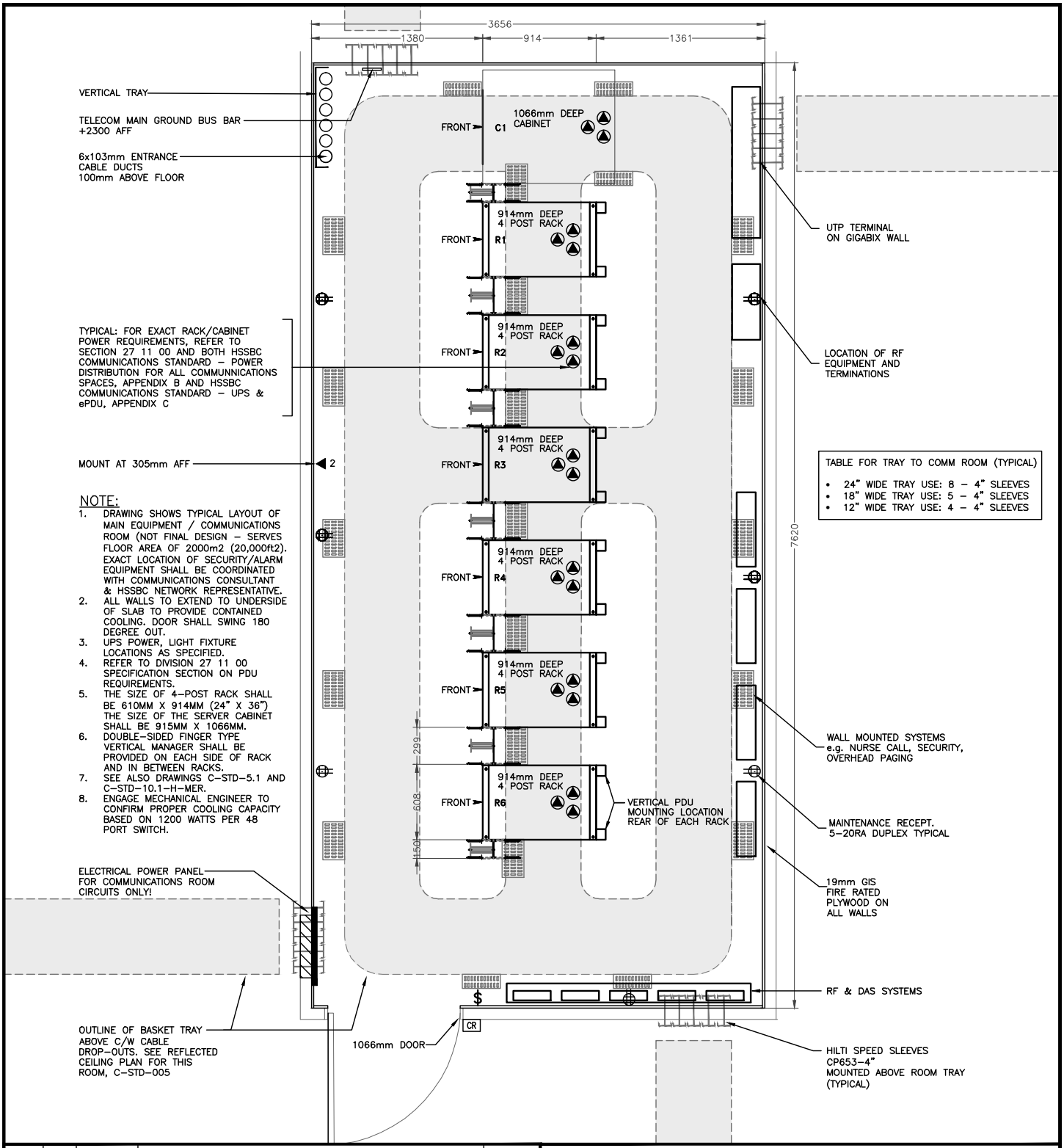
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–001.2

Rev. 1



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COMMUNICATIONS–HOSPITAL MER ROOMS FLOOR PLAN (2000m2)

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HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–004.1–H–MER

Rev. 1

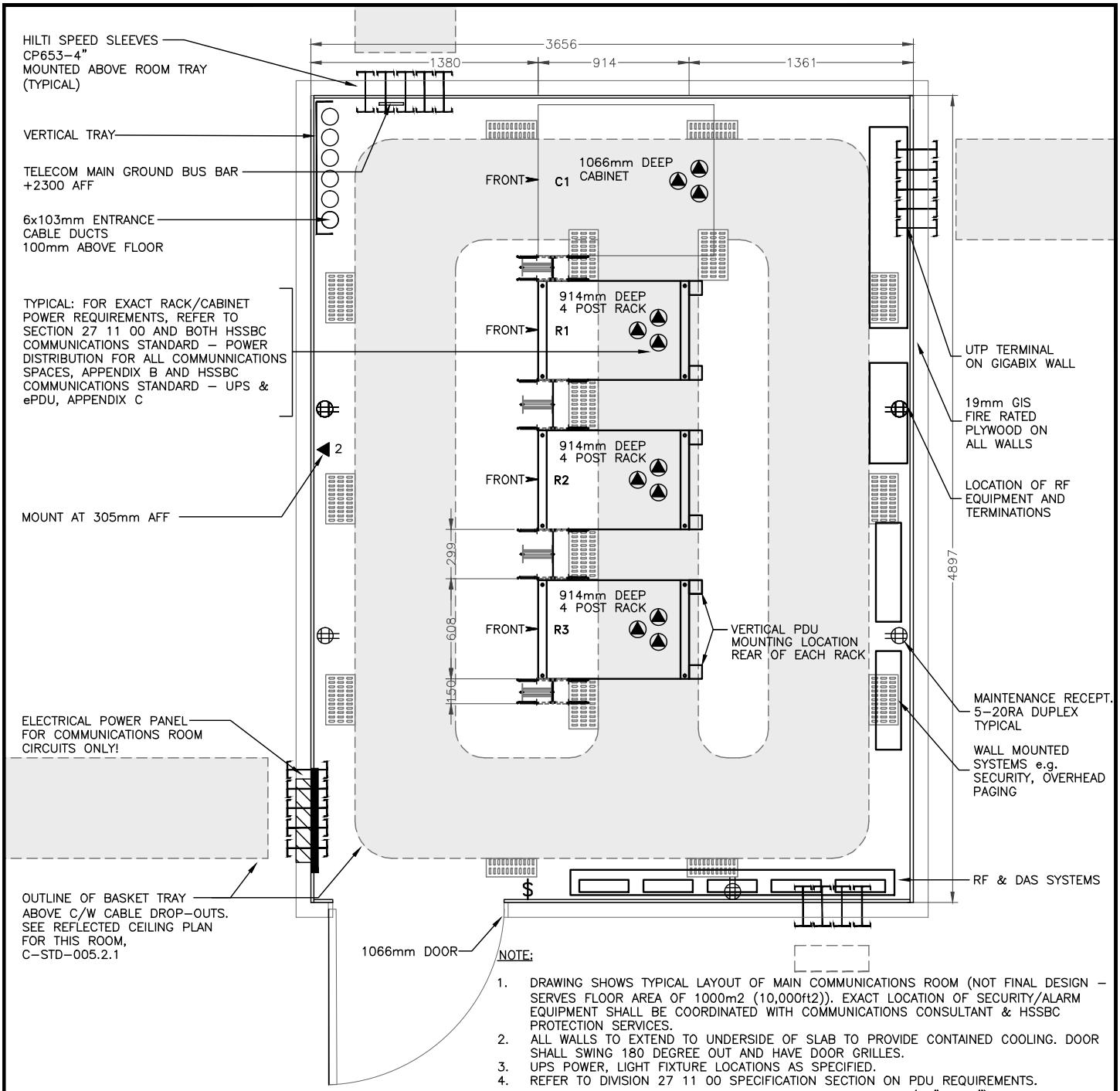

TABLE FOR TRAY TO COMM ROOM (TYPICAL)

- 24" WIDE TRAY USE: 8 – 4" SLEEVES
- 18" WIDE TRAY USE: 5 – 4" SLEEVES
- 12" WIDE TRAY USE: 4 – 4" SLEEVES

NOTE:

1. DRAWING SHOWS TYPICAL LAYOUT OF MAIN COMMUNICATIONS ROOM (NOT FINAL DESIGN – SERVES FLOOR AREA OF 1000m2 (10,000ft2)). EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC PROTECTION SERVICES.
2. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOOR SHALL SWING 180 DEGREE OUT AND HAVE DOOR GRILLES.
3. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
4. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
5. THE SIZE OF 4–POST RACK SHALL BE 610mm x 914mm (24" x 36") AND THE SIZE OF THE SERVER CABINET SHALL BE 915MM X 1066MM.
6. DOUBLE–SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK AND IN BETWEEN RACKS.
7. SEE ALSO DRAWINGS C–STD–5.2.1 AND C–STD–10.3.1–C–MER.
8. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER 48 PORT SWITCH.

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COMMUNICATIONS–COMMUNITY MER COMMUNICATIONS ROOM FLOOR PLAN (1000m2)

Health Shared Services BC
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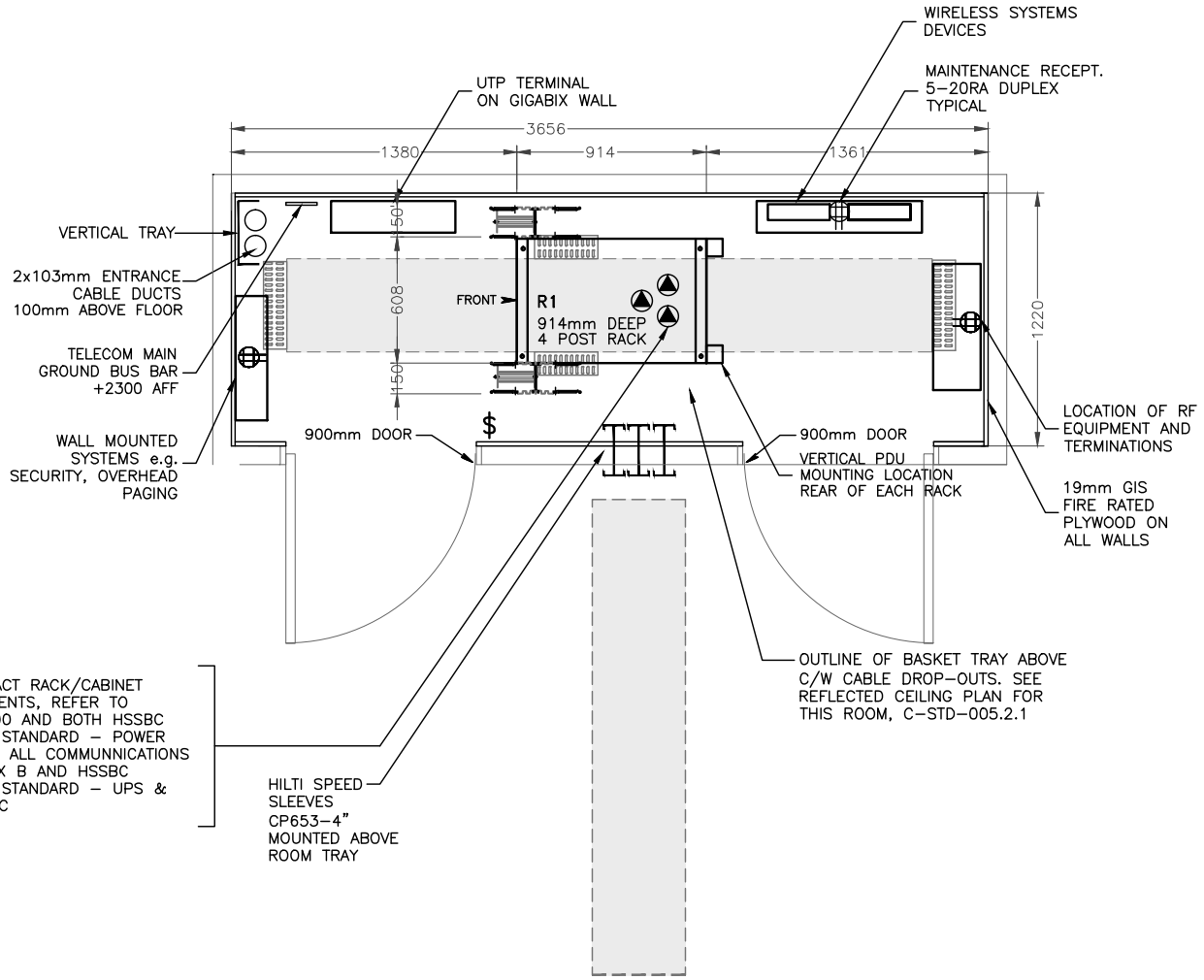
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–004.2–C–MER Rev. 1

TABLE FOR TRAY TO COMM ROOM (TYPICAL)

- 24" WIDE TRAY USE: 8 – 4" SLEEVES
- 18" WIDE TRAY USE: 5 – 4" SLEEVES
- 12" WIDE TRAY USE: 4 – 4" SLEEVES



NOTE:

1. DRAWING SHOWS TYPICAL LAYOUT OF COMMERCIAL LARGE COMMUNICATIONS CLOSET (NOT FINAL DESIGN – SERVES FLOOR AREA OF 500m2 (5,000ft2)).
2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC PROTECTION SERVICES.
3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOORS SHALL SWING 180 DEGREE OUT AND HAVE DOOR GRILLES.
4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
6. THE SIZE OF 4–POST RACK SHALL BE 610mm x 914mm (24" x 36").
7. DOUBLE–SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK.
8. SEE ALSO DRAWINGS C–STD–5.3 AND C–STD–10.5–C–LTC.
9. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER 48 PORT SWITCH.

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COMMUNICATIONS–COMMUNITY LARGE COMMUNICATIONS CLOSET FLOOR PLAN (500m2)

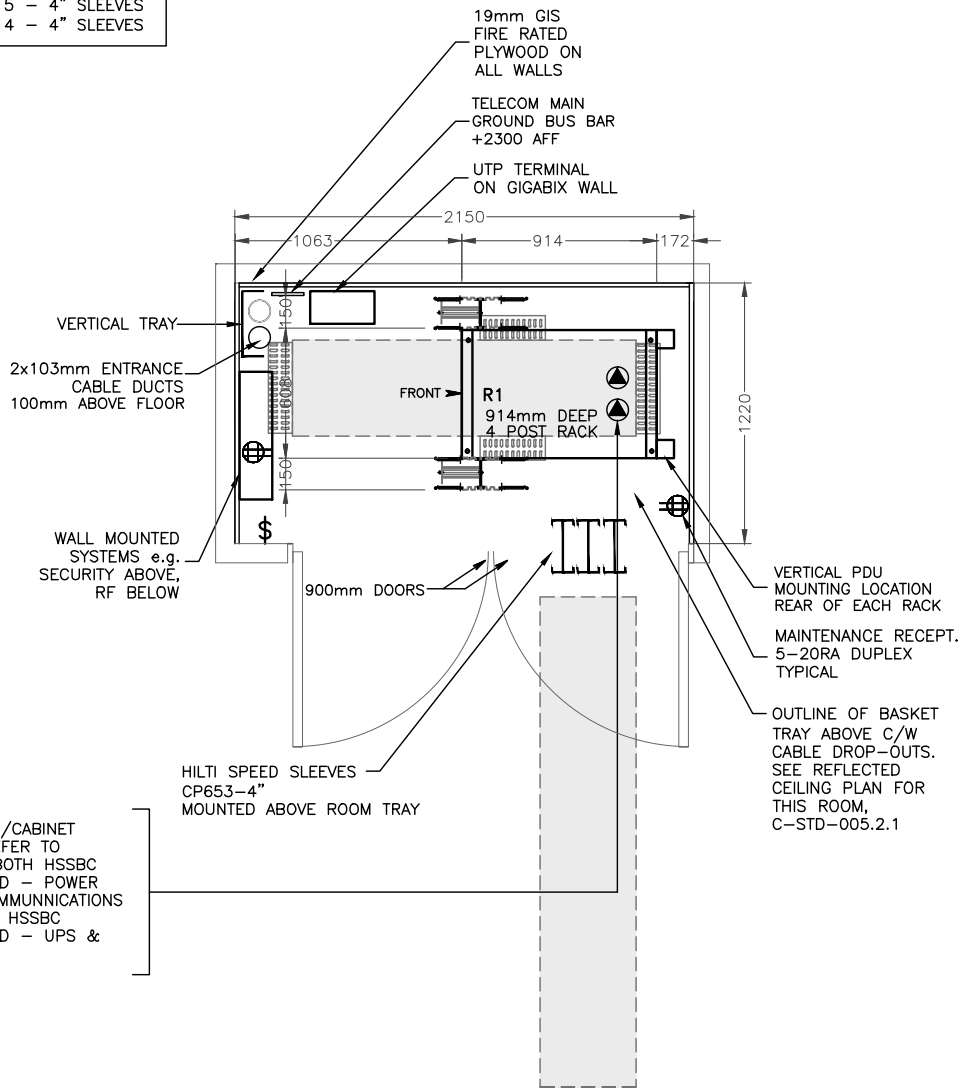
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–004.3–C–LCC

Rev. 1

TABLE FOR TRAY TO COMM ROOM (TYPICAL)

- 24" WIDE TRAY USE: 8 – 4" SLEEVES
- 18" WIDE TRAY USE: 5 – 4" SLEEVES
- 12" WIDE TRAY USE: 4 – 4" SLEEVES



NOTE:

1. DRAWING SHOWS TYPICAL LAYOUT OF COMMERCIAL SMALL COMMUNICATIONS CLOSET (NOT FINAL DESIGN – SERVES FLOOR AREA OF 100m2 (1,000ft2).
2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC PROTECTION SERVICES.
3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOORS SHALL SWING 180 DEGREE OUT.
4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
6. THE SIZE OF 4–POST RACK SHALL BE 610mm x 914mm (24" x 36").
7. DOUBLE–SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK.
8. SEE ALSO DRAWINGS C–STD–5.4 AND C–STD–10.6–C–SCC.
9. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER 48 PORT SWITCH.

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COMMUNICATIONS–COMMUNITY SMALL COMMUNICATIONS CLOSET FLOOR PLAN (100m2)

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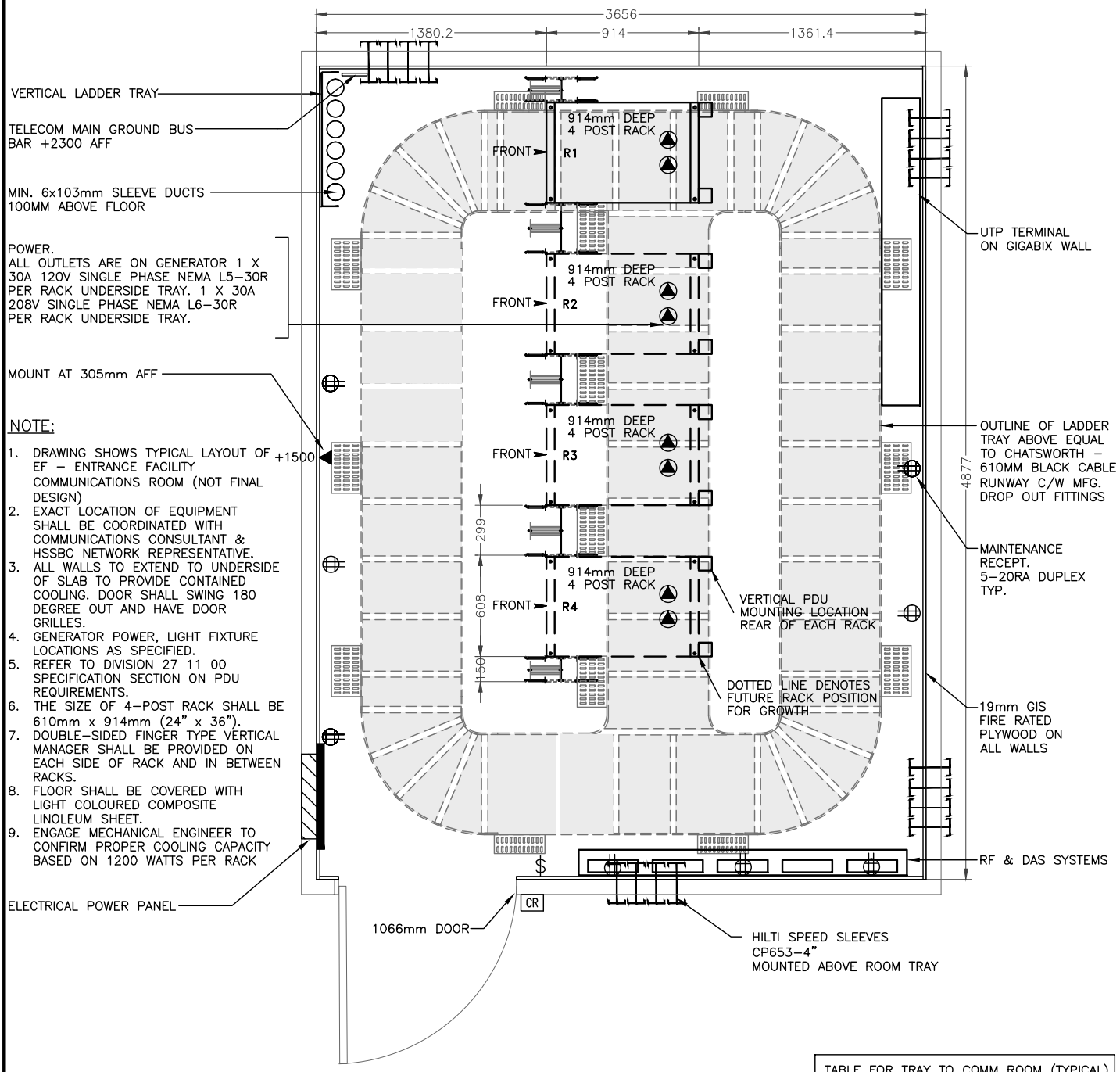
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–004.4–C–SCC

Rev. 1



NOTE:

1. DRAWING SHOWS TYPICAL LAYOUT OF EF - ENTRANCE FACILITY COMMUNICATIONS ROOM (NOT FINAL DESIGN)
2. EXACT LOCATION OF EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC NETWORK REPRESENTATIVE.
3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOOR SHALL SWING 180 DEGREE OUT AND HAVE DOOR GRILLES.
4. GENERATOR POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
6. THE SIZE OF 4-POST RACK SHALL BE 610mm x 914mm (24" x 36").
7. DOUBLE-SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK AND IN BETWEEN RACKS.
8. FLOOR SHALL BE COVERED WITH LIGHT COLOURED COMPOSITE LINOLEUM SHEET.
9. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER RACK

TABLE FOR TRAY TO COMM ROOM (TYPICAL)

- 24" WIDE TRAY USE: 8 - 4" SLEEVES
- 18" WIDE TRAY USE: 5 - 4" SLEEVES
- 12" WIDE TRAY USE: 4 - 4" SLEEVES

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COMMUNICATIONS-HOSPITAL ENTRANCE FACILITY (EF) FLOOR PLAN

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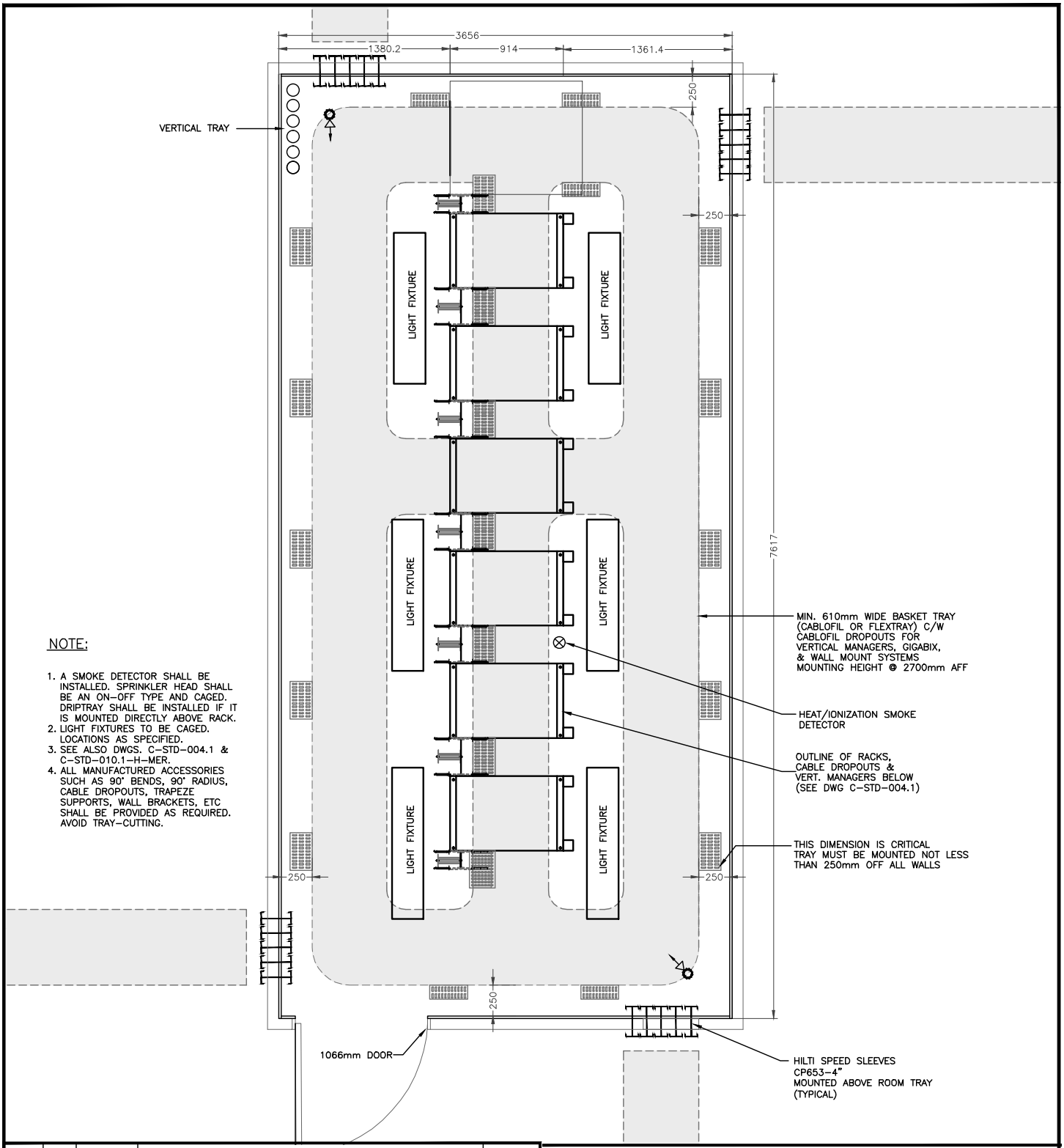
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-004.5-H-EF

Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-004.1 & C-STD-010.1-H-MER.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY-CUTTING.

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COMMUNICATIONS – HOSPITAL MER
REFLECTED CEILING PLAN (TYPICAL)

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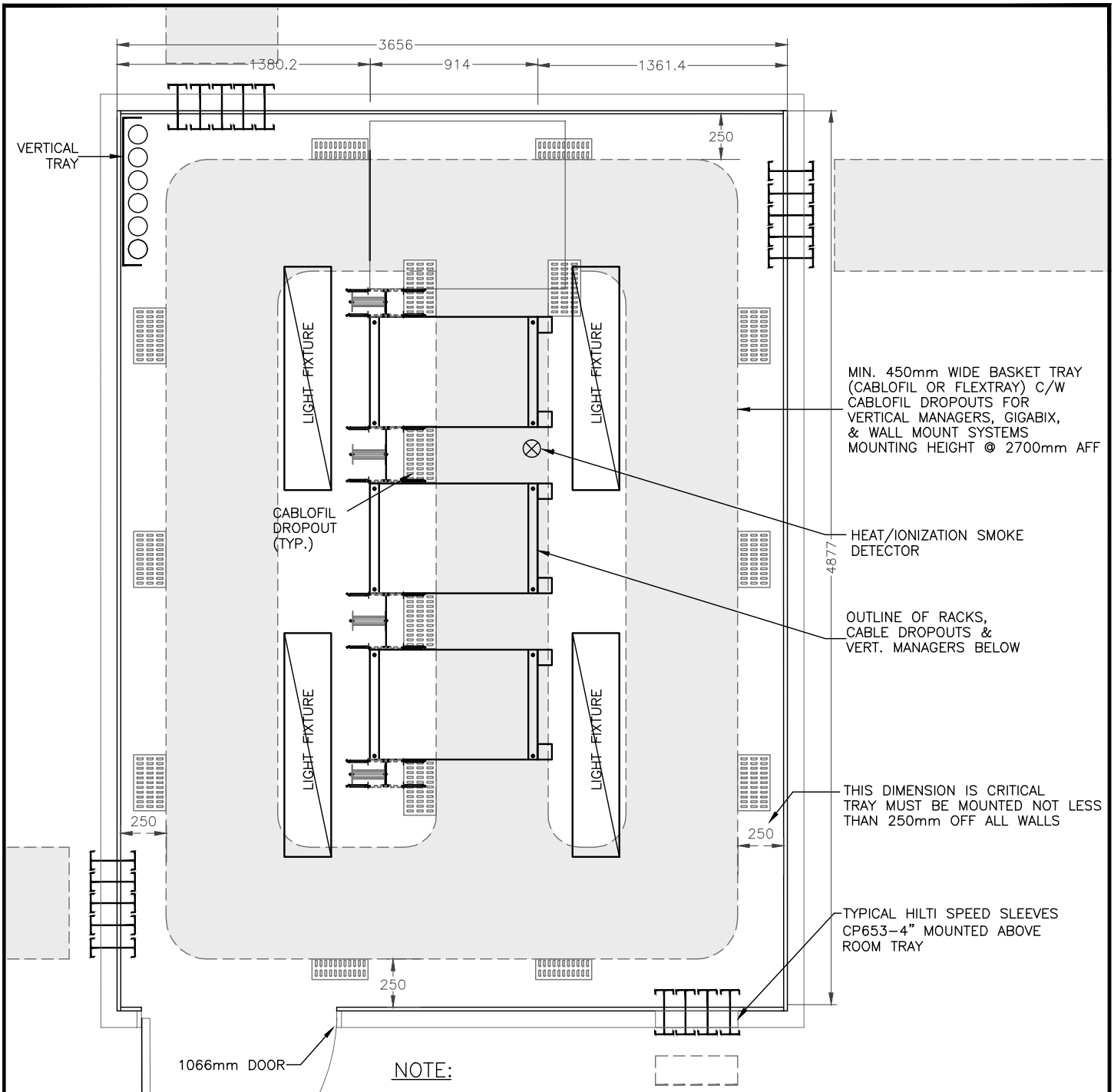
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-005.1-H-MER

Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-004.2.1 & C-STD-010.3.1-C-MER.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS,

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COMMUNICATIONS-COMMUNITY MER COMMUNICATIONS ROOM REFLECTED CEILING PLAN (TYPICAL)

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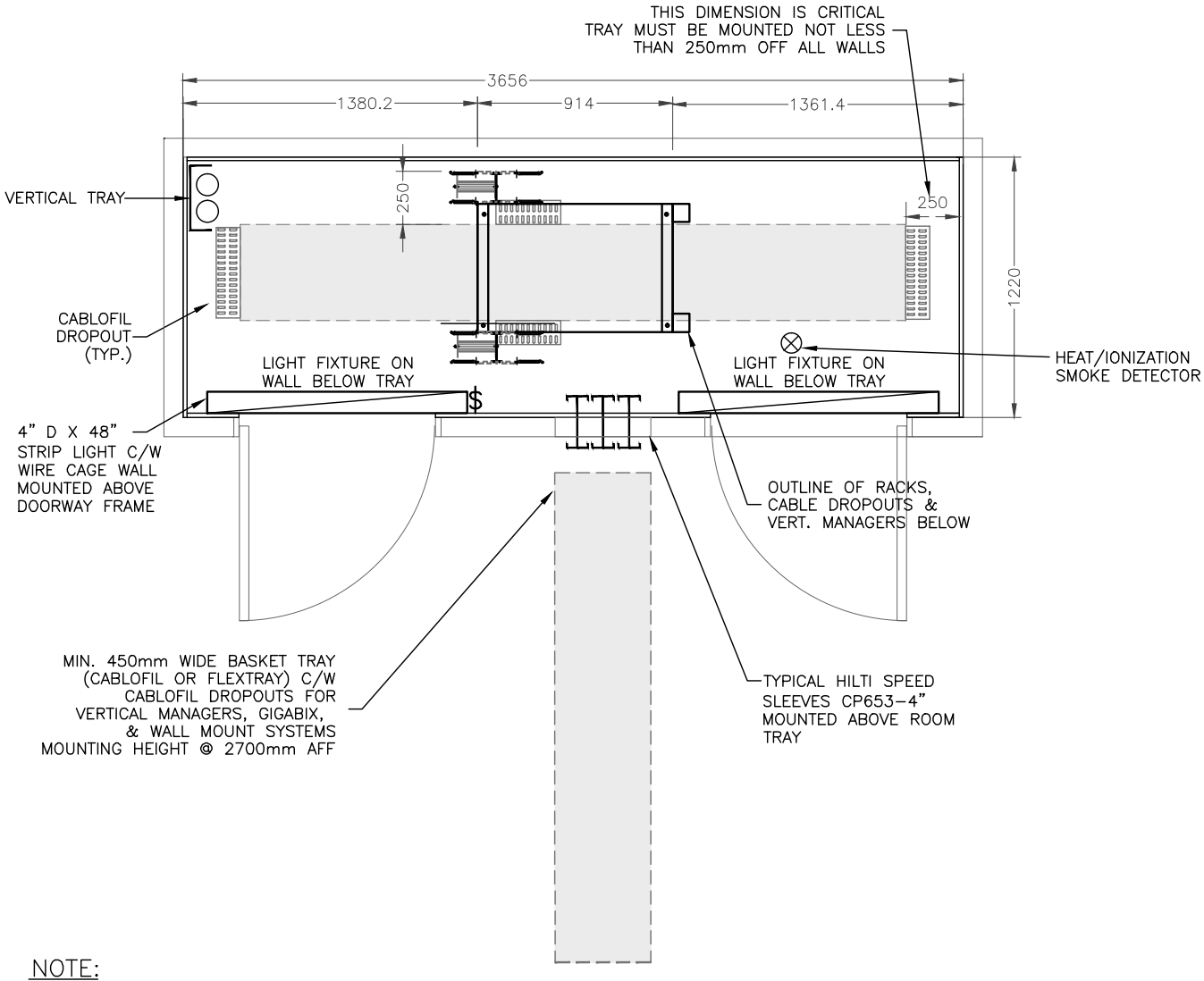
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-005.2-C-MER | Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-004.3 & C-STD-010.5-C-LTC.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY-CUTTING.

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COMMUNICATIONS-COMMUNITY LARGE COMMUNICATIONS CLOSET REFLECTED CEILING PLAN (TYPICAL)

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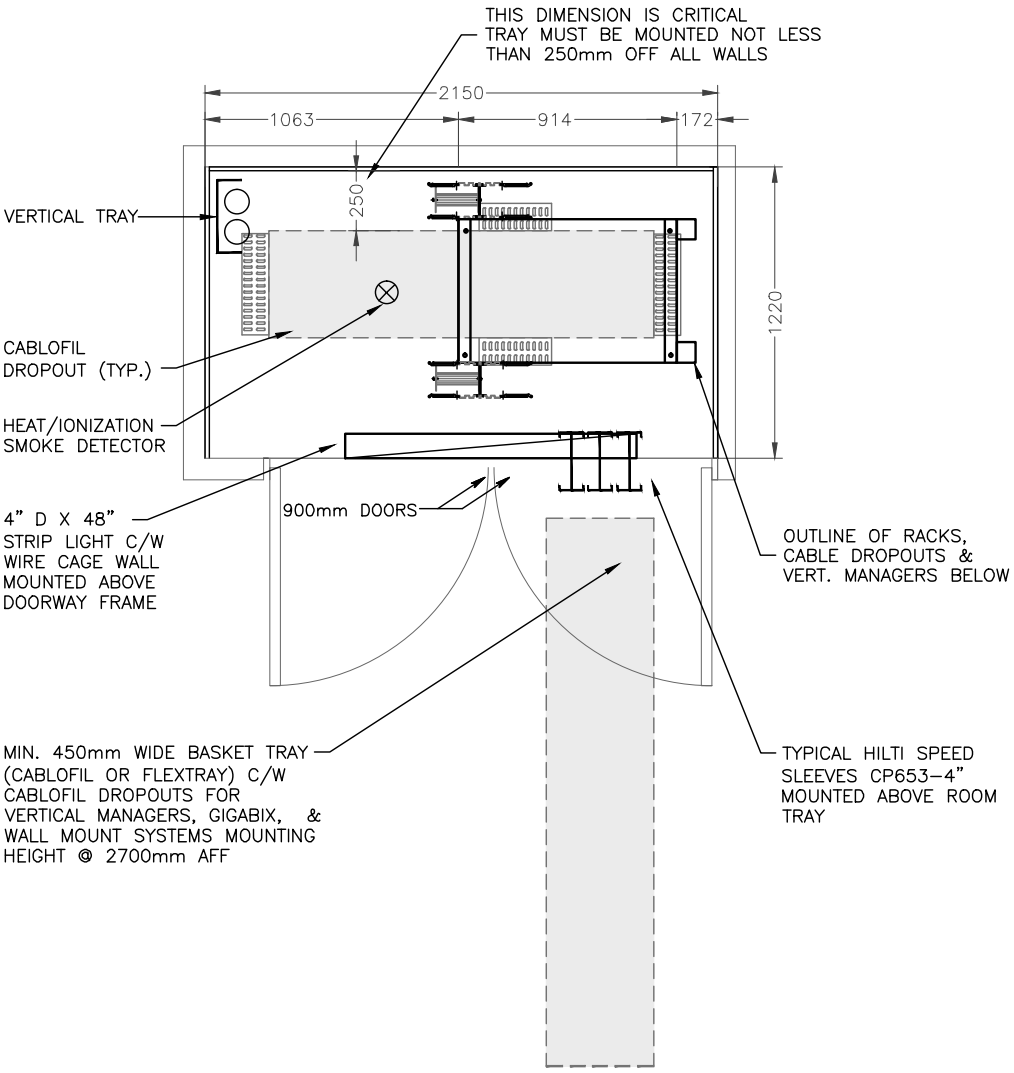
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-005.3-C-LCC | Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-004.4 & C-STD-010.6-C-SCC.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY-CUTTING.

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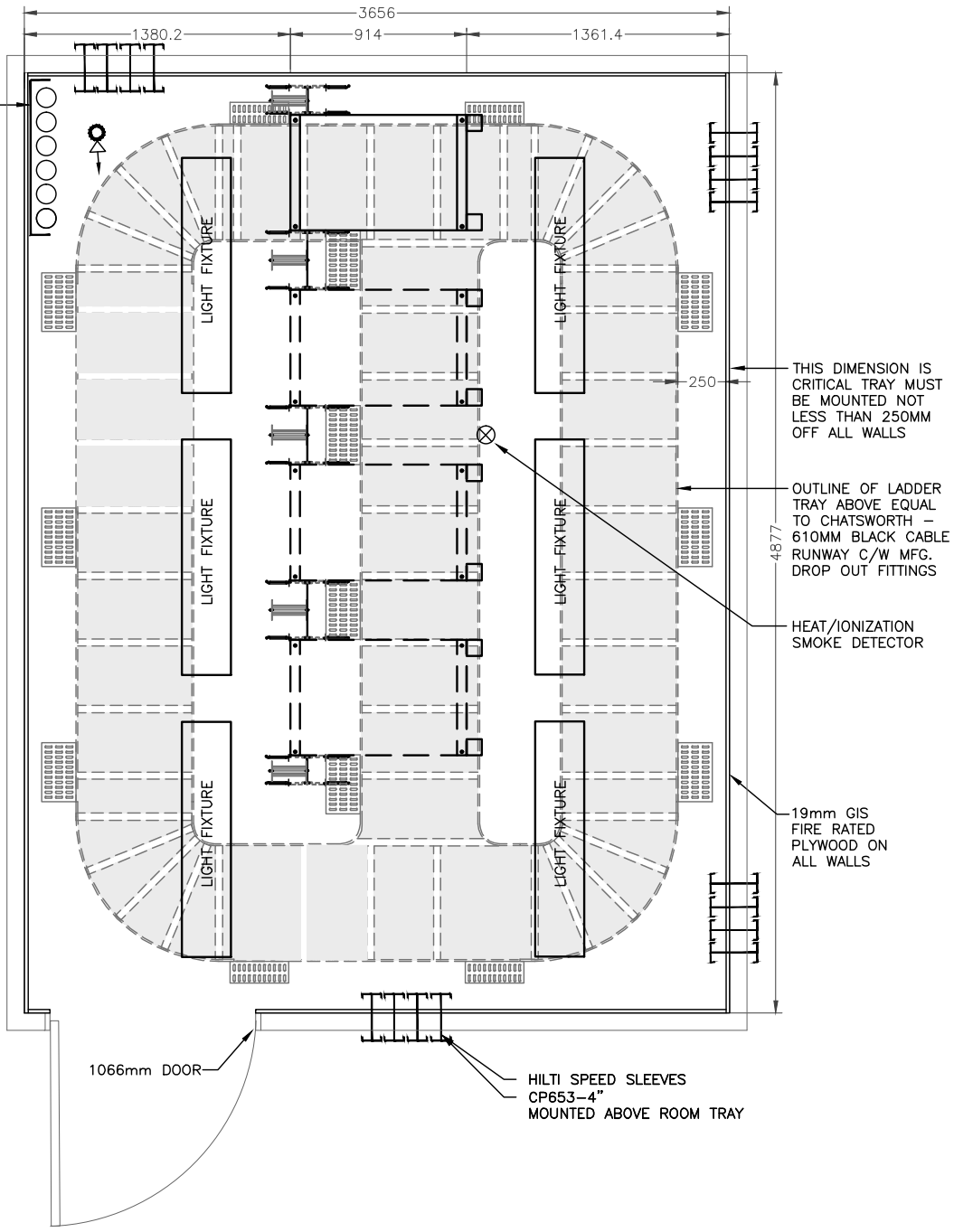
COMMUNICATIONS-COMMUNITY SMALL COMMUNICATIONS CLOSET REFLECTED CEILING PLAN (TYPICAL)

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-005.4-C-SCC | Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON–OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. CSTD–004.5–H–EF.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS, WALL BRACKETS, ETC SHALL BE PROVIDED AS REQUIRED. AVOID TRAY–CUTTING.

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COMMUNICATIONS–HOSPITAL ENTRANCE FACILITY (EF) REFLECTED CEILING PLAN (TYPICAL)

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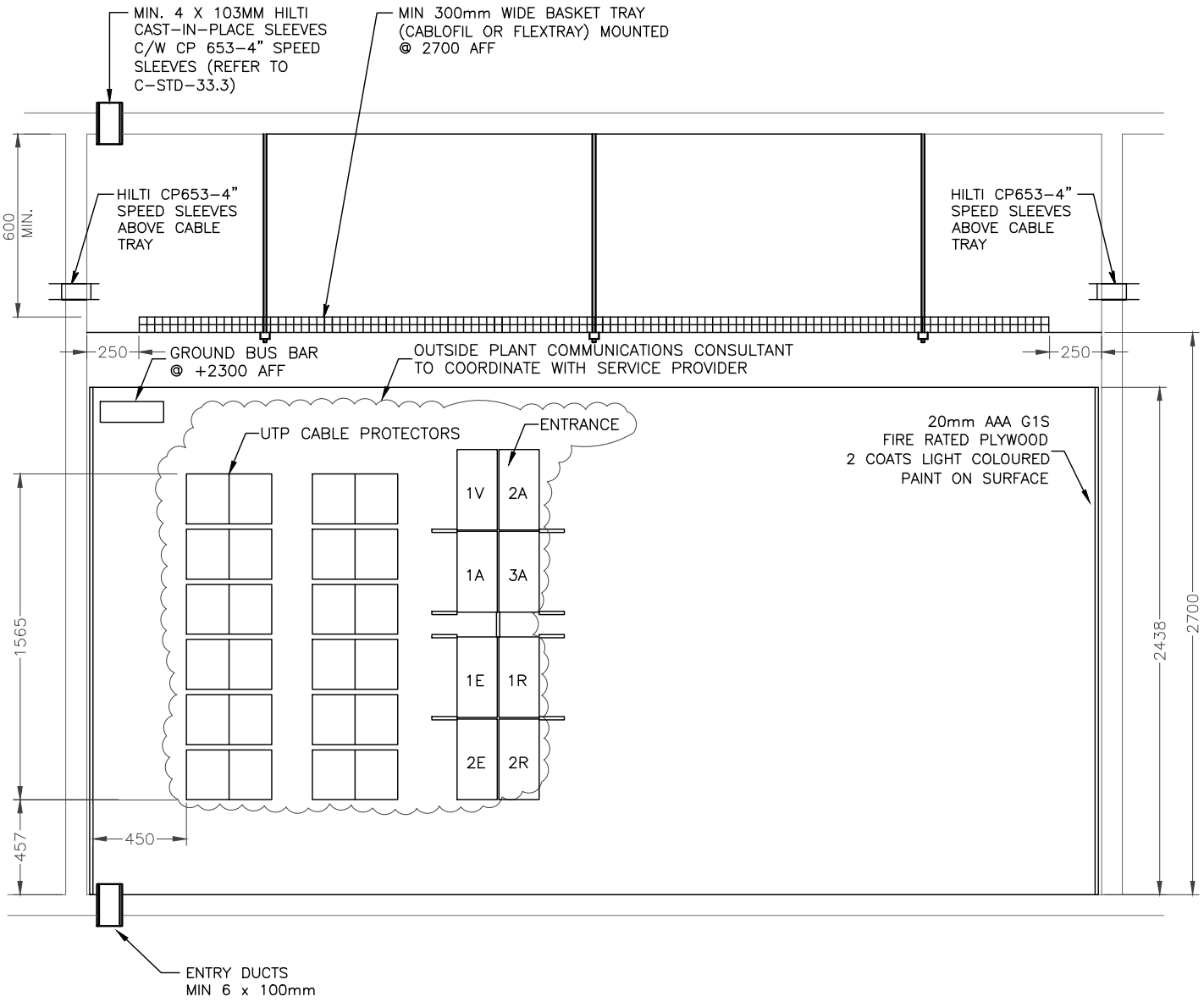
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–005.5–H–EF

Rev. 1



NOTES:

1. THIS DRAWING REPRESENTS THE UTP TERMINAL LAYOUT IN A TYPICAL EF, MER ROOM AND IS NOT TO BE TAKEN AS THE FINAL DESIGN. NOTE CABLE PROTECTORS ARE TYPICALLY LOCATED IN ENTRANCE FACILITY.
2. BOTTOM ROW OF PROTECTORS SHALL BE INSTALLED IN LINE WITH THE BOTTOM OF GIGABIX TERMINATIONS AS SHOWN.
3. HANG LIGHTS ON CHAIN TO ALLOW FOR FREE SWING ABOVE THE VENTILATED TRAY
4. MOUNT POWER OUTLETS @ 300 mm AFF MEASURED FROM THE TOP OF THE DEVICES.
5. GIGXBIX MOUNT V REPRESENTS VOICE TIES, A – AMPHENOL VOICE TIES, E – ENTRANCE, R – RISERS
6. SEE ALSO ASSOCIATED COMMUNICATIONS ROOM DRAWINGS.

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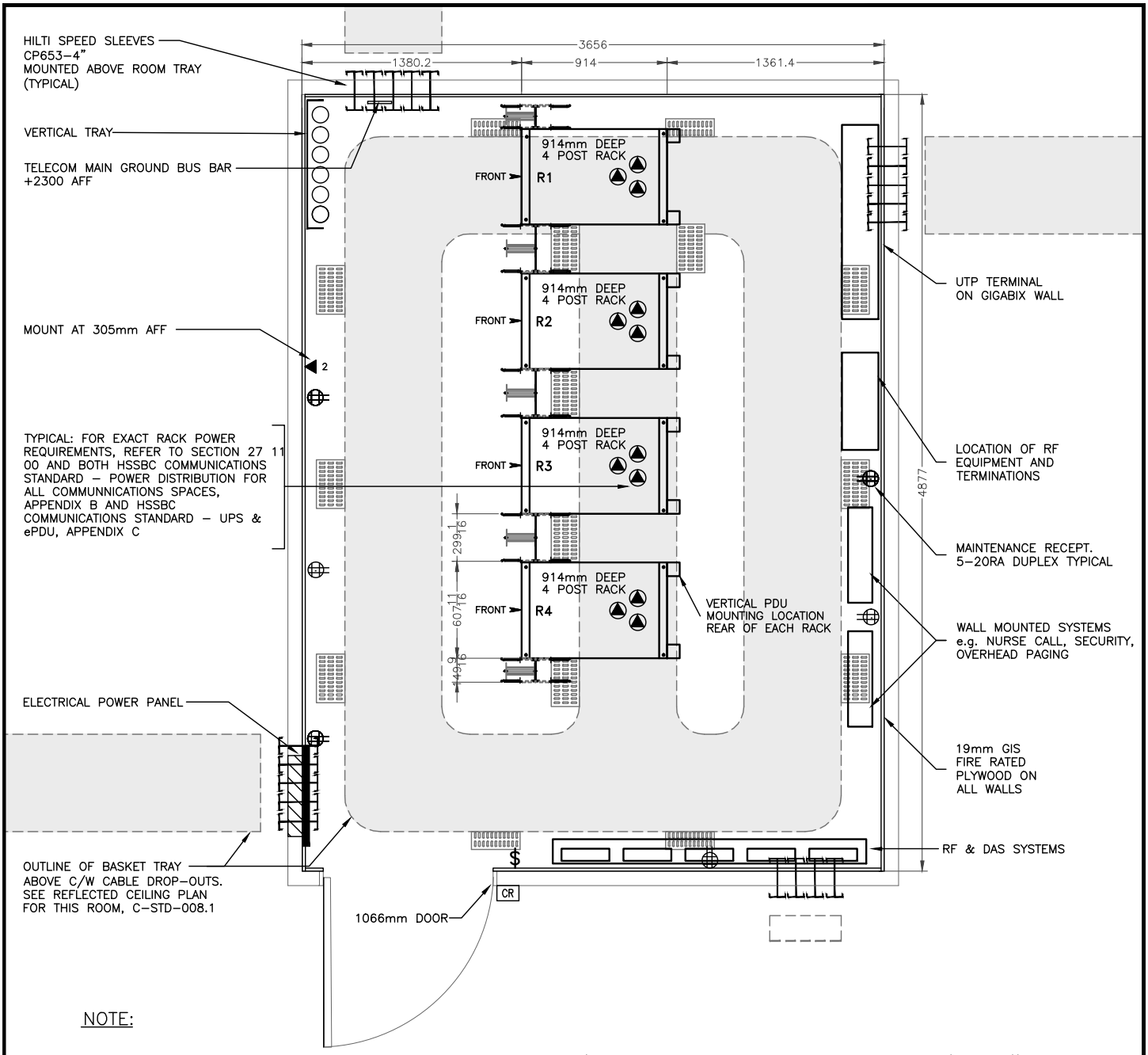
COMMUNICATIONS EF, MER ROOM UTP TERMINAL (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-006

Rev. 1



NOTE:

1. DRAWING SHOWS TYPICAL LAYOUT OF TR – LOCAL COMMUNICATIONS ROOM (NOT FINAL DESIGN – SERVES FLOOR AREA OF 2000m2 (20,000ft2)).
2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC NETWORK REPRESENTATIVE.
3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOOR SHALL SWING 180 DEGREE OUT.
4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
6. THE SIZE OF 4–POST RACK SHALL BE 610mm x 914mm (24" x 36").
7. DOUBLE–SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK AND IN BETWEEN RACKS.
8. FLOOR SHALL BE COVERED WITH LIGHT COLOURED COMPOSITE LINOLEUM SHEET.
9. SEE ALSO DRAWINGS C–STD–8.1 AND C–STD–10.2–H–TR.
10. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER 48 PORT SWITCH.

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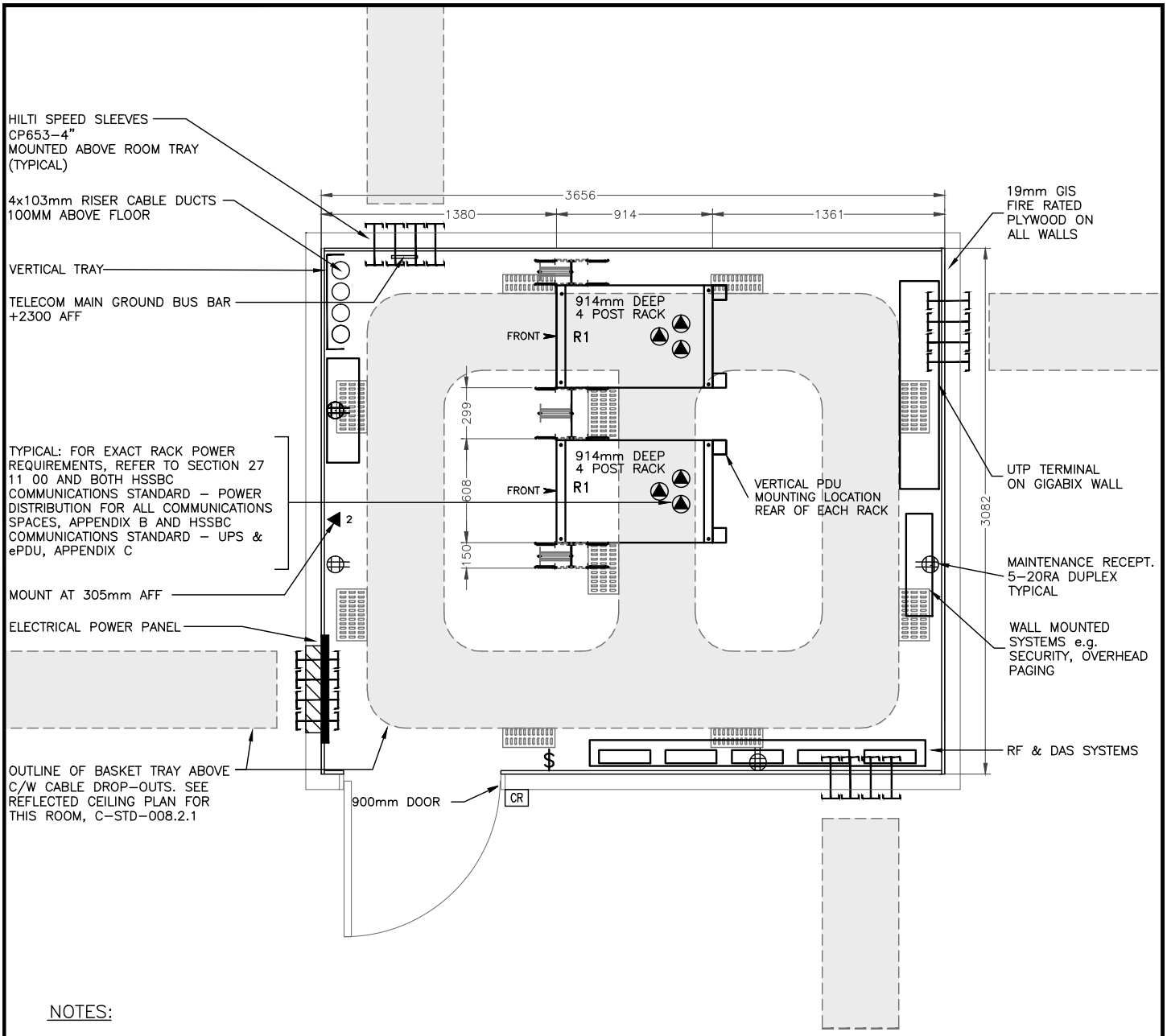
COMMUNICATIONS – HOSPITAL TR COMMUNICATIONS ROOM FLOOR PLAN (2000m2)

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–007.1–H–TR

Rev. 1



NOTES:

1. DRAWING SHOWS TYPICAL LAYOUT OF TR – LOCAL COMMUNICATIONS ROOM (NOT FINAL DESIGN – SERVES FLOOR AREA OF 800m2 (8,000ft2)).
2. EXACT LOCATION OF SECURITY/ALARM EQUIPMENT SHALL BE COORDINATED WITH COMMUNICATIONS CONSULTANT & HSSBC PROTECTION SERVICES.
3. ALL WALLS TO EXTEND TO UNDERSIDE OF SLAB TO PROVIDE CONTAINED COOLING. DOOR SHALL SWING 180 DEGREE OUT.
4. UPS POWER, LIGHT FIXTURE LOCATIONS AS SPECIFIED.
5. REFER TO DIVISION 27 11 00 SPECIFICATION SECTION ON PDU REQUIREMENTS.
6. THE SIZE OF 4–POST RACK SHALL BE 610mm x 914mm (24" x 36").
7. DOUBLE–SIDED FINGER TYPE VERTICAL MANAGER SHALL BE PROVIDED ON EACH SIDE OF RACK AND IN BETWEEN RACKS.
8. FLOOR SHALL BE COVERED WITH LIGHT COLOURED COMPOSITE LINOLEUM SHEET.
9. SEE ALSO DRAWINGS C–STD–008.2.1, C–STD–009 AND C–STD–010.4.1–C–TR TO C–STD–013.
10. ENGAGE MECHANICAL ENGINEER TO CONFIRM PROPER COOLING CAPACITY BASED ON 1200 WATTS PER 48 PORT SWITCH.

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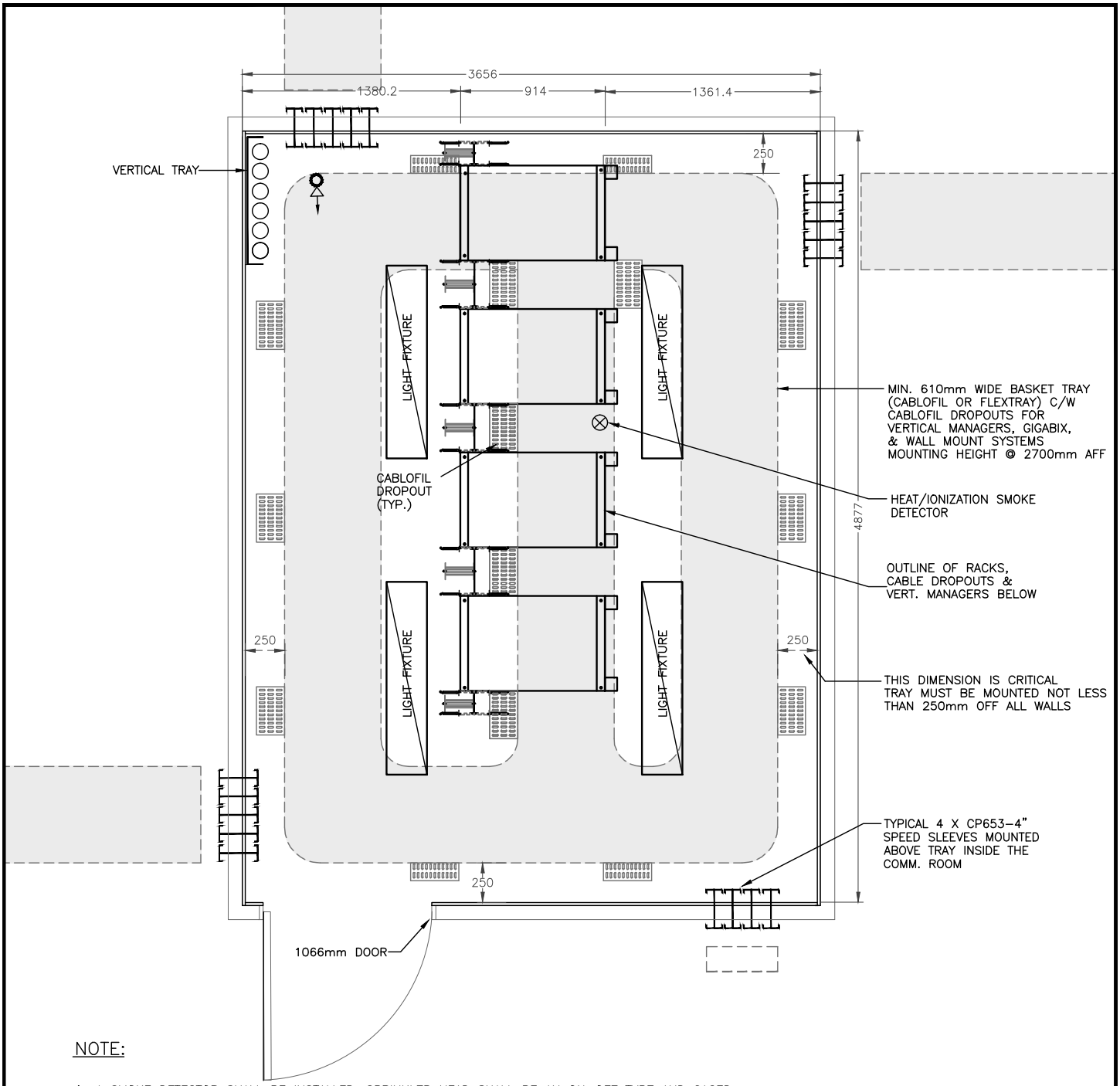
COMMUNICATIONS–COMMUNITY TR COMMUNICATIONS ROOM FLOOR PLAN (800m2)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–007.2–C–TR

Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-007.1 & C-STD-010.2-H-TR.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS,

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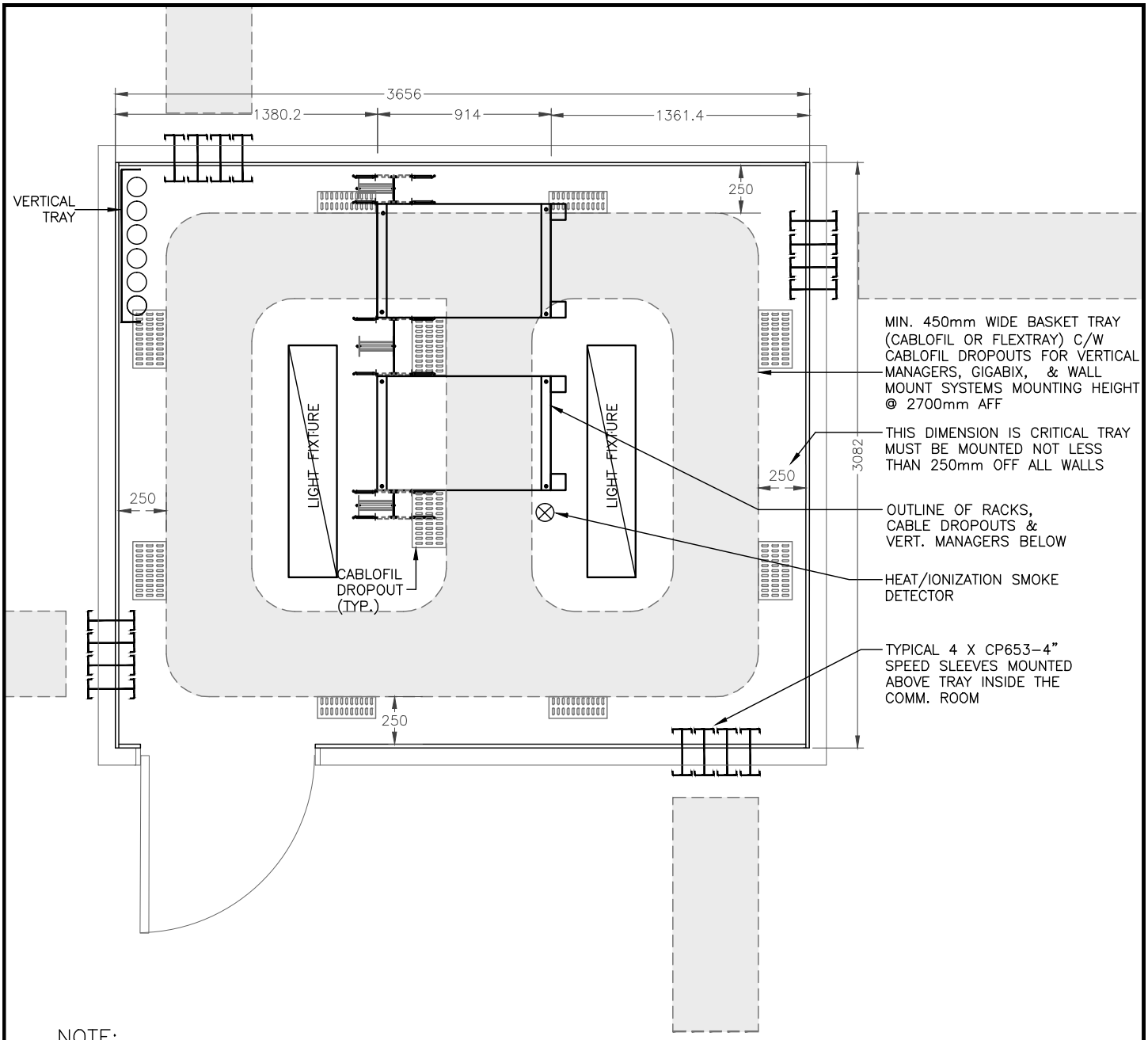
COMMUNICATIONS – HOSPITAL
TR COMMUNICATIONS ROOM
REFLECTED CEILING PLAN (TYPICAL)

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-008.1-H-TR

Rev. 1



NOTE:

1. A SMOKE DETECTOR SHALL BE INSTALLED. SPRINKLER HEAD SHALL BE AN ON-OFF TYPE AND CAGED. DRIPTRAY SHALL BE INSTALLED IF IT IS MOUNTED DIRECTLY ABOVE RACK.
2. LIGHT FIXTURES TO BE CAGED. LOCATIONS AS SPECIFIED.
3. SEE ALSO DWGS. C-STD-007.2.1 & C-STD-010.4-C-TR.
4. ALL MANUFACTURED ACCESSORIES SUCH AS 90° BENDS, 90° RADIUS, CABLE DROPOUTS, TRAPEZE SUPPORTS,

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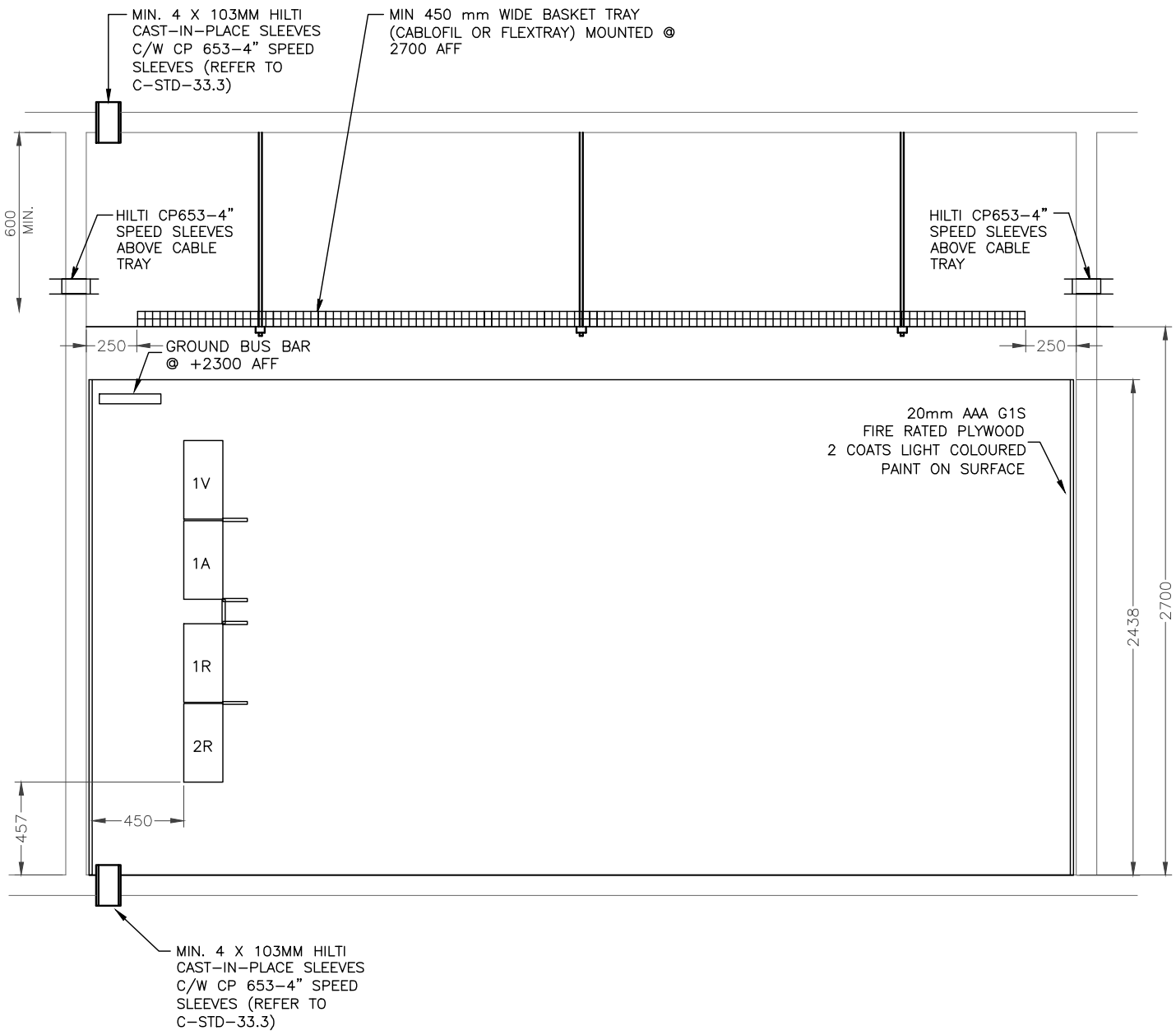
COMMUNICATIONS-COMMUNITY TR COMMUNICATIONS ROOM REFLECTED CEILING PLAN (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-008.2-C-TR

Rev. 1



NOTES:

1. THIS DRAWING REPRESENTS THE UTP TERMINAL LAYOUT IN A TYPICAL LOCAL COMMUNICATIONS ROOM AND IS NOT TO BE TAKEN AS THE FINAL DESIGN. NOTE CABLE PROTECTORS ARE TYPICALLY LOCATED IN ENTRANCE FACILITY.
2. HANG LIGHTS ON CHAIN TO ALLOW FOR FREE SWING ABOVE THE VENTILATED TRAY
3. MOUNT POWER OUTLETS @ 300 mm AFF MEASURED FROM THE TOP OF THE DEVICES.
4.. GIGXBIX MOUNT V REPRESENTS VOICE TIES, A – AMPHENOL VOICE TIES, R – RISERS
5. SEE ALSO ASSOCIATED COMMUNICATIONS ROOM DRAWINGS.

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COMMUNICATIONS
TR COMMUNICATIONS ROOM
UTP TERMINATION (TYPICAL)

Health Shared Services BC
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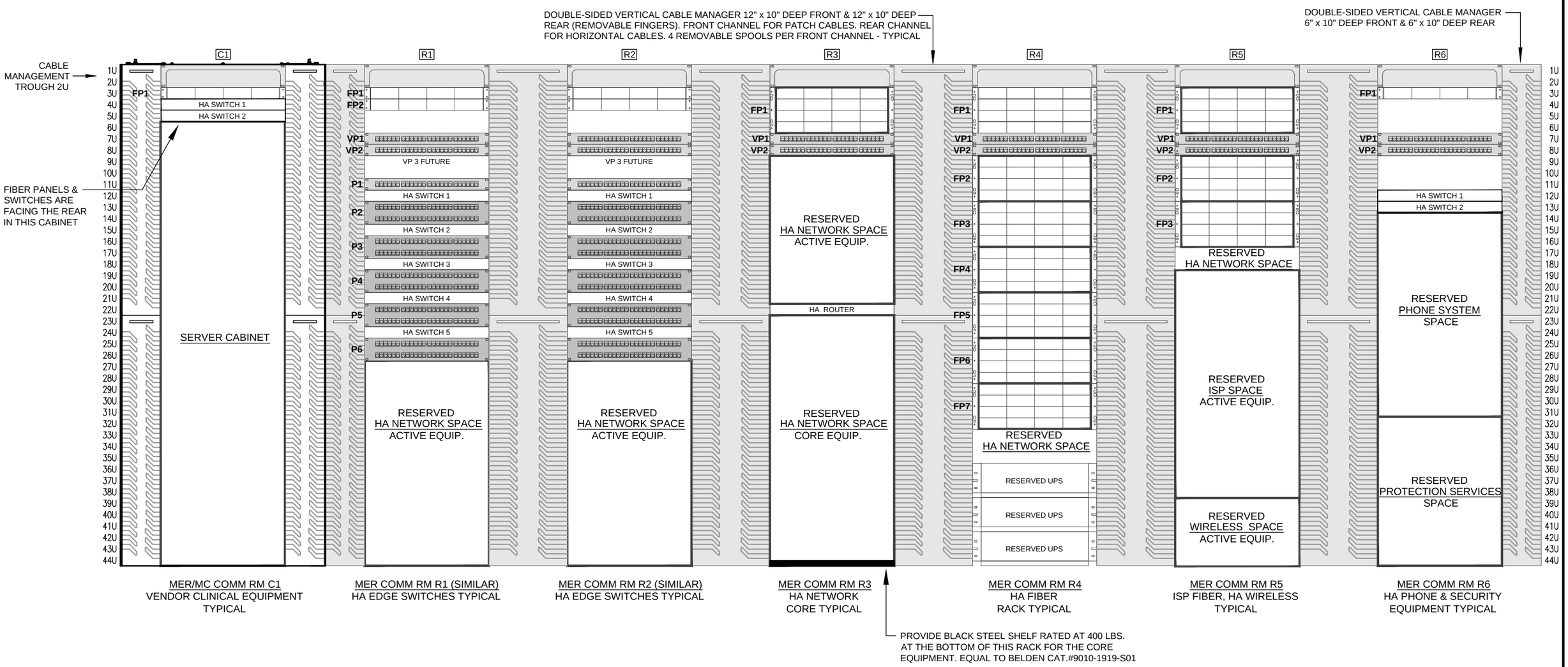
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-009

Rev. 1



NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

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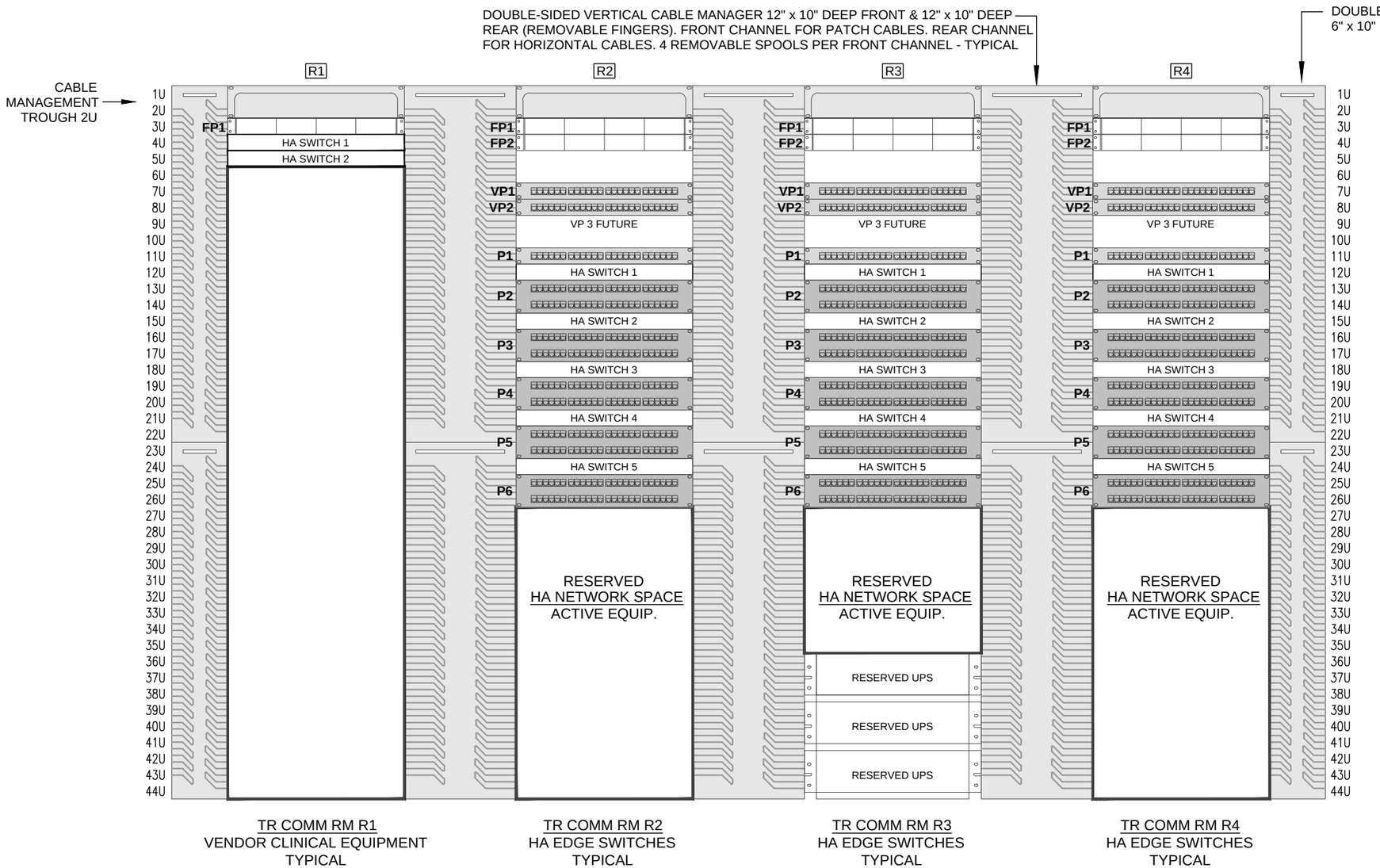
COMMUNICATIONS – HOSPITAL MER
RACK LAYOUT (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-010.1-H-MER

Rev. 1



NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

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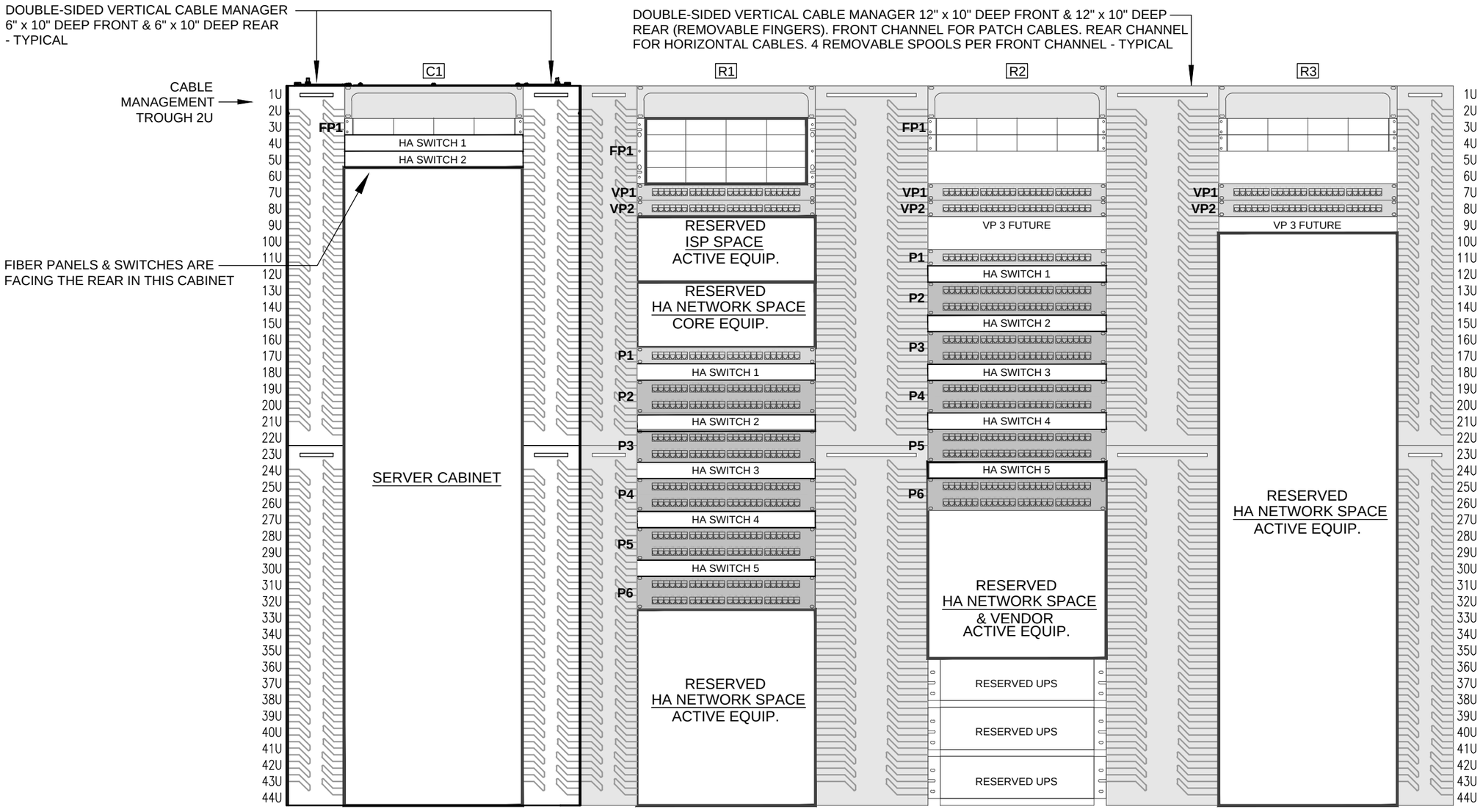
COMMUNICATIONS – HOSPITAL TR COMMUNICATIONS ROOM RACK LAYOUT (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–010.2–H–TR

Rev. 1



MER COMM RM C1
VENDOR EQUIP, EQUIP TYPICAL

MER COMM RM R1
ISP & HA CORE EQUIP. HA EDGE SWITCHES TYPICAL

MER COMM RM R2
HA EDGE SWITCHES TYPICAL

MER COMM RM R3
HA PHONE AND SECURITY EQUIPMENT TYPICAL

NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT.
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.
5. PROVIDE 10-32 CAGE NUTS ON CABINETS.

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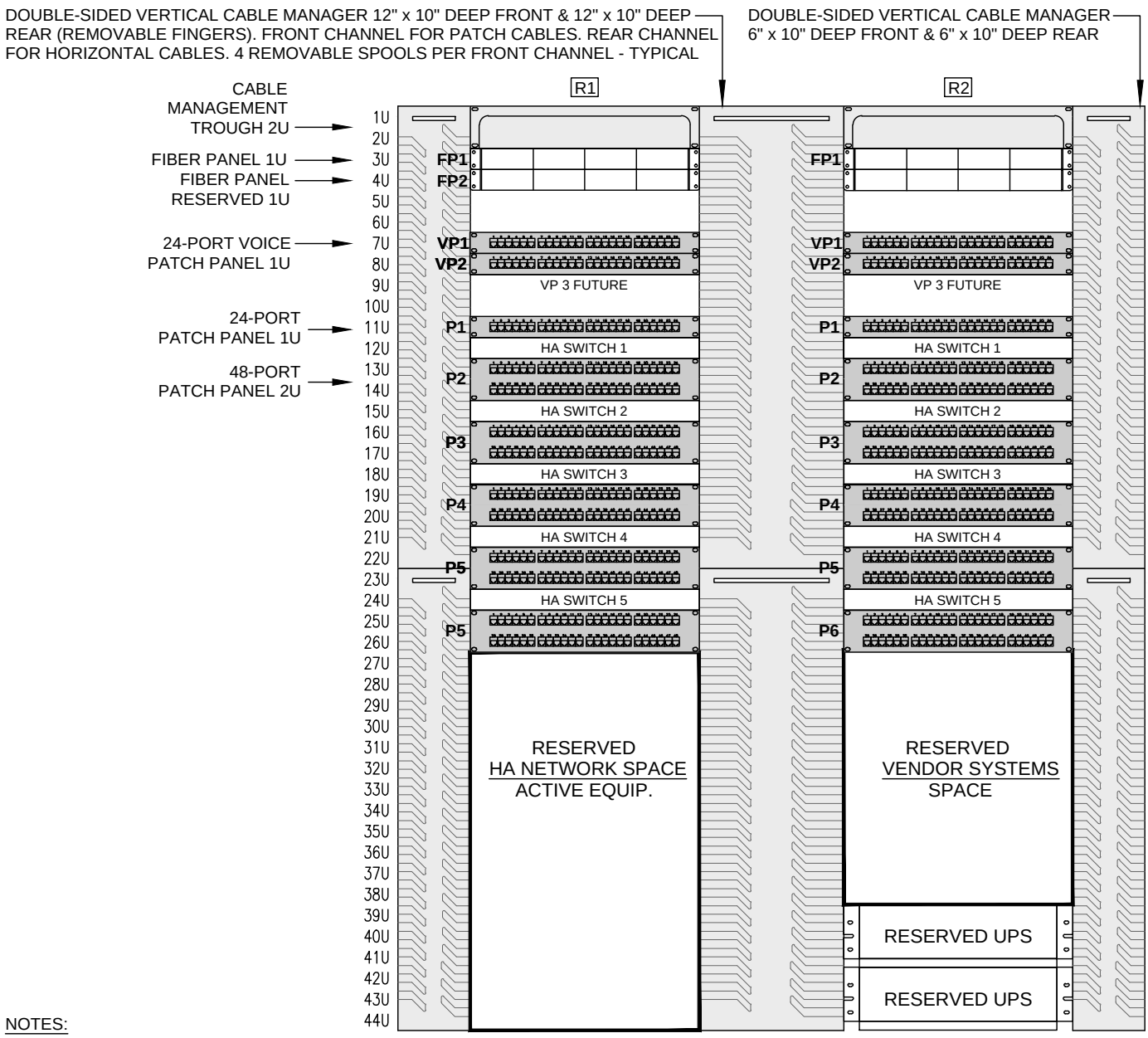
COMMUNICATIONS–COMMUNITY MER COMMUNICATIONS ROOM RACK LAYOUT (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–010.3.1–C–MER

Rev. 1



NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

TR COMM RM R1
HA EDGE SWITCHES
TYPICAL

TR COMM RM R2
HA EDGE SWITCHES
VENDOR EQUIP
TYPICAL

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COMMUNICATIONS–COMMUNITY TR COMMUNICATIONS ROOM RACK LAYOUT (TYPICAL)

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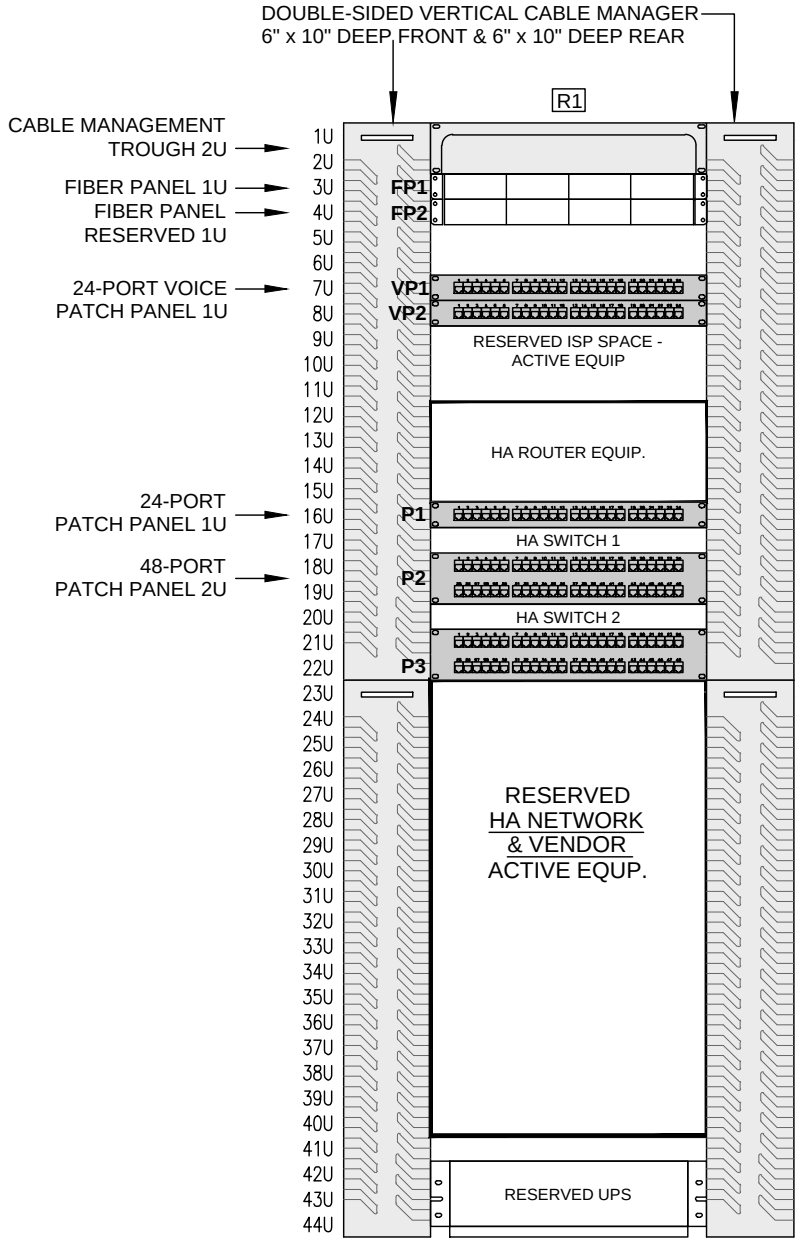
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC
(HSSBC)

File No. C–STD–010.4–C–TR

Rev. 1



LARGE COMM CLOSET R1
HA NETWORK & VENDOR EQUIP.
TYPICAL

NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

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COMMUNICATIONS–COMMUNITY LARGE COMMUNICATIONS CLOSET RACK LAYOUT (TYPICAL)

Health Shared Services BC
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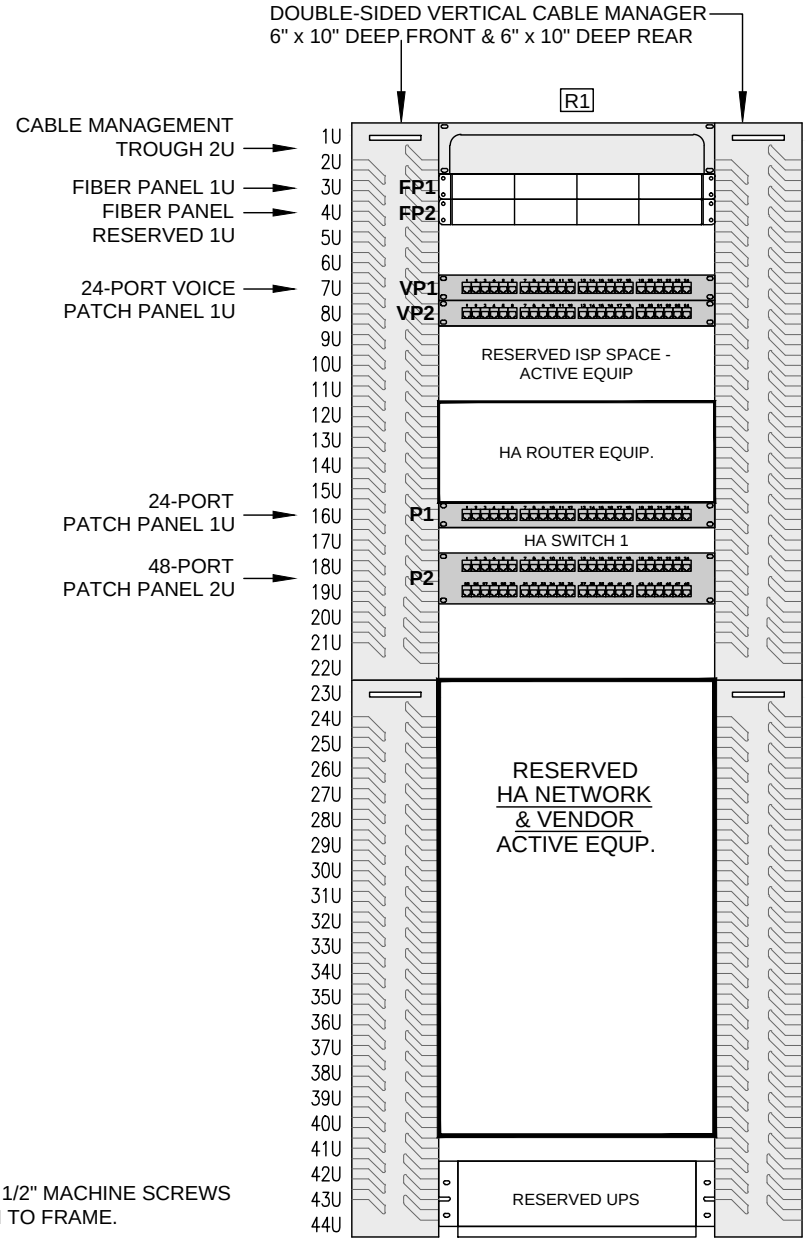
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–010.5–C–LCC

Rev. 1



SMALL COMM CLOSET R1
HA NETWORK & VENDOR EQUIP.
TYPICAL

NOTES:

1. PROVIDE 100 10-32 x 1/2" MACHINE SCREWS PER RACK & ATTACH TO FRAME.
2. PROVIDE SEISMIC TIE-DOWN STRAP FOR UPS EQUIPMENT.
3. ONLY 12" PATCH CABLE SHALL BE USED. PATCH WITHIN PATCHING UNIT (SWITCH SANDWICHED BETWEEN PATCH PANELS).
4. HSSBC REPRESNTATIVE TO APPROVE ALLOCATION OF VENDOR EQUIPMENT.

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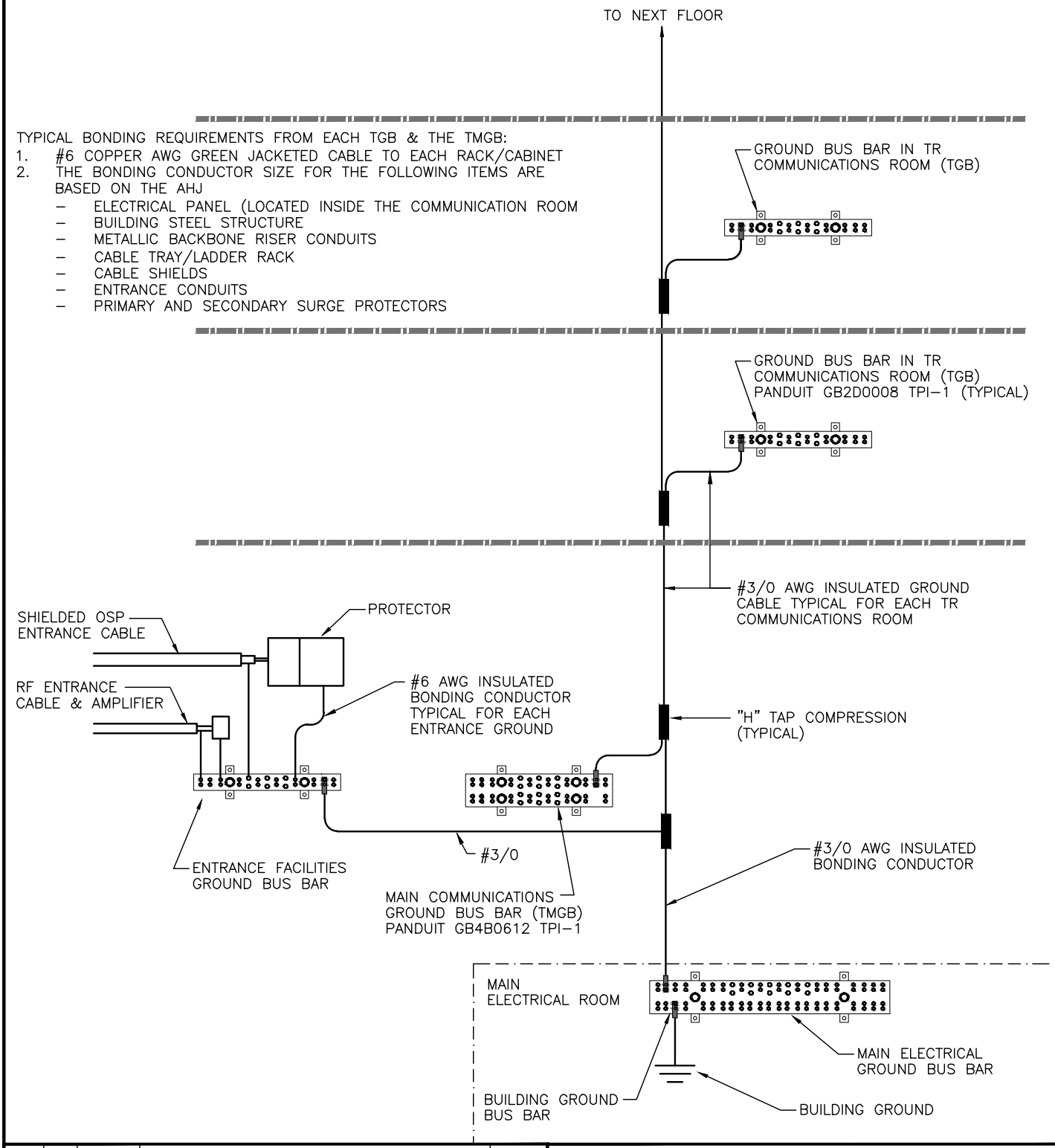
COMMUNICATIONS–COMMUNITY SMALL COMMUNICATIONS CLOSET RACK LAYOUT (TYPICAL)

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–010.6–C–SCC

Rev. 1



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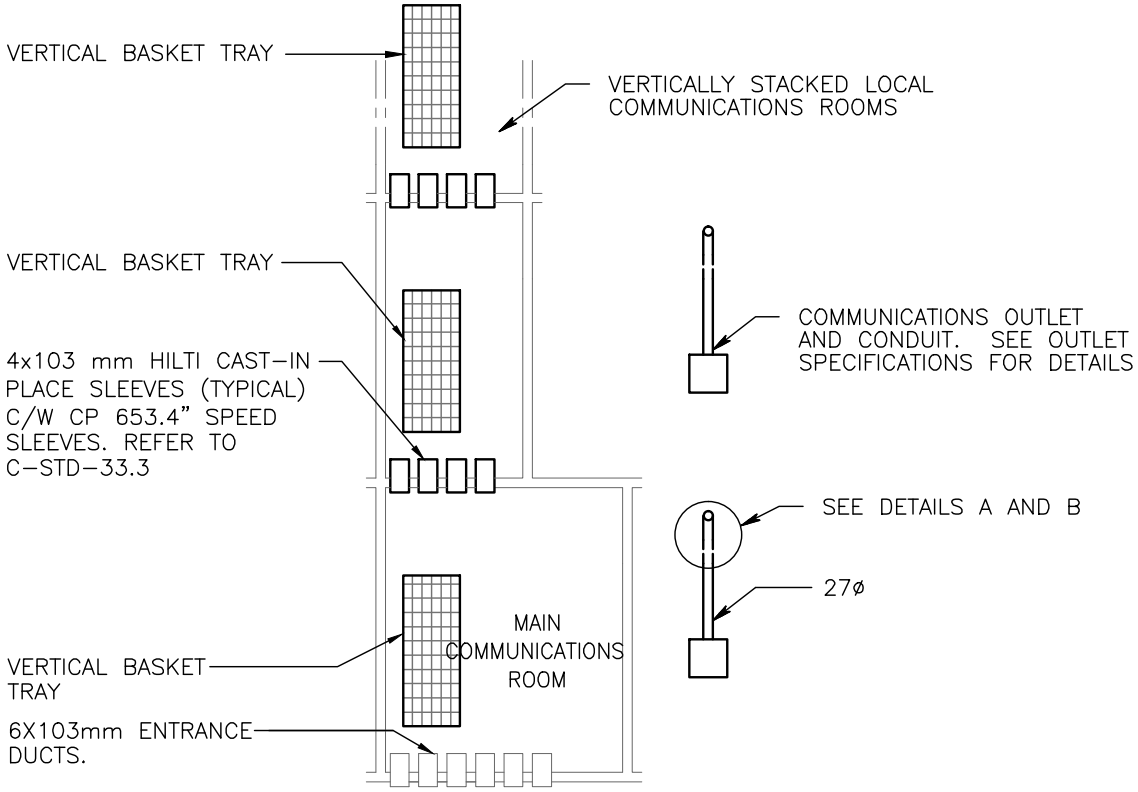
COMMUNICATIONS ROOM GROUNDING AND BONDING (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

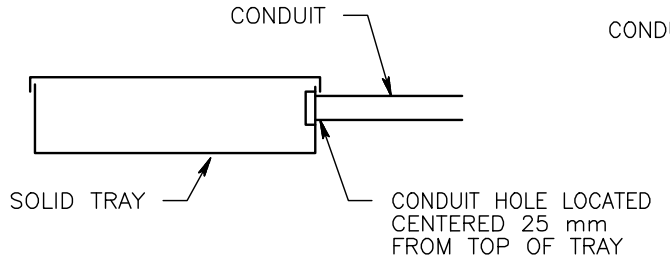
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–011

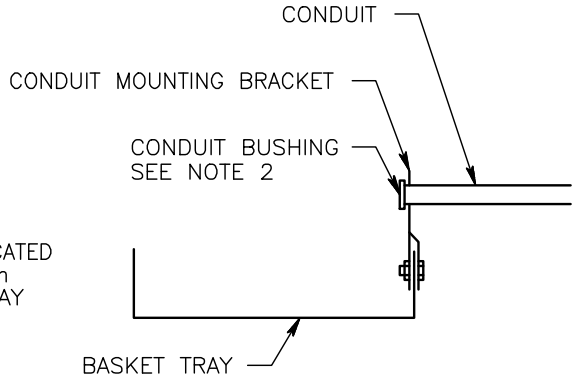
Rev. 1



TYPICAL RISER DIAGRAM



DETAIL A – CONDUIT TO SOLID TRAY



DETAIL B – CONDUIT TO BASKET TRAY

NOTES:

1. FOR RESIDENTIAL BUILDINGS CONSULT C-STD-013.
2. IF CONDUIT MOUNTING BRACKET IS NOT USED ON BASKET TRAY, USE GROUNDING BUSHING TO GROUND CONDUIT WITH A #12 AWG WIRE TO THE TRAY.

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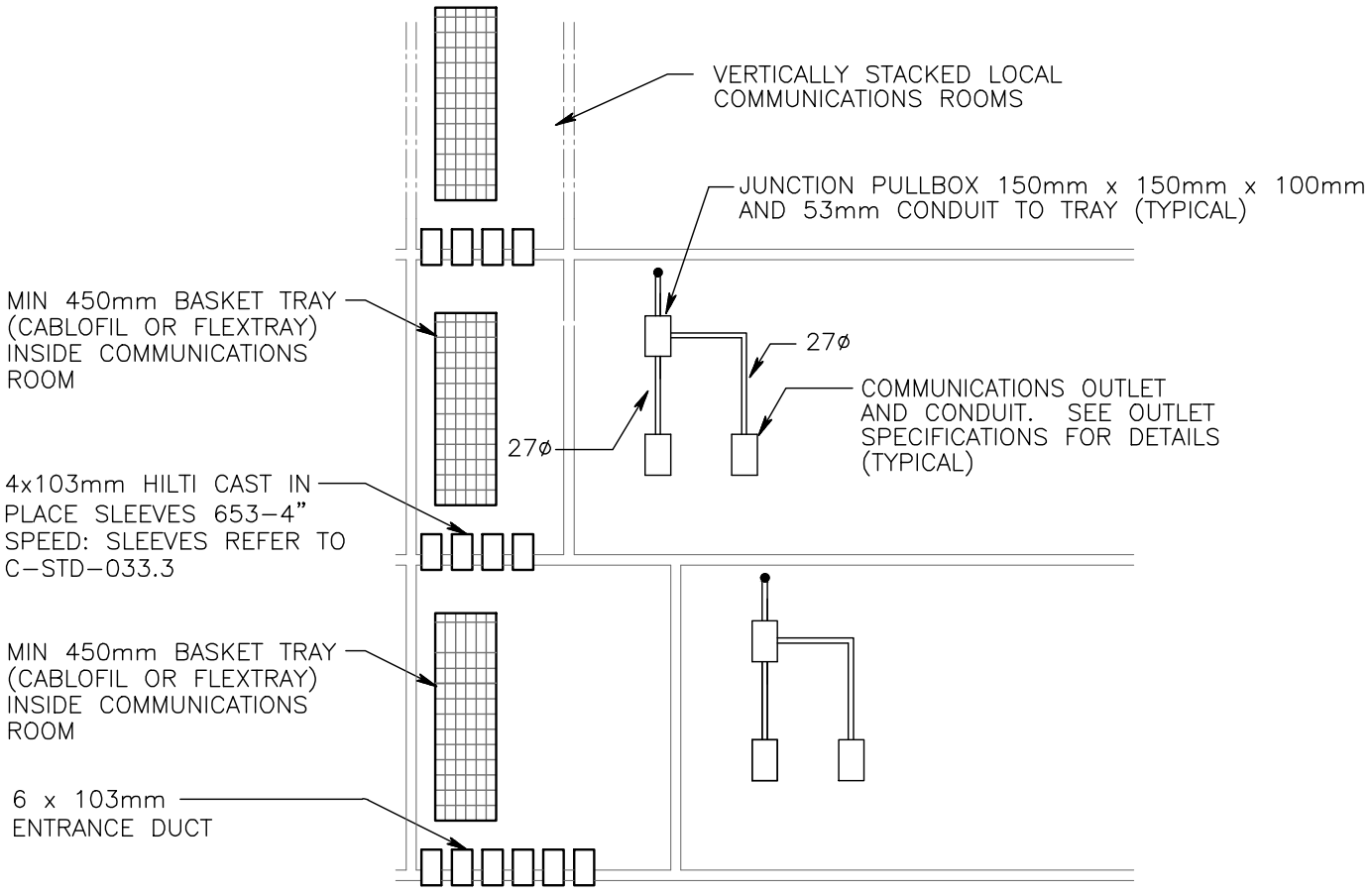
STACKED COMMUNICATIONS ROOM & PATHWAY IN BLDGS. (TYP.)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-012

Rev. 1



NOTES:

1. MINIMUM CONDUIT SIZE SHALL BE 27ø. IF A LARGER NUMBER OF OUTLETS HAS TO BE INSTALLED IN THE SAME AREA, A MINIMUM 53ø FEEDER CONDUIT SHALL BE USED AS A "ZONE CONDUIT" FOR EACH AREA. THE CONDUIT SHALL TERMINATE IN A LARGE PULL-BOX INSIDE THE AREA WHICH SHALL BE THE CONDUIT DISTRIBUTION POINT FOR THAT AREA.

2. OUTLET BOX: DUAL GANG DEEP WITH SINGLE GANG MUDRING & DEVICE COVER. RUN 2x CATEGORY 6 VERIFIED 4-PAIR CABLE TO EACH OUTLET UNLESS OTHERWISE NOTED. SEE OUTLET SPECIFICATIONS.

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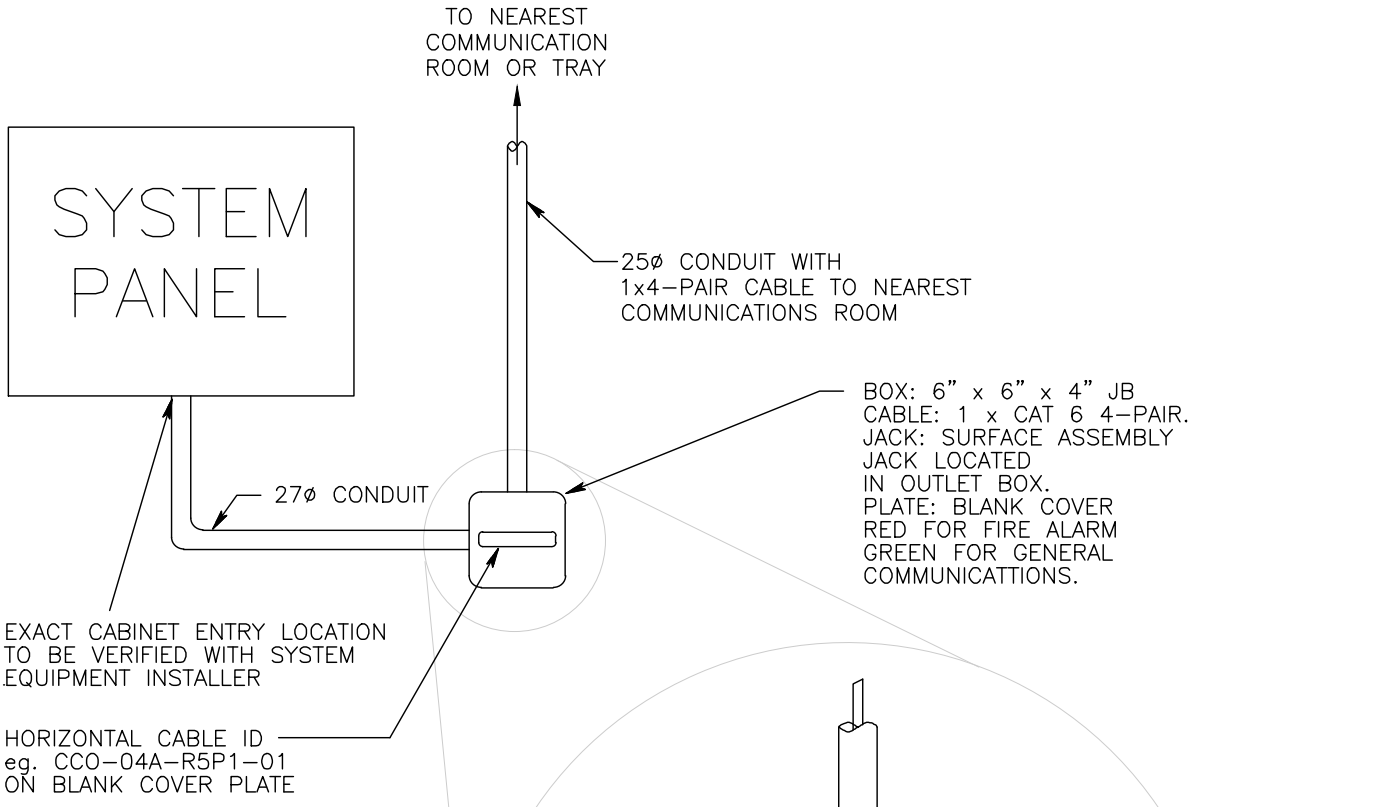
COMMUNICATION RISER & PATHWAYS IN BUILDING (TYPICAL)

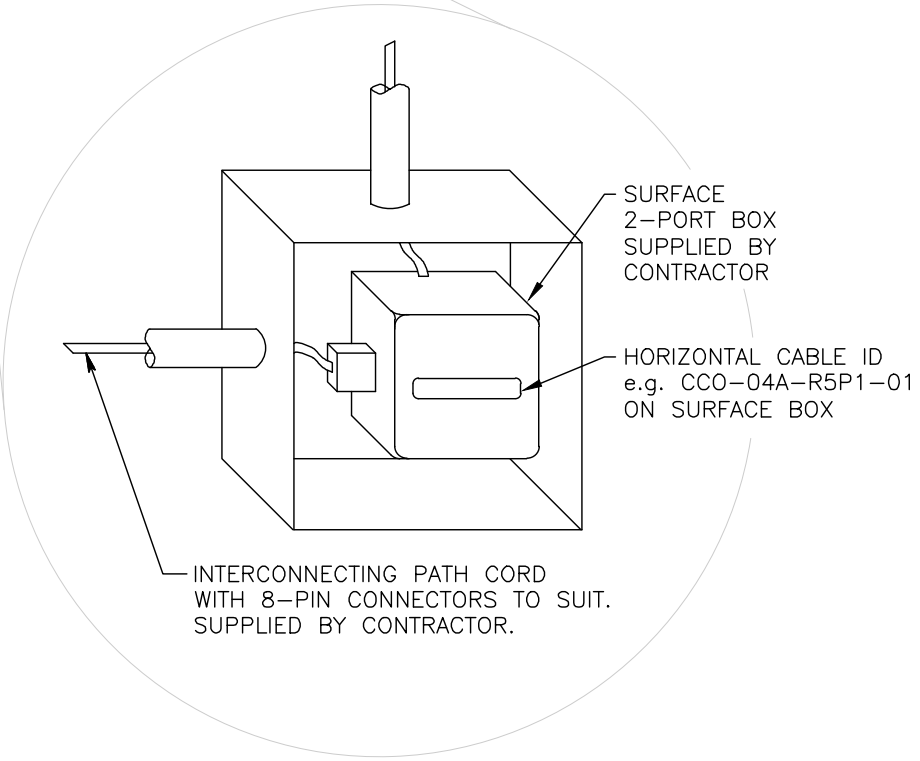
Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-013

Rev. 1





NOTES:

1. THE DRAWING SHOWS TYPICAL REQUIREMENTS WHEN CONNECTING, HORIZONTAL CABLES FOR DATA AND/OR VOICE CONNECTIONS TO BMS, LIGHTING CONTROL, ACCESS CONTROL, CCTV, METERING, GENERATOR, ELEVATOR, FIRE ALARM, MASTER CLOCK SYSTEM AND/OR ANY OTHER APPLICATIONS NOT SPECIFICALLY NOTED.
2. FINAL DETAILS WILL BE CONFIRMED WITH HSSBC NS REPRESENTATIVE AT TIME OF INSTALLATION.
3. ALL CABLING TERMINATE ON RACK MOUNT PATCHPANEL IN COMMUNICATION ROOM UNLESS NOTED OTHERWISE.
4. CONDUIT IS NOT REQUIRED INSIDE COMMUNICATION ROOMS

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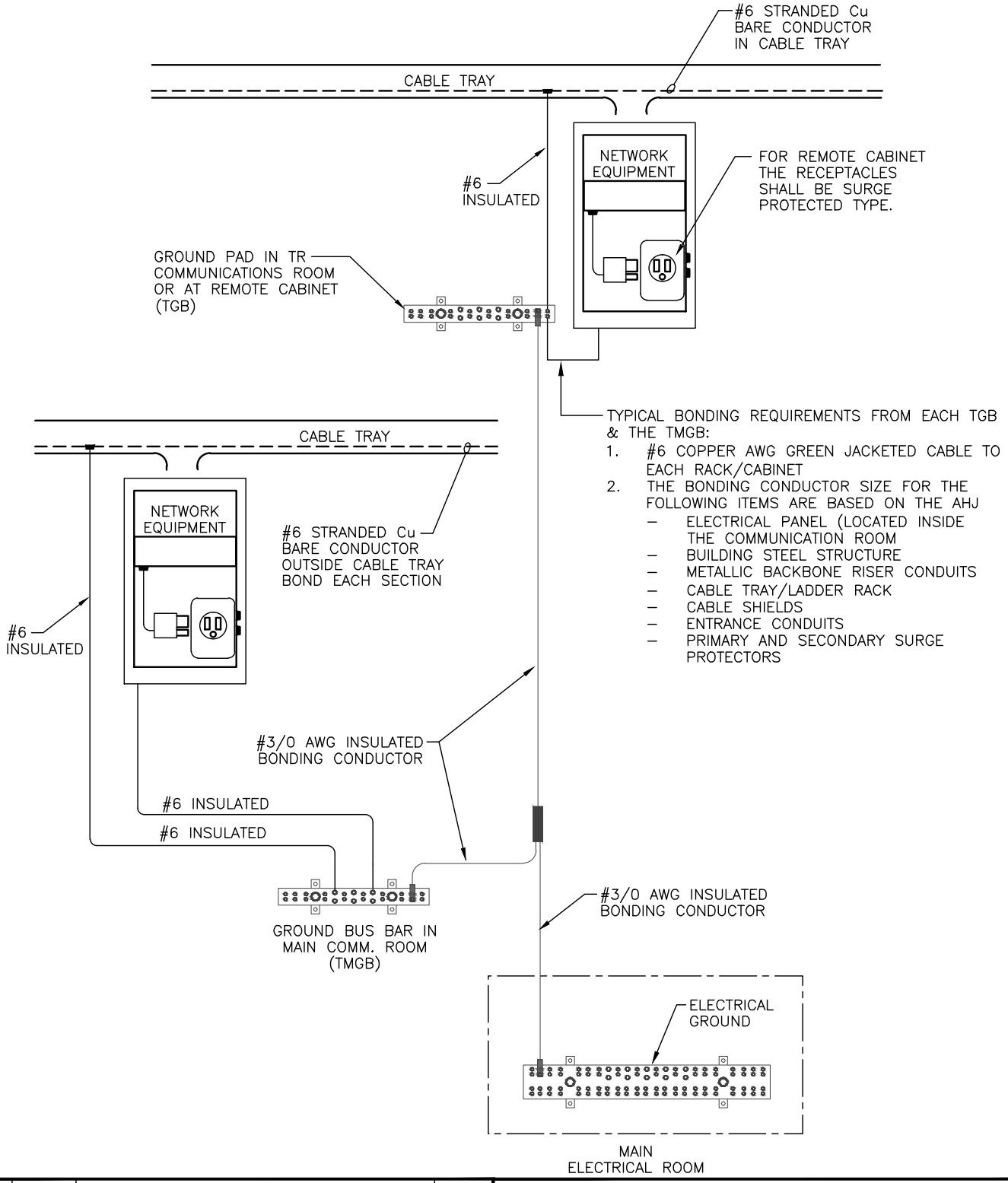
COMMUNICATIONS DEMARCATION FOR SPECIAL SERVICES (TYPICAL)

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–014

Rev. 1



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COMMUNICATIONS CLOSET RACK, REMOTE CABINET & BUILDING GROUNDING

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

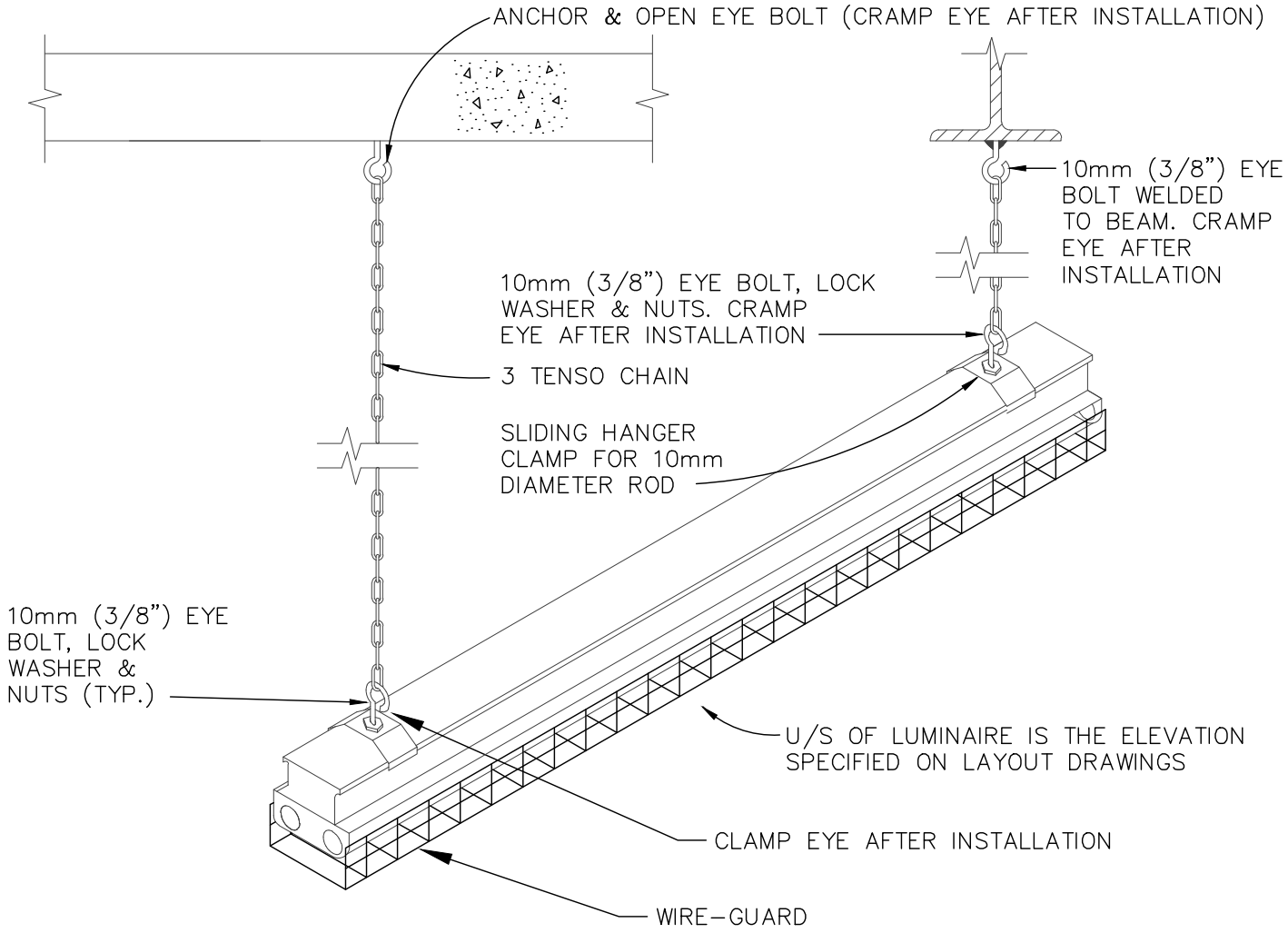
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C–STD–016

Rev. 1

CONCRETE CEILING

STEEL BEAM



SYMBOL:

F2 DENOTES LUMINAIRE TYPE F2

NOTES:

1. EXACT HANGER DETAIL AT LUMINAIRE MAY VARY DEPENDING ON MAKE AND MODEL OF LUMINAIRE. WHERE MULTIPLE LUMINAIRES ARE REQUIRED IN A ROW (UP TO ONE LUMINAIRE GAP BETWEEN LUMINAIRES) USE 41mm $_2$ 41mm SQUARE RACEWAY MOUNTED ON TOP OF LUMINAIRES. RACEWAY SHALL BE SUPPORTED AS SHOWN AT MAXIMUM 2440mm INTERVALS.

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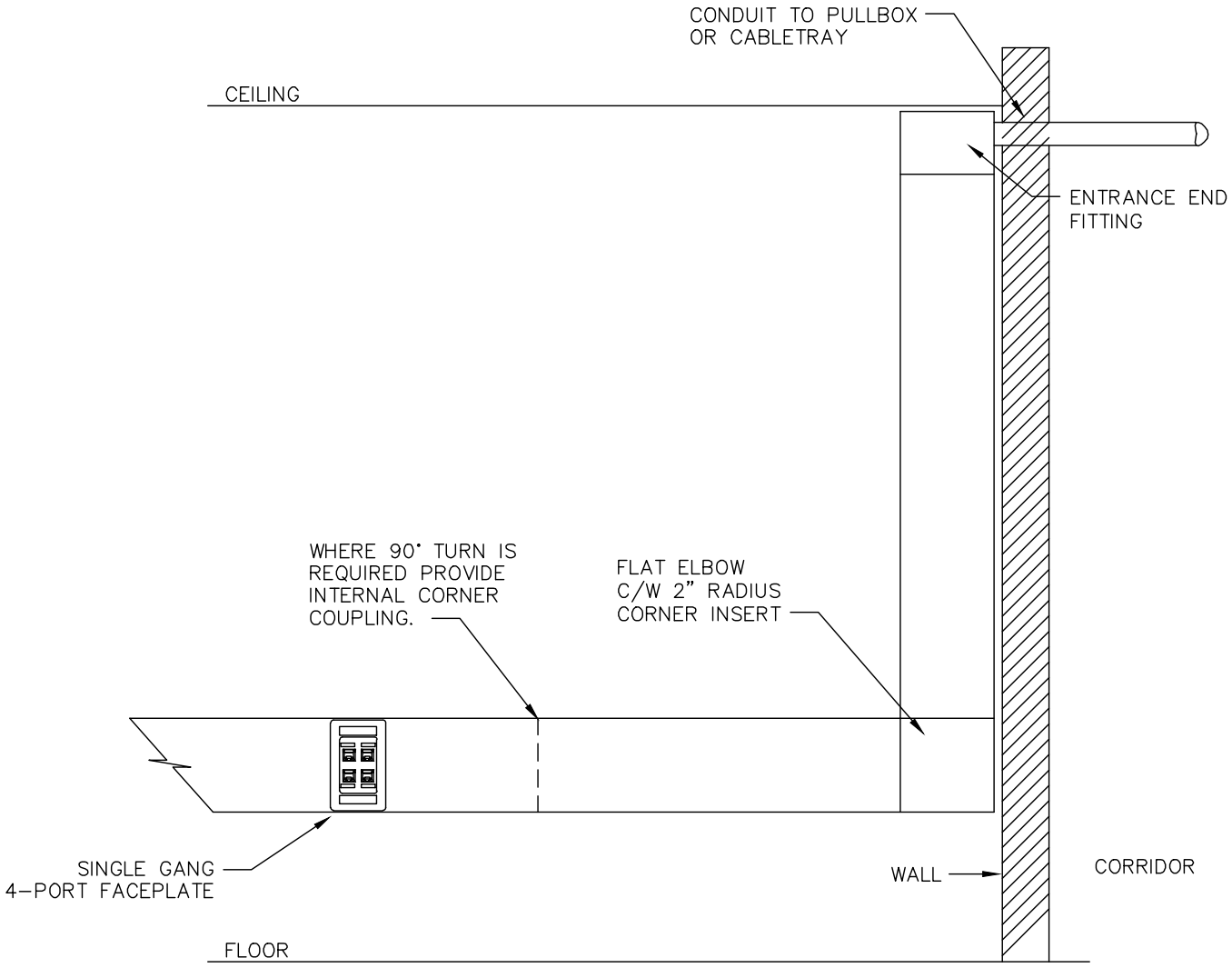
COMMUNICATIONS SUSPENDED FLUORESCENT LUMINAIRE MOUNTING DETAILS

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-017

Rev. 1



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COMMUNICATIONS WIREMOLDS 4000 & 6000 SERIES DETAILS

Health Shared Services BC
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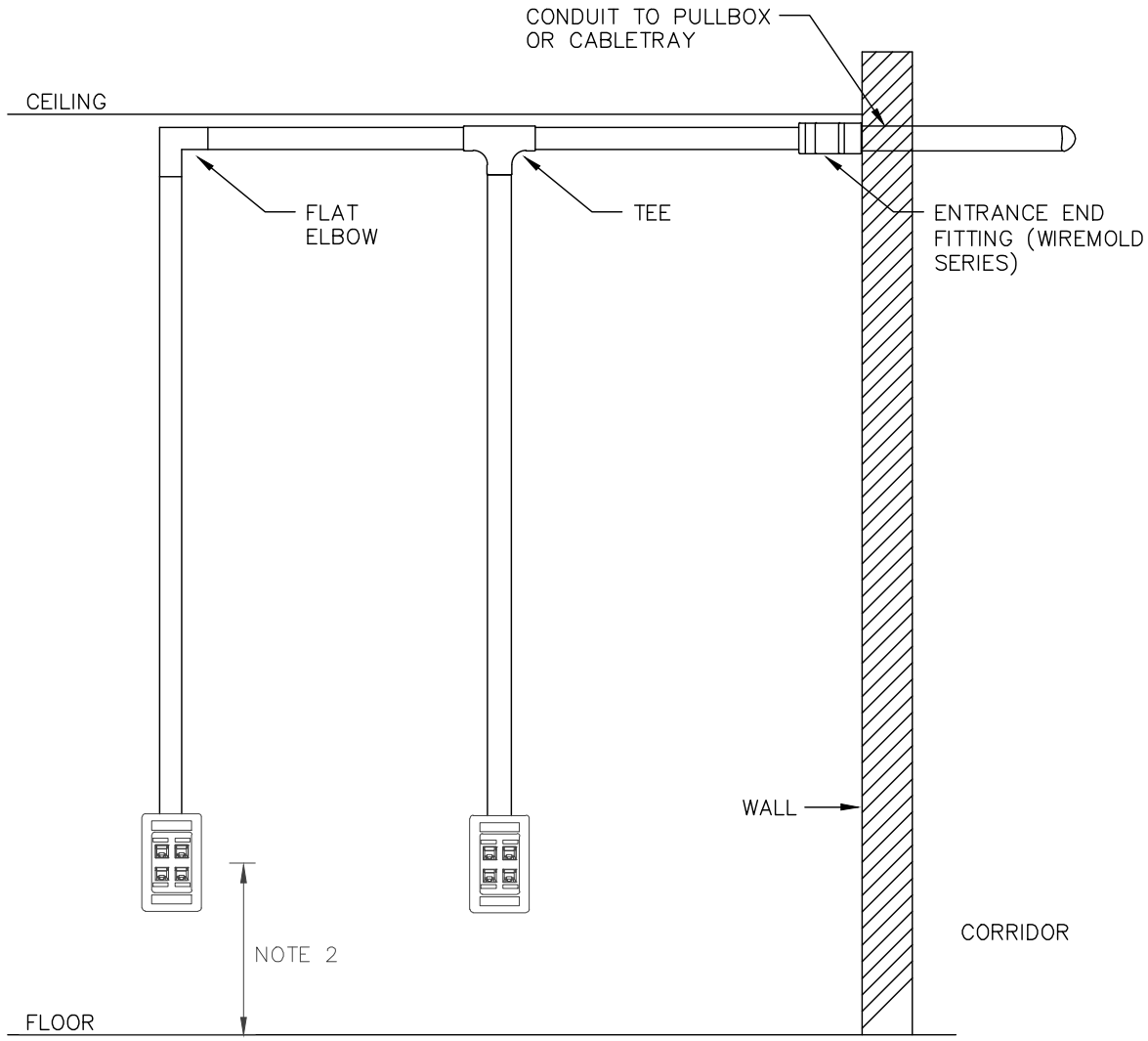
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-019

Rev. 1



NOTES:

1. WHERE 90° TURN IS REQUIRED PROVIDE INTERNAL CORNER COUPLING.
2. 300mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.

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COMMUNICATIONS WIREMOLD DETAILS

Health Shared Services BC
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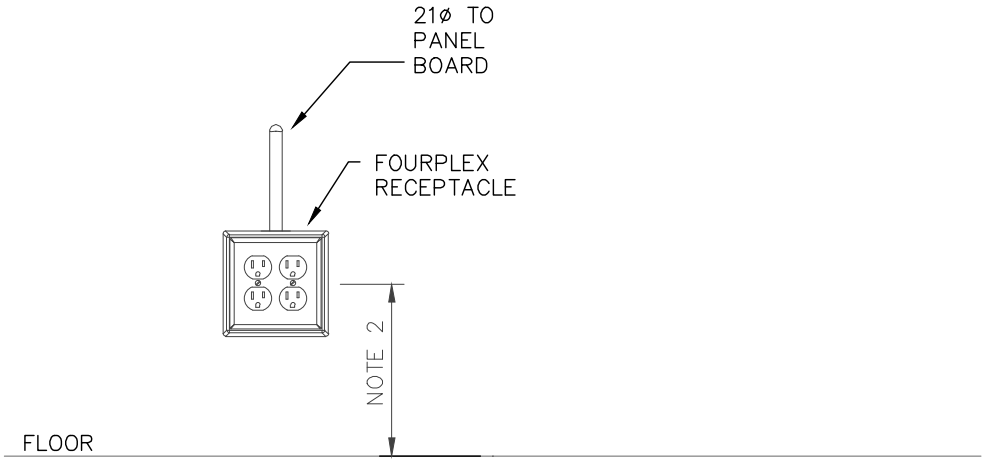
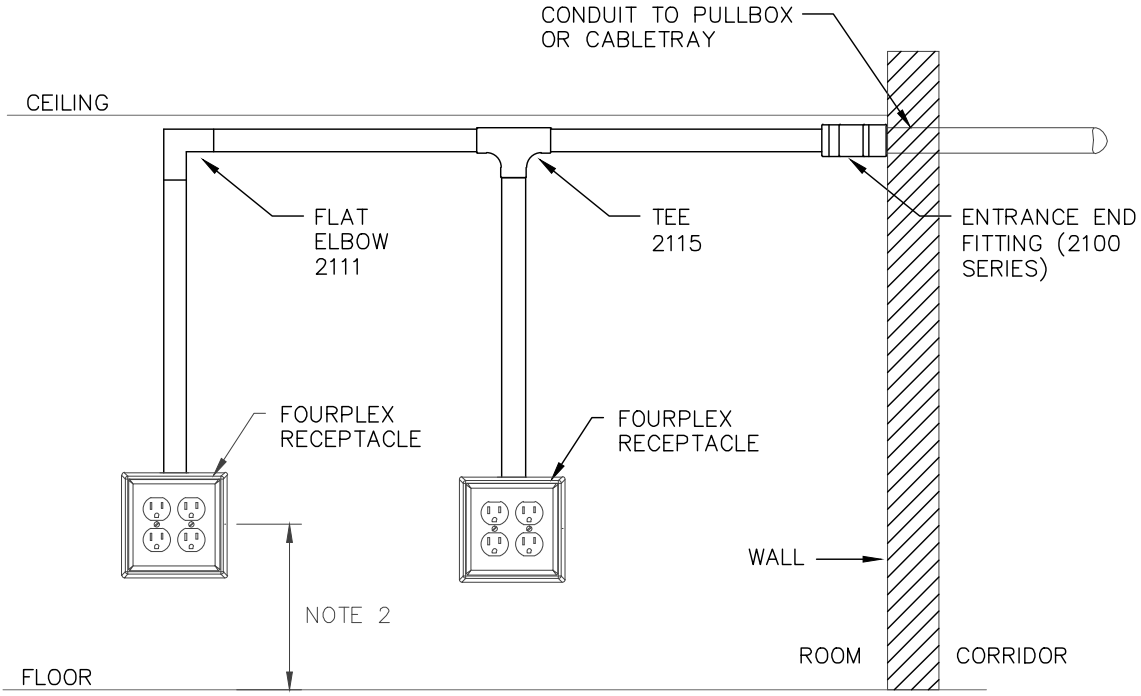
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-020

Rev. 1



SURFACE MOUNTED RECEPTACLE OUTLETS (CONDUIT SYSTEM)



SURFACE MOUNTED RECEPTACLE OUTLETS (WIREMOLD SYSTEM)

NOTES:

1. WHERE 90° TURN IS REQUIRED PROVIDE INTERNAL CORNER COUPLING (2117TC).
2. 300mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.

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COMMUNICATIONS RECEPTACLE DETAILS

Health Shared Services BC
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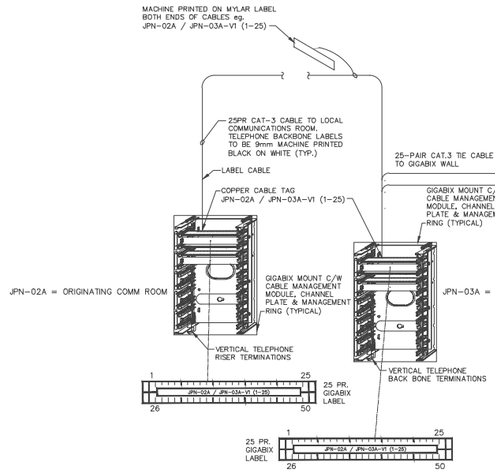
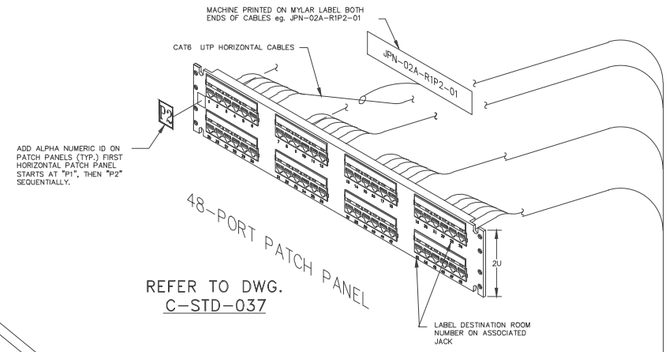
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-021

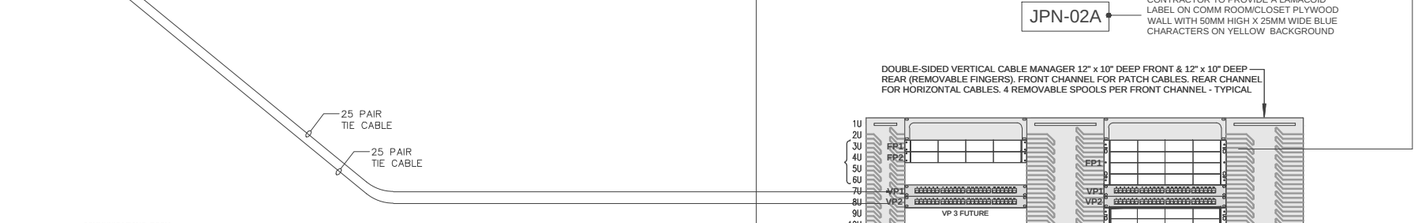
Rev. 1

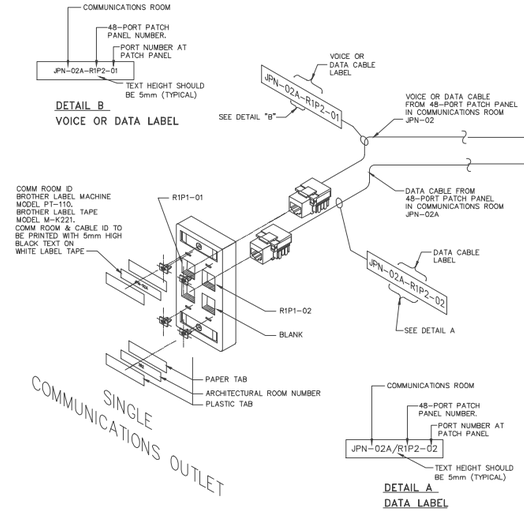


REFER TO DWG.
C-STD-035

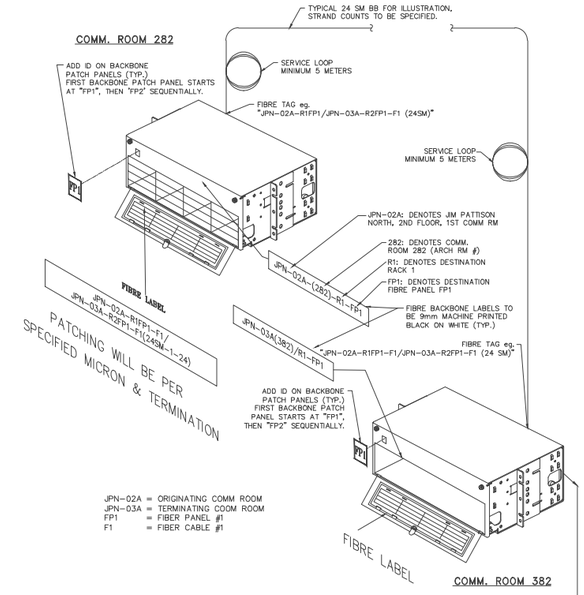


REFER TO DWG.
C-STD-037



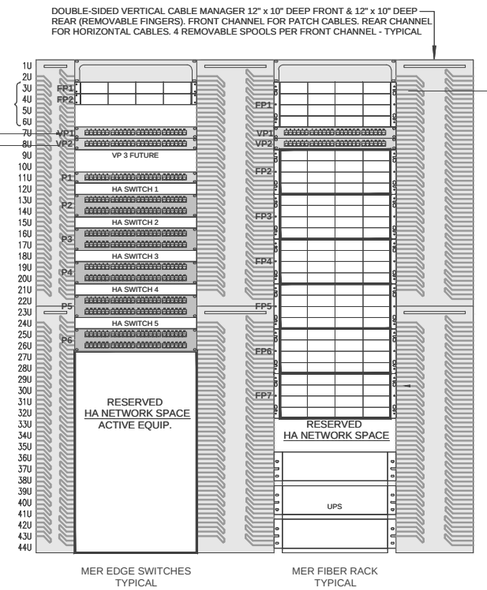


REFER TO DWG.
C-STD-024



REFER TO DWG.
C-STD-034

JPN-02A — CONTRACTOR TO PROVIDE A LAMACOID LABEL ON COMM ROOM/CLOSET PLYWOOD WALL WITH 50MM HIGH X 25MM WIDE BLUE CHARACTERS ON YELLOW BACKGROUND



FOR CABINET DETAILS REFER TO DWG. C-STD-010.x

REFER TO DWG.
C-STD-010.x

HEALTH SHARED SERVICES BC (HSSBC)

NO.	DATE	REVISIONS	BY

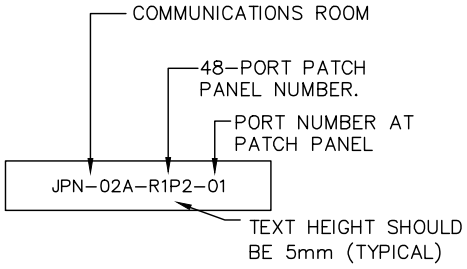
Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

BUILDING/FACILITY NAME

PROJECT TITLE

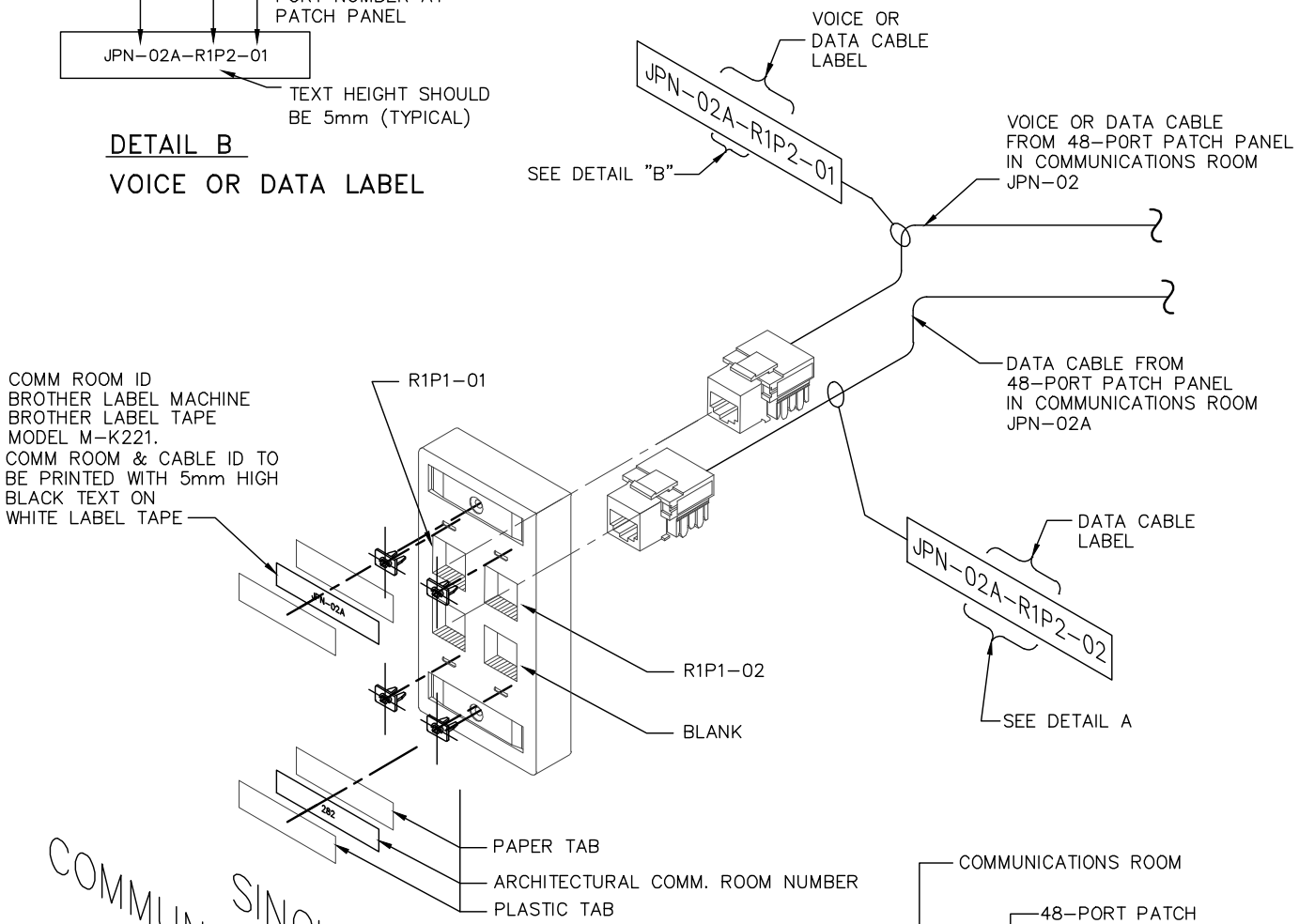
DRAWING TITLE
COMMUNICATIONS LABELLING DIAGRAM

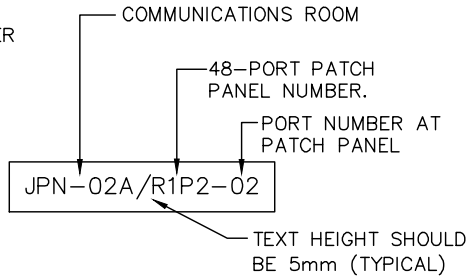
SCALE: NTS	DATE: 02 29 16
DRAWN BY: CT	SHEET No.
REVIEWED BY: EG	
DESIGNER'S NAME: EG/NM	
PROJECT No.	OF
FILE NAME: C-STD-023	REV. 1



DETAIL B

VOICE OR DATA LABEL





DETAIL A

DATA LABEL

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COMMUNICATIONS TYPICAL FACEPLATE LABELING

Health Shared Services BC
A division of the Provincial Health Services Authority
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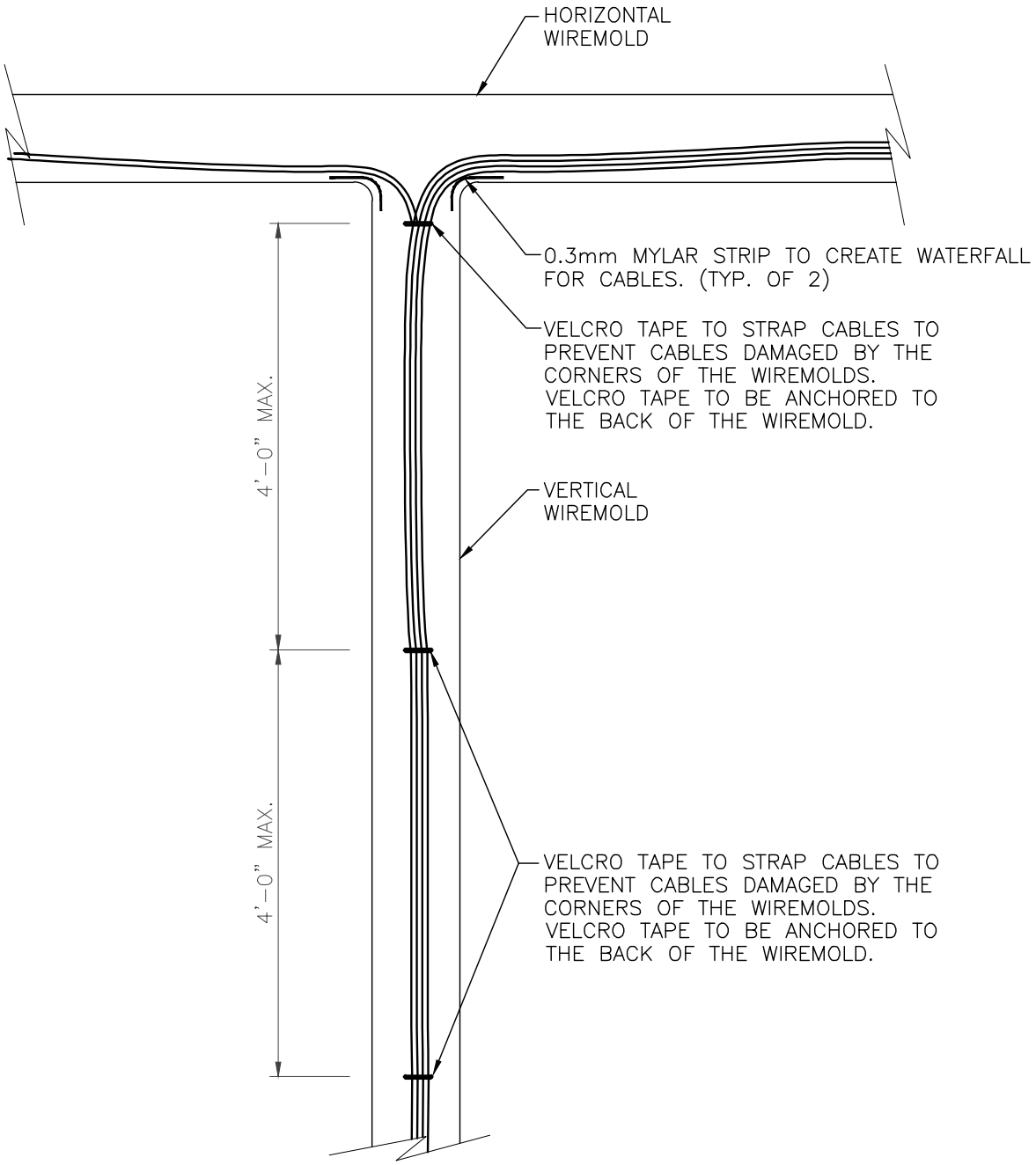
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–024

Rev. 1



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COMMUNICATIONS
CABLE SUPPORT DETAILS FOR 4000 & 6000 WIREMOLD VERTICAL RISER

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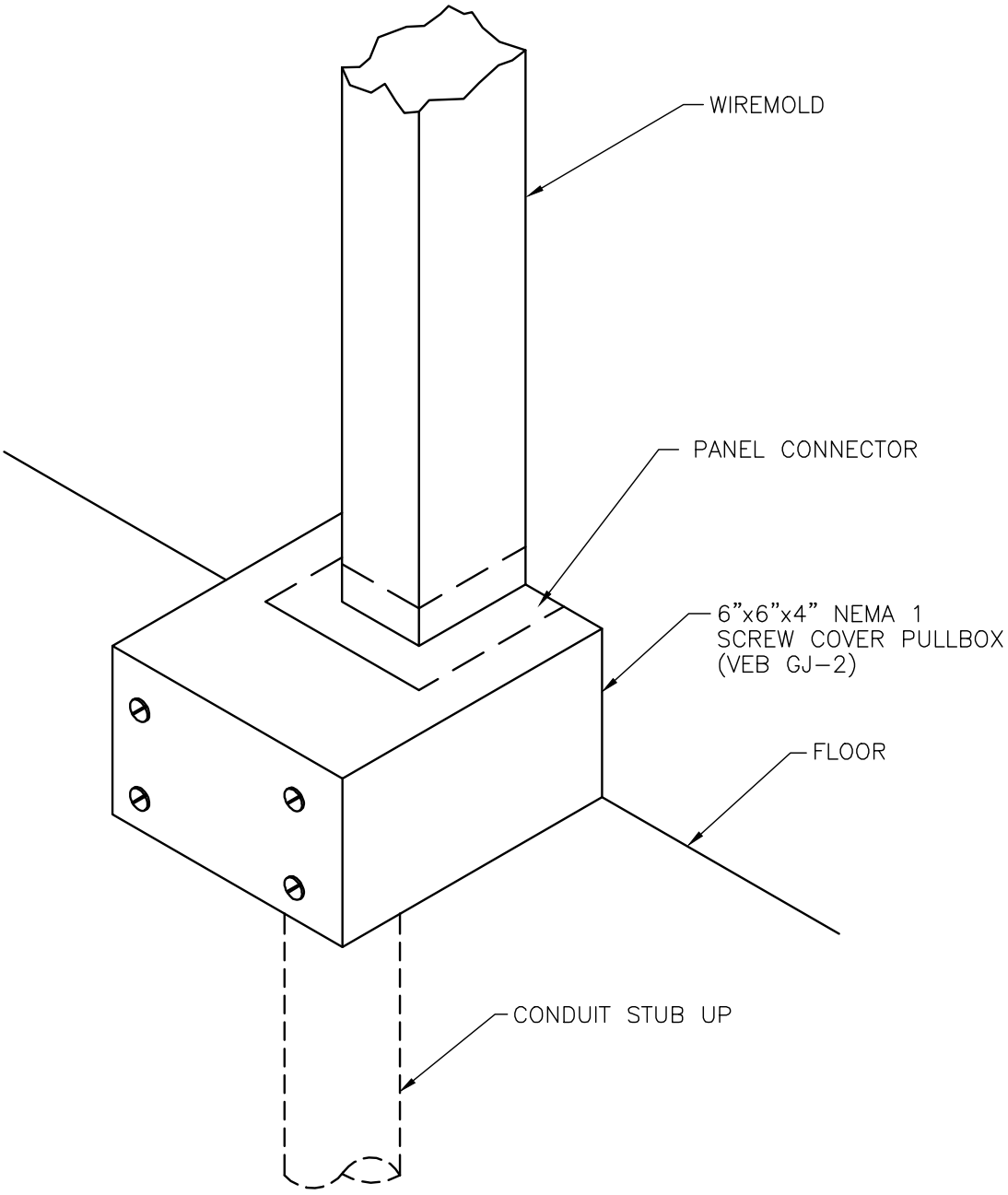
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-027

Rev. 1



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COMMUNICATIONS
TYPICAL CONNECTION BETWEEN CONDUIT & 4000/6000 WIREMOLD

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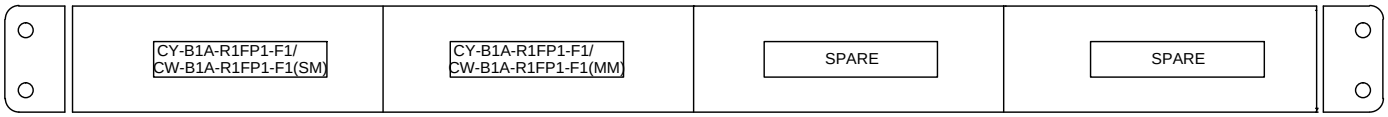
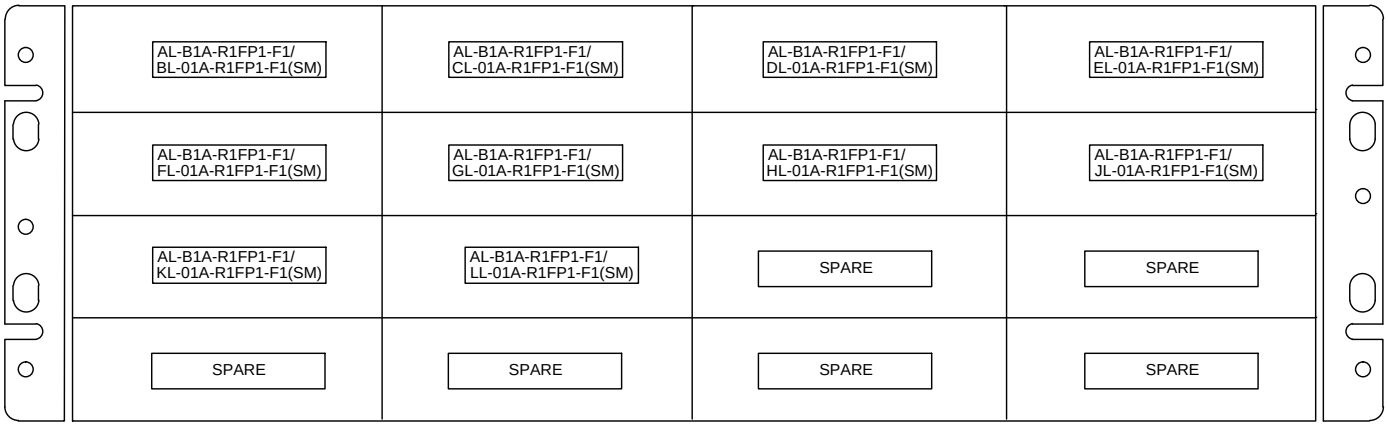
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-028

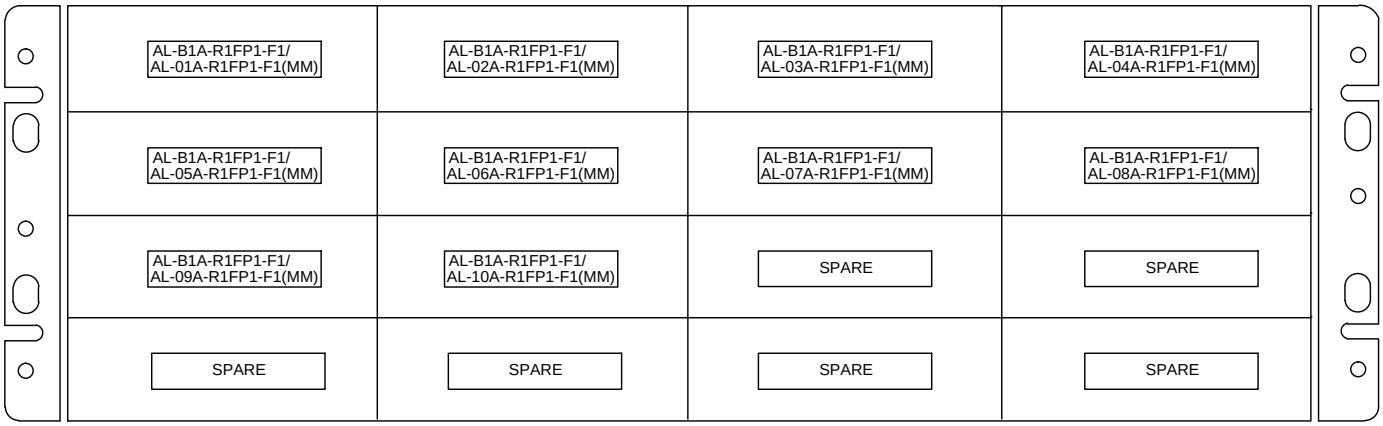
Rev. 1



INTER-BUILDING FIBER - 1U PANEL (MEDIUM SITE UP TO 100 USERS)



INTER-BUILDING FIBER - 4U PANEL (ABOVE 100 USERS)



INTRA-BUILDING FIBER - 4U PANEL (ABOVE 100 USERS)

NOTES:

1. LABEL ON CABLE, MPO CASSETTE, BULKHEAD/ADAPTER PLATE AND PANEL COVER.
2. FIBER PATCH PANEL SHALL HAVE ABILITY TO HOUSE SINGLE MODE / MULTI MODE FIBER, FUSION SPLICE, PRE-TERMINATED FIBER WITH MPO CASSETTES / BULKHEAD TERMINATIONS.

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COMMUNICATIONS FIBER PANEL LABEL

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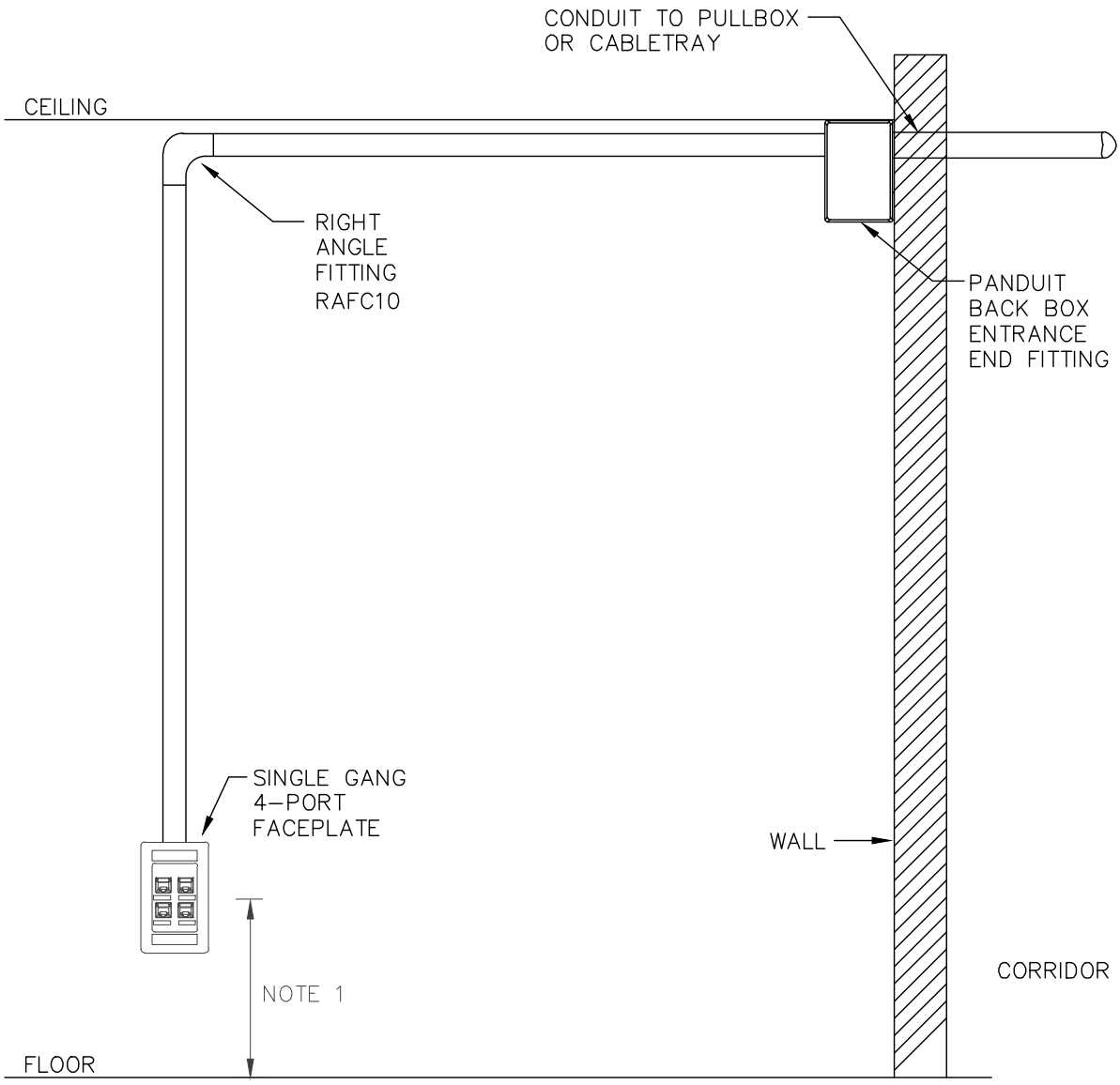
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-029

Rev. 1



NOTES:

1. 300mm OR MOUNTING HEIGHT TO MATCH EXISTING OUTLET MOUNTING HEIGHT IN THE SAME ROOM.

2. MINIMUM CABLE BENDING RADIUS SHALL BE 1" OR 25mm.

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COMMUNICATIONS PANDUIT LDP–10 SERIES NON METALLIC DETAILS

Health Shared Services BC
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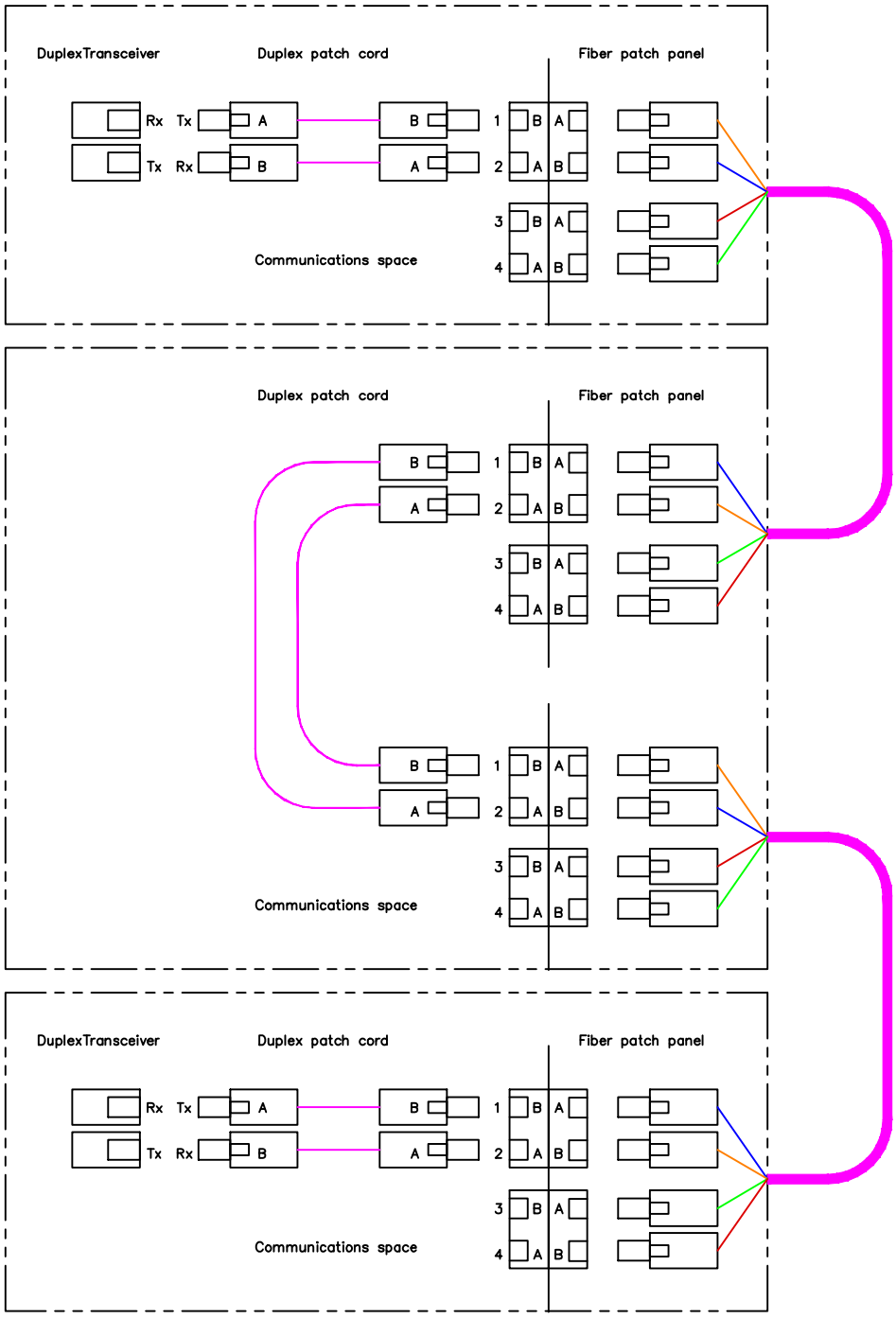
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–031

Rev. 1



NOTES:

PRINT IN COLOR.

ALL INDIVIDUAL ELEMENTS OF A CHANNEL SHALL PROVIDE A CROSSOVER. CHANNEL ELEMENTS INCLUDE EVERY PATCH CORD, EVERY ADAPTER (COUPLING), AND EVERY CABLE SEGMENT BETWEEN PATCH PANELS.

DUPLEX PATCH CORDS SHALL HAVE A A–B TO B–A CONFIGURATION.

FIBER CABLE SHALL HAVE A 1–2 (BLUE–ORANGE)TO 2–1 (BLUE–ORANGE), 3–4 (GREEN–BROWN) TO 4–3 (GREEN–BROWN), ETC. CONFIGURATION. EACH PAIR POSITIONING SHALL BE REVERSED.

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COMMUNICATIONS REVERSE FIBER PAIR POSITIONING

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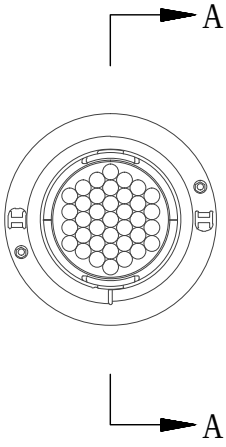
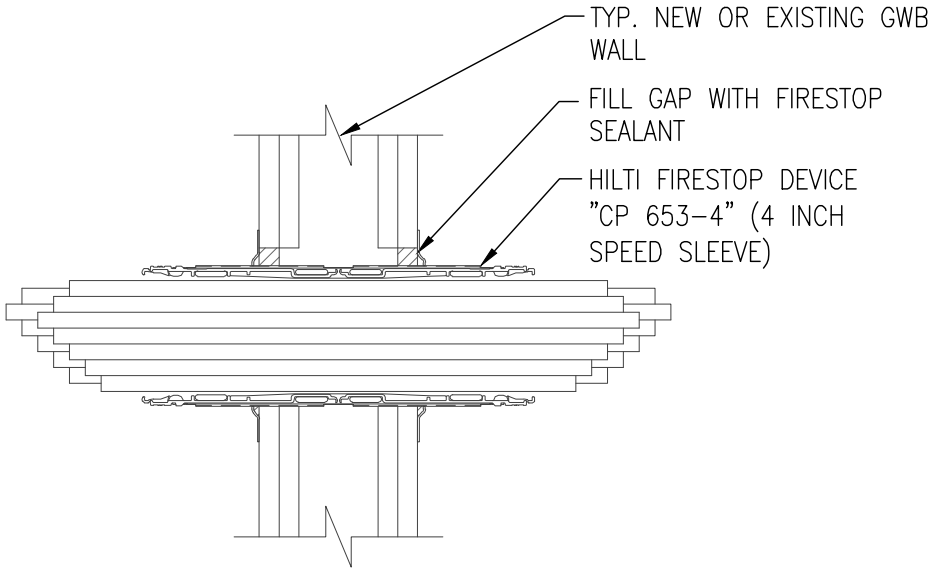
HEALTH SHARED SERVICES BC (HSSBC)

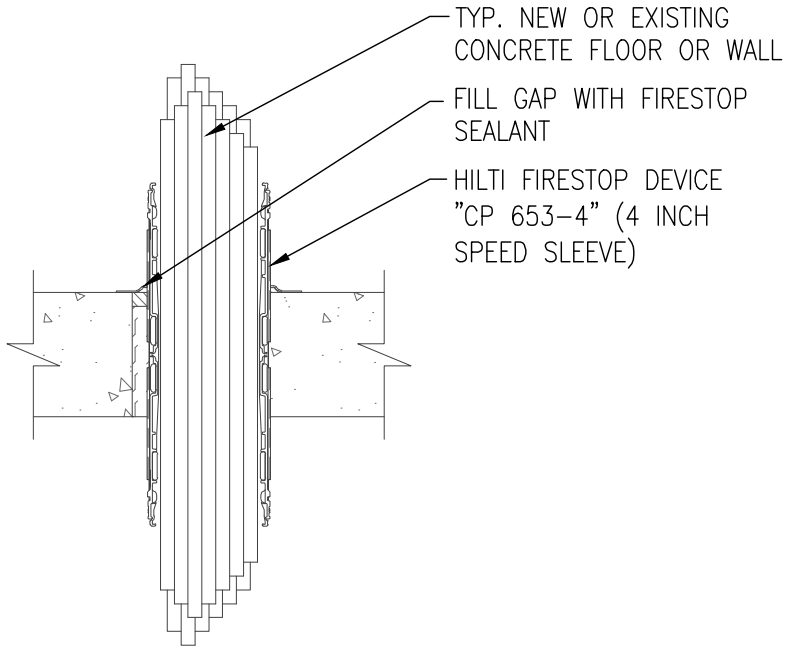
File No. C–STD–032

Rev. 1





NOTE: THIS DETAIL IS FOR GYPSUM OPENINGS



NOTE: THIS DETAIL IS FOR CORED OPENINGS

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COMMUNICATIONS TYPICAL FIRESTOPPING DETAILS

Health Shared Services BC
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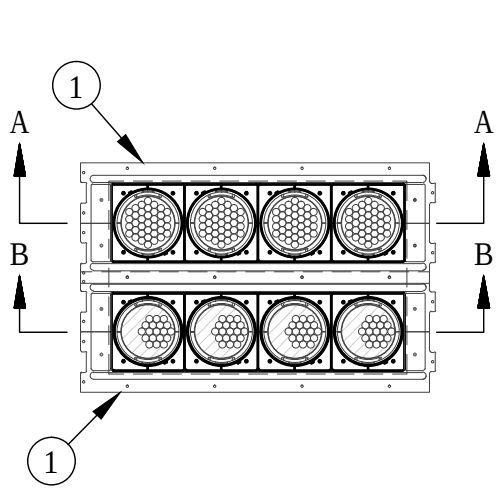
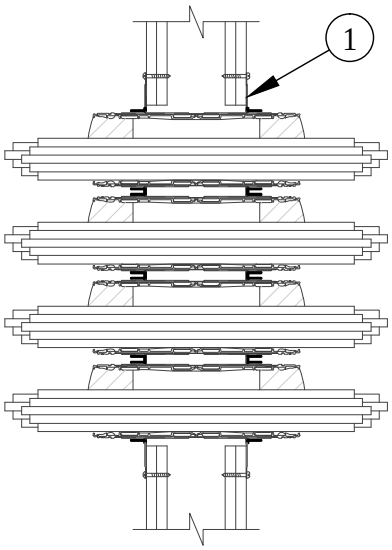
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–033.1

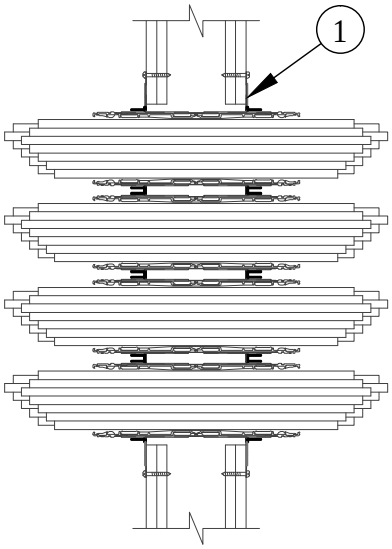
Rev. 1

THIS IS AN ILLUSTRATION OF A GANGPLATE FOR THE HILT CP 653–4" I SPEED SLEEVES THE PLATES ARE AVAILABLE FOR EITHER 3 OR 4 SLEEVE PLATES. USE BLANKING PLUGS WHEN SOME OF THE OPENINGS ARE NOT BEING USED





SECTION B-B



SECTION A-A

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS–SL GP 16" AND 24" FIRESTOP GANGPLATE

1. FIRESTOP DEVICE* — THE FIRESTOP DEVICE CONSISTS OF A STEEL PLATE SANDWICH CONSTRUCTION WITH THREE (16" DEVICE SIZE) OR FOUR (24" DEVICE SIZE) CIRCULAR OPENING PORTS WHICH ARE EACH NOM 4 IN. (102 MM) DIAM. THE FIRESTOP DEVICE IS INTENDED TO BE ORIENTED VERTICALLY OR HORIZONTALLY AND MOUNTED TO THE FACE OF THE OPENING ON BOTH SIDES OF WALL. THE 16" AND 24" FIRESTOP DEVICES WHEN ORIENTED HORIZONTALLY ARE ATTACHED TO THE 16 IN. (406 MM) AND 24 IN. (610 MM), RESPECTIVELY, CENTER TO CENTER SPACED WALL STUDS AT EACH SIDE OF OPENING, OVER THE GYPSUM BOARD.

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COMMUNICATIONS (HILTI) SPEED SLEEVE GANGING PLATE CFS–SL GP 16" AND 24"

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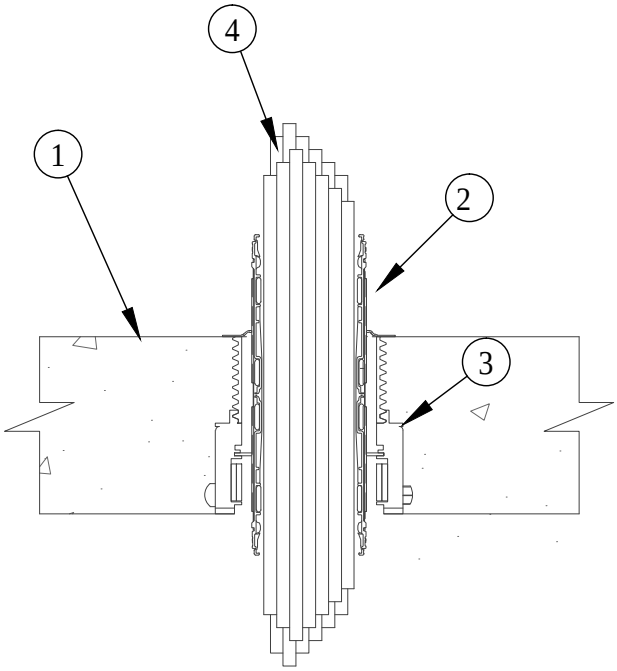
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–033.2

Rev. 1



REFER TO HILTI SYSTEM DRAWING F-A-3060

COMBINATION CAST-IN-PLACE & SPEED SLEEVE ASSEMBLY

NOTE:

1) CONCRETE SLAB
2) HILTI SPEED SLEEVE CP 653–4"
3) HILTI CAST–IN–PLACE SLEEVE CP 680–P 4"
4) COMMUNICATION CABLES

GENERAL NOTES:

- THIS DETAIL IS FOR RISER SLEEVES FOR COMMUNICATION ROOMS USING CAST–IN–PLACE SLEEVES IN COMBINATION WITH SPEED SLEEVES.
- ALL RISER SLEEVES ARE COMMUNICATION CABLES ONLY; DO NOT USE FOR CONDUIT OR POWER CIRCUITS

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COMMUNICATIONS (HILTI) CAST–IN–PLACE/SPEED SLEEVE F–A–3060 SYSTEM DWG

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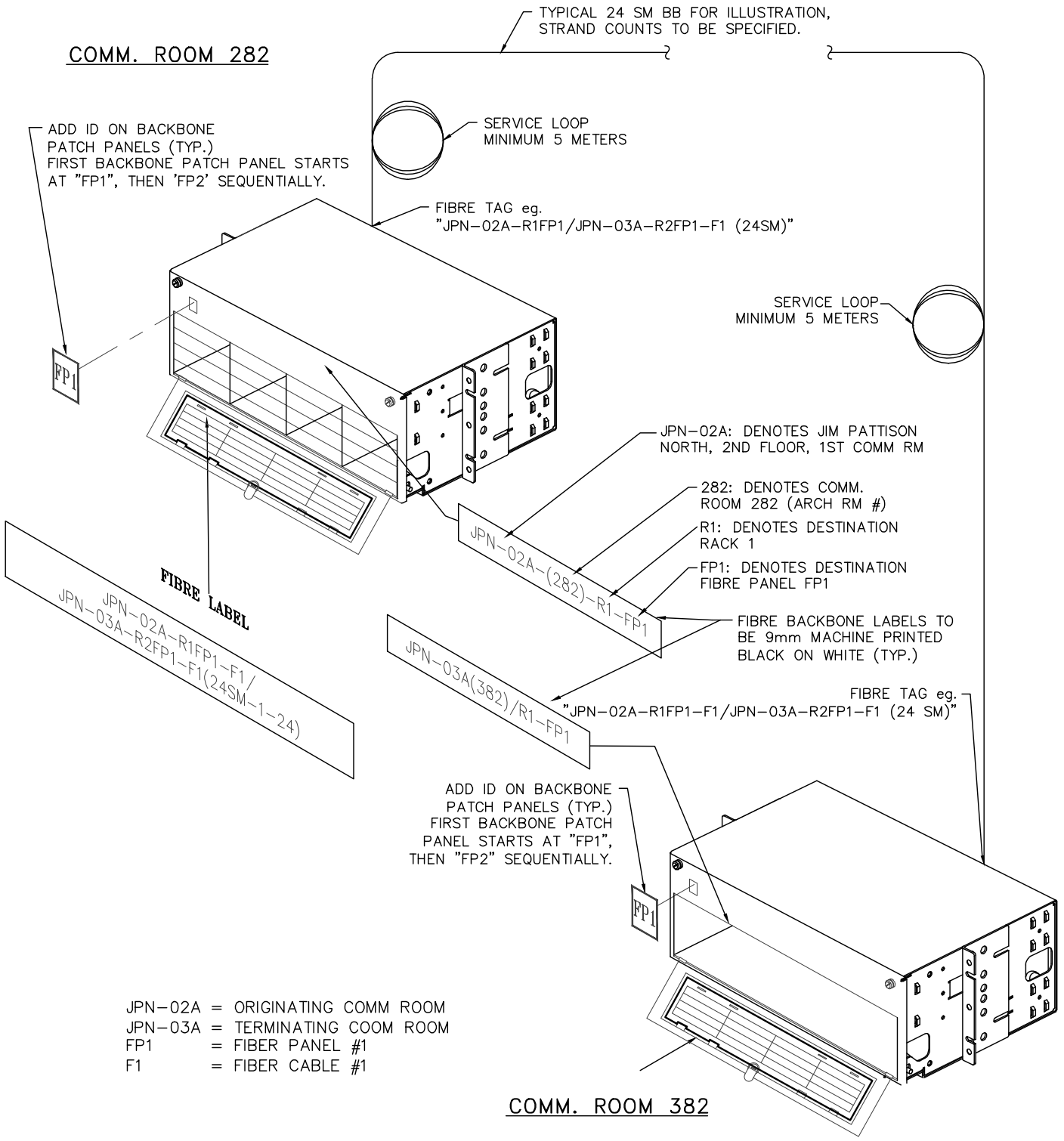
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–033.3

Rev. 1



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COMMUNICATIONS INTRA BUILDING FIBER BACKBONE DETAILS

Health Shared Services BC
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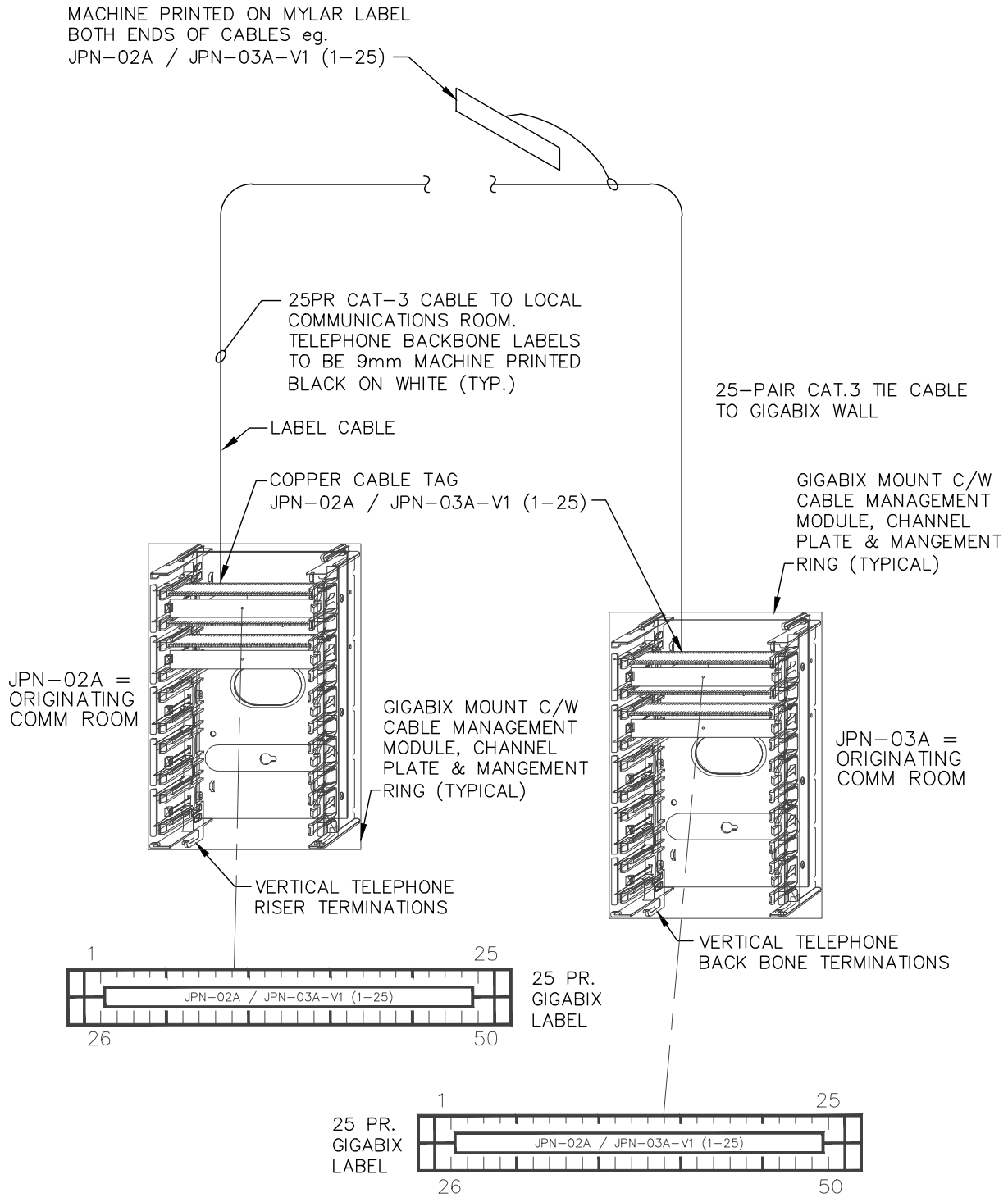
HEALTH SHARED SERVICES BC (HSSBC)

File No. C-STD-034

Rev. 1

CP 653-4



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COMMUNICATIONS INTRA BUILDING VOICE RISER MULTI–PAIR CABLE DETAILS

HEALTH SHARED SERVICES BC
(HSSBC)

File No. C–STD–035

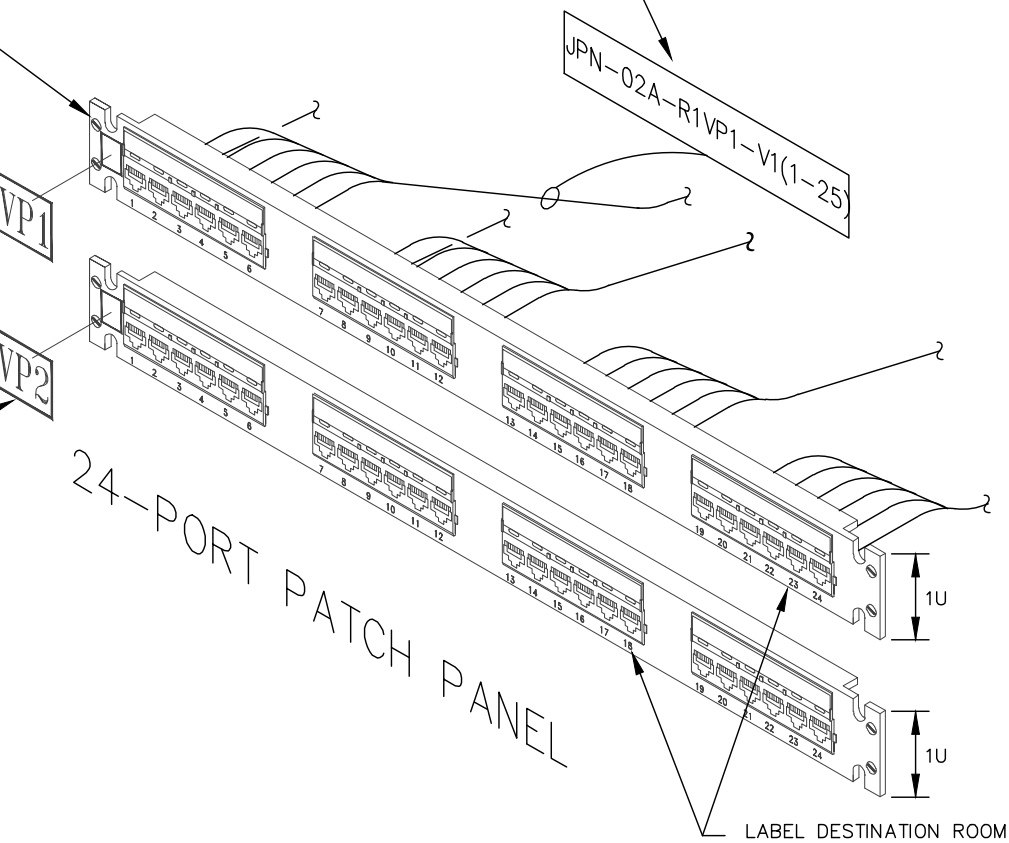
Rev. 1

IF SPECIFIED, GROUP COPPER BB CABLES TOGETHER ON PATCH PANEL LABEL FRONT PANEL DESTINATION COMM. ROOM ID
eg. JPN–02A–R1VP1–V1(1–25)

MACHINE PRINTED ON MYLAR LABEL BOTH ENDS OF CABLES eg. JPN–02A–R1P1–V1(1–25)

ADD LETTER DESIGNATIONS ON PATCH PANELS (TYP.) FIRST VOICE PATCH PANEL STARTS AT "VP1", THEN "VP2" SEQUENTIALLY.

ADD VP1, VP2 OR VP3 ON EACH PATCH PANELS



24–PORT PATCH PANEL

NOTE: 25–PAIR CAT.3 VOICE TIE CABLES TO GIGABIX WALL ARE TO BE LABELLED ON RACK–MOUNT PATCH PANEL AS VP1, VP2, ETC.

TERMINATE 1 PAIR PER PORT (PAIR #1), 2 PAIRS ON 24TH PORT.
25TH PAIR ON 25 PAIR CABLE ON PAIR 2 ON 24TH PORT.

LABEL DESTINATION ROOM NUMBER ON ASSOCIATED JACK

No.	BY	DATE	REVISIONS	App'd

Building/Facility Name

Scale

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Project No.

	BY	DATE
Drawn	CT	02 29 16
Check'd	EG/NM	02 29 16
Design'd	NM/EG	02 29 16
Approv'd	AM	02 29 16

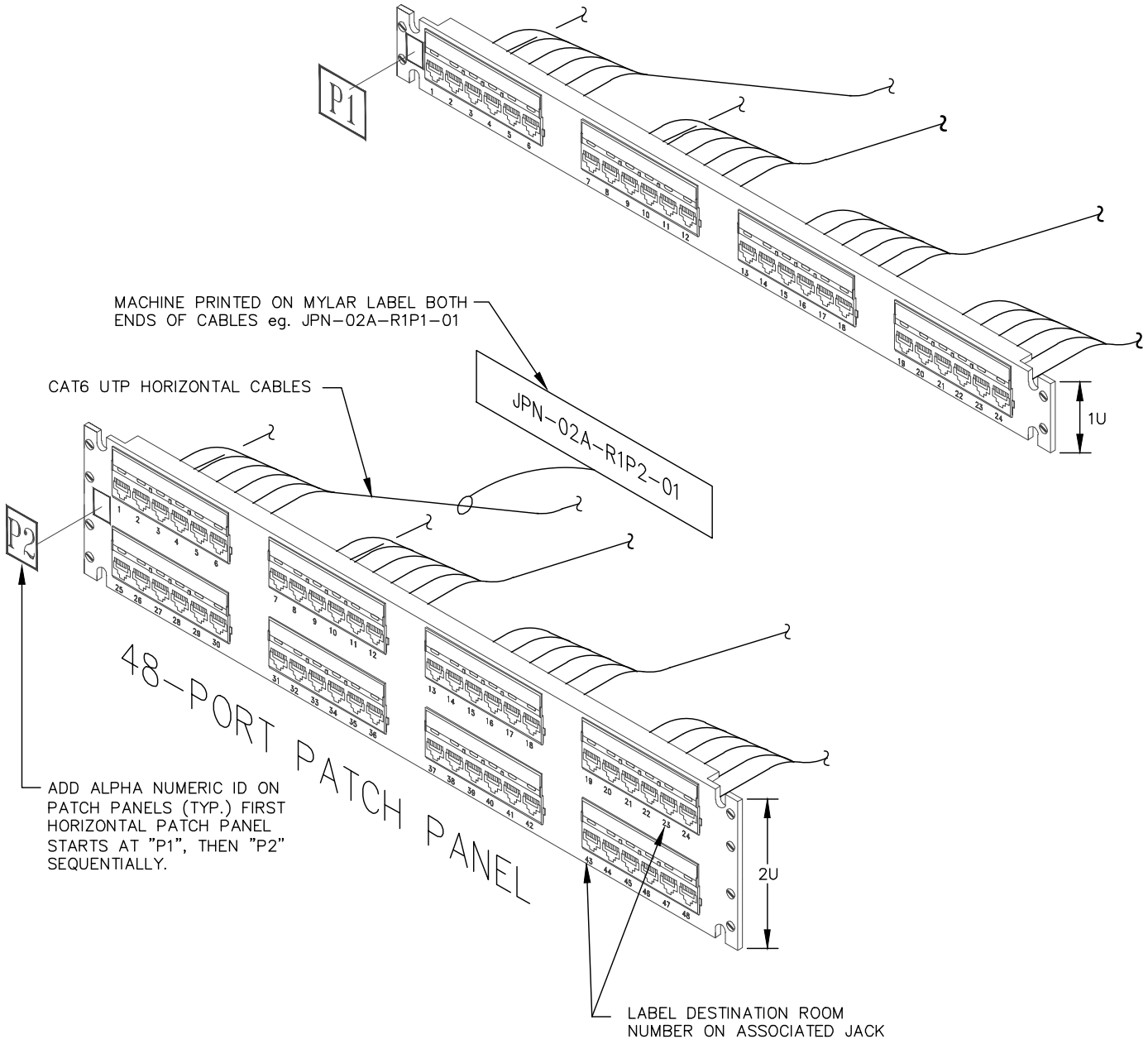
COMMUNICATIONS UTP 24 PORT VOICE (TIE) PATCH PANEL

Health Shared Services BC
A division of the Provincial Health Services Authority
Province-wide shared services. Better Value.

HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–036

Rev. 1



No.	BY	DATE	REVISIONS	App'd

Building/Facility Name

Scale

Sheet No. of

Project No.

	BY	DATE
Drawn	CT	02 29 16
Check'd	EG/NM	02 29 16
Design'd	NM/EG	02 29 16
Approv'd	AM	02 29 16

COMMUNICATIONS HORIZONTAL PATCH PANEL

Health Shared Services BC
A division of the Provincial Health Services Authority
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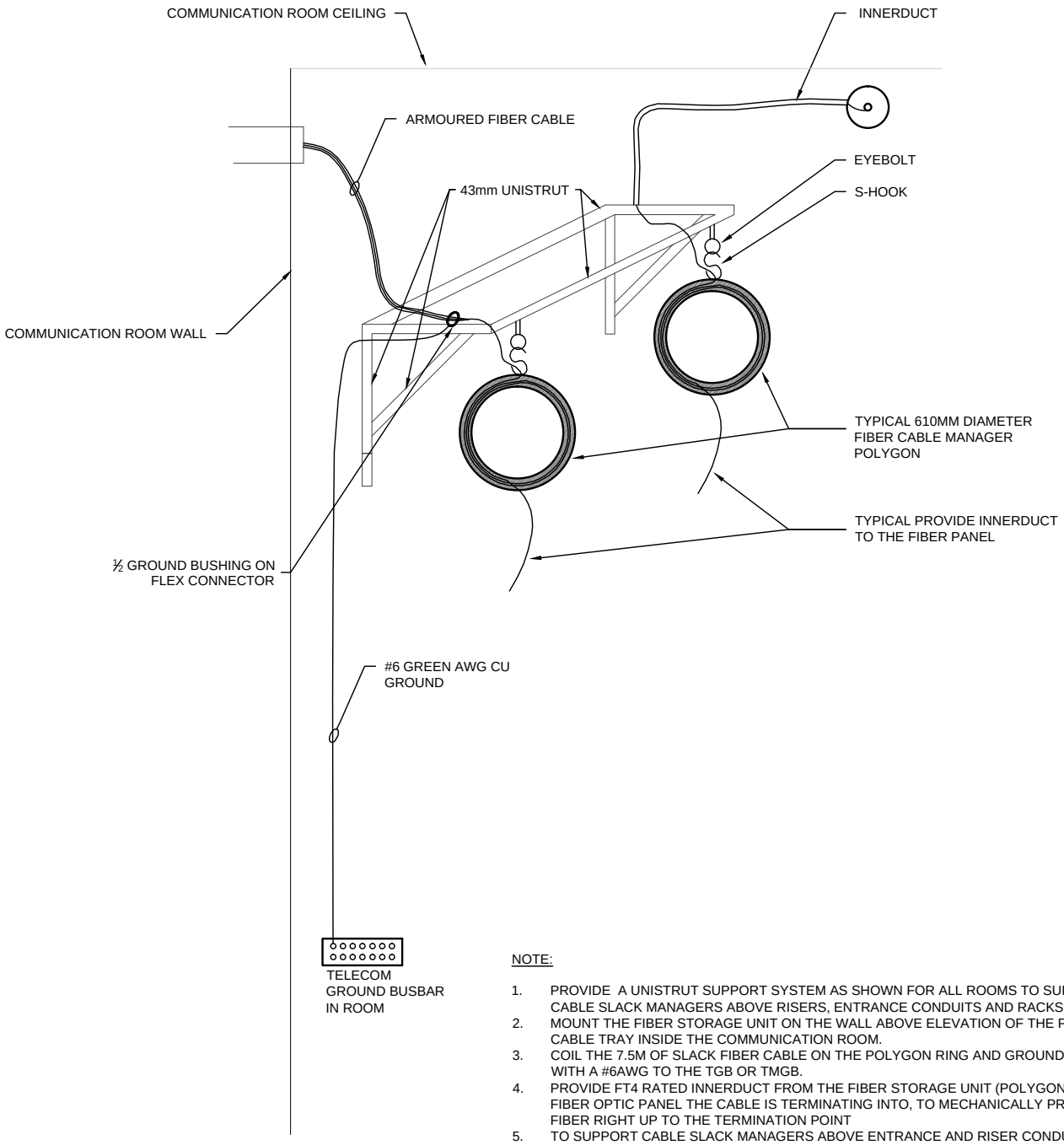
HEALTH SHARED SERVICES BC (HSSBC)

File No. C–STD–037

Rev. 1



NOTE:

1. PROVIDE A UNISTRUT SUPPORT SYSTEM AS SHOWN FOR ALL ROOMS TO SUPPORT FIBER CABLE SLACK MANAGERS ABOVE RISERS, ENTRANCE CONDUITS AND RACKS.
2. MOUNT THE FIBER STORAGE UNIT ON THE WALL ABOVE ELEVATION OF THE PERIMETER CABLE TRAY INSIDE THE COMMUNICATION ROOM.
3. COIL THE 7.5M OF SLACK FIBER CABLE ON THE POLYGON RING AND GROUND THE ARMOUR WITH A #6AWG TO THE TGB OR TMGB.
4. PROVIDE FT4 RATED INNERDUCT FROM THE FIBER STORAGE UNIT (POLYGON RING) TO THE FIBER OPTIC PANEL THE CABLE IS TERMINATING INTO, TO MECHANICALLY PROTECT THE FIBER RIGHT UP TO THE TERMINATION POINT
5. TO SUPPORT CABLE SLACK MANAGERS ABOVE ENTRANCE AND RISER CONDUITS.

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COMMUNICATIONS FIBER SLACK STORAGE UNIT

Health Shared Services BC
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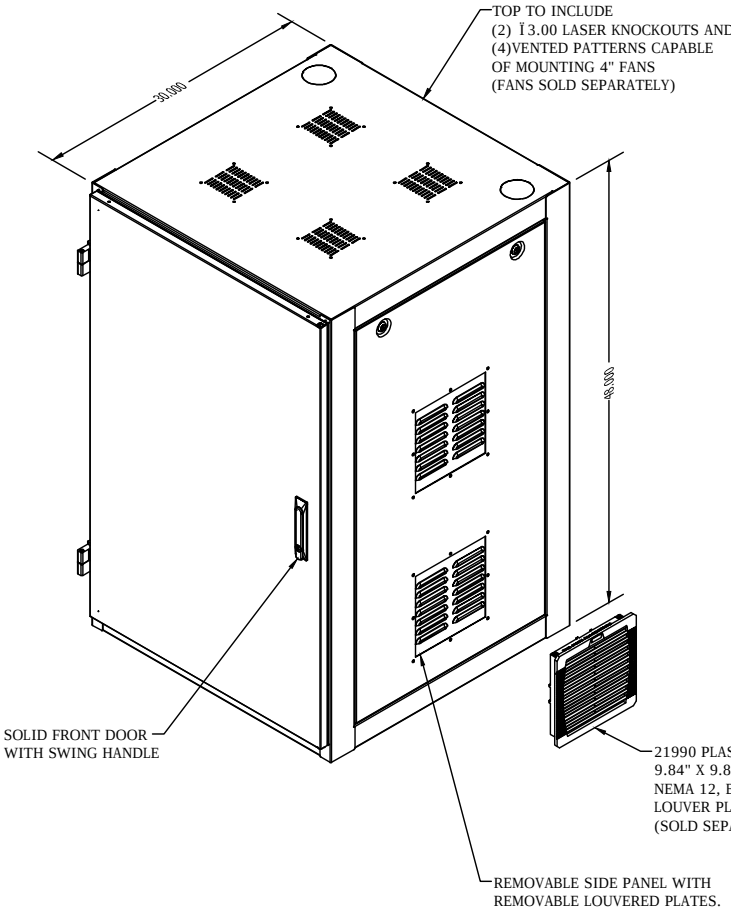
HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-038

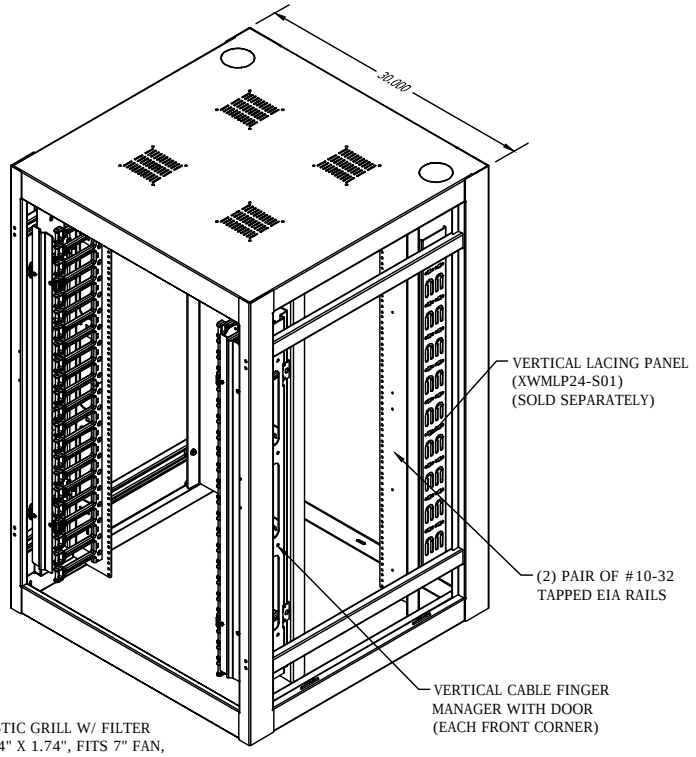
Rev. 1

WALL MOUNT CABINET, HEAVY DUTY CONSTRUCTION, 24U 48" HIGH X 30" WIDE X 30" DEEP,14GA WELDED CONSTRUCTION, WITH 12 GA REAR, (2) PAIR OF 12GA RAILS TAPPED 10-32, SILKCREENED RU MARKINGS, (40) 10-32 HARDWARE, TOP AND BOTTOM VENTED WITH 4" FAN MOUNTING PROVISIONS, WITH (2) 3.0" ROUND KNOCKOUTS TOP AND BOTTOM, SOLID FRONT DOOR WITH LOCKING SWING HANDLE, REMOVABLE LOUVERED SIDE PANELS WITH LOCKS, (2) VERTICAL CABLE FINGER MANAGER WITH DOOR, ONE IN EACH FRONT CORNER, PAINTED BLACK TEXTURE POWDER COAT, STANDARD PACKAGING ON A PALLET, NOT SEISMIC CERTIFIEDÁ

ISOMETRIC VIEW
ASSEMBLED



ISOMETRIC VIEW
DOOR AND SIDES
REMOVED FOR CLARITY



BELDEN WALL CABINET PART #: XWM243030-S01 REV.3

NOTE:

1. PROVIDE A SEISMIC ENGINEER'S CERTIFICATE FOR THE MOUNTING OF THIS CABINET
2. PROVIDE PANDUIT AIR BOOTS FOR EACH 75MM KO OPENING INTO THE CABINET

No.	BY	DATE	REVISIONS	App'd

Building/Facility Name

Scale

Sheet No. of

Project No.

	BY	DATE
Drawn	CT	02 29 16
Check'd	EG/NM	02 29 16
Design'd	NM/EG	02 29 16
Approv'd	AM	02 29 16

COMMUNICATIONS
WALL MOUNT COMMUNICATIONS CABINET

Health Shared Services BC
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HEALTH SHARED SERVICES BC
(HSSBC)

File No. C-STD-039

Rev. 1

APPENDIX A - HSSBC COMMUNICATIONS STANDARD SAMPLE DATABASE

HSSBC - Network Edge
Horizontal Cable Information

SAMPLE DATA FORMAT ONLY - PLEASE DELETE IT BEFORE ENTERING NEW DATA

Note: Submit Telecom Room ID to Network Services for approval upon award of contract.

			Originating Endpoint - (Telecom Closet)				**Terminating Endpoint -** (User office)							
Use	Type	Cable	Telecom Arch Room #	Telecom Room ID	Termination type	Switch Port ID/ Voice Panel ID	Bldg Code	Floor Code	Room #	Termination type	Full Cable ID	Company Name	Install Date	Other Linkage Records
Voice	UTP	Cat 6	20	JPN-B1A	Patch Panel	R2P1-01	JPN	B1	25	RJ45	JPN-B1A-R1P1-01	ABC	01-Jun-11	JPN-B1A/CP-B1A-V1-001
Data	UTP	Cat 6	20	JPN-B1A	Patch Panel	S1-01	JPN	B1	25	RJ45	JPN-B1A-R1P1-02	ABC	01-Jun-11	
Data	UTP	Cat 6	20	JPN-B1A	Patch Panel	S1-02	JPN	B1	25	RJ45	JPN-B1A-R1P1-03	ABC	01-Jun-11	
Data	UTP	Cat 6	20	JPN-B1A	Patch Panel	S1-03	JPN	B1	25	RJ45	JPN-B1A-R1P1-04	ABC	01-Jun-11	
WP	UTP	Cat 6	20	JPN-B1A	Patch Panel	S1-04	JPN	B1	38	RJ45	JPN-B1A-R1P1-05	ABC	01-Jun-11	
WP	UTP	Cat 6	20	JPN-B1A	Patch Panel	S1-05	JPN	B1	38	RJ45	JPN-B1A-R1P1-06	ABC	01-Jun-11	

HSSBC - Network Edge
Intra-Building UTP Riser Cable Information

SAMPLE DATA FORMAT ONLY - PLEASE DELETE IT BEFORE ENTERING NEW DATA

		Originating Endpoint- (Main Telecom Closet)				**Terminating Endpoint-** (Local Telecom Closet)						
Type	Cable	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Full Cable ID	Company Name	Install Date
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-001	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-002	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-003	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-004	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-005	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-006	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-007	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-008	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-009	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-010	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-011	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-012	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-013	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-014	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-015	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-016	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-017	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-018	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-019	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-020	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-021	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-022	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-023	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-024	ABC	01-Jun-11
UTP	Tel 25 pair	01	123	JPN-01A	Giga Bix	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-V1-025	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB1	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB2	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB3	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB4	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB5	ABC	01-Jun-11
UTP	Cat6	01	123	JPN-01A	Patch Panel	02	234	JPN-02B	Giga Bix	JPN-01A/JPN-02B-R1P1-BB6	ABC	01-Jun-11

HSSBC - Network Support
Inter-Building UTP Riser Cable Information

SAMPLE DATA FORMAT ONLY - PLEASE DELETE IT BEFORE ENTERING NEW DATA

		Originating Endpoint- (Main Telecom Closet)				**Terminating Endpoint-** (Main Telecom Closet)							
Type	Cable	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Floor Cod	Telecom Room	Telecom Room ID	Termination type	Full Cable ID	Company Name	Install Date	Other Linkage Record
UTP	Tel 100 pair	01	500	JPN-01A	Giga Bix	01	100	JPS-01A	Giga Bix	JPN-01/JPS-01B/V1-001	ABC	01-Jun-11	
UTP	Tel 100 pair	01	500	JPN-01A	Giga Bix	01	100	JPS-01A	Giga Bix	JPN-01/JPS-01B/V1-002	ABC	01-Jun-11	
UTP	Tel 100 pair	01	500	JPN-01A	Giga Bix	01	100	JPS-01A	Giga Bix	JPN-01/JPS-01B/V1-003	ABC	01-Jun-11	
UTP	Tel 100 pair	01	500	JPN-01A	Giga Bix	01	100	JPS-01A	Giga Bix	JPN-01/JPS-01B/V1-004	ABC	01-Jun-11	

HSSBC - Network Edge
Intra-Building Fiber Riser cable information

SAMPLE DATA FORMAT ONLY - PLEASE DELETE IT BEFORE ENTERING NEW DATA

		Originating Endpoint- (Main Telecom Closet)								**Terminating Endpoint-** (Local Telecom Closet)										
Type	Cable	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Rack ID	Patch Panel	Cable ID	Strand	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Rack ID	Patch Panel	Cable ID	Strand	Full Cable ID	Company Name	Install Date
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	1	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	1	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	2	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	2	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	3	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	3	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	4	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	4	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	5	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	5	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	6	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	6	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	7	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	7	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	8	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	8	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	9	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	9	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	10	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	10	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	11	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	11	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM10G	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	12	02	223	JPN-02A	LC, SC, ST or MTRJ	R1	FP1	F1	12	JPN-01A-R1FP1/JPN02A-R1FP1-	ABC	01-Jun-11
Fiber	50MM1G																			
Fiber	62.5MM																			
Fiber	SM																			

HSSBC - Network Edge
Inter-Building Fiber Riser cable information

SAMPLE DATA FORMAT ONLY - PLEASE DELETE IT BEFORE ENTERING NEW DATA

		Originating Endpoint- (Main Telecom Closet)								**Terminating Endpoint-** (Main Telecom Closet)										
Type	Cable	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Rack ID	Patch Panel	Cable ID	Strand	Floor Code	Telecom Room #	Telecom Room ID	Termination type	Rack ID	Patch Panel	Cable ID	Strand	Full Cable ID	Company Name	Install Date
Fiber	SM	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	1	01	100	JPS-01A	LC, SC, ST or MTRJ	R1	FP1	F1	1	PN-01A-R1FP1/JPS-01A-R1FP1-F1-	ABC	01-Jun-11
Fiber	SM	01	123	JPN-01A	LC, SC, ST or MTRJ	R1	FP1	F1	2	01	100	JPS-01A	LC, SC, ST or MTRJ	R1	FP1	F1	2	PN-01A-R1FP1/JPS-01A-R1FP1-F1-	ABC	01-Jun-11

Rack Mount UPS Power - Existing Acute Sites/New and Existing Community Sites

Description	**Comm. Room serving a wiring zone: 0-240 Drops**	**Comm. Room serving a wiring zone: 0-240 Drops**	**Comm. Room serving a wiring zone: 0-480 Drops**	**Comm. Room serving a wiring zone: 480 > Drops**
Input Power	Generator Protected Power for all Acute Sites. In Community sites that are not equipped with generator protected power, utility power is acceptable.	Generator Protected Power for all Acute Sites. In Community sites that are not equipped with generator protected power, utility power is acceptable.	Generator Protected Power for all Acute Sites. In Community sites that are not equipped with generator protected power, utility power is acceptable.	Generator Protected Power for all Acute Sites. In Community sites that are not equipped with generator protected power, utility power is acceptable.
Maintenance Receptacles	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	1	2	4	4
Equipment Rack Receptacles	Provide two (2) L6-30R receptacles and one (1) L5-15R, each on dedicated circuits above the rack on Emergency Generator Power or Utility Power. One L6-30R will be used to provide input power into the UPS and the other will be used for a back-up ePDU. The L5-15R is intended to distribute 120V Generator Protected power for third party equipment in the rack. The L5-15R can be used to connect to a horizontal PDU or 1500VA UPS.	**Rack 1** - - Provide one (1) L6-30R and one (1) L5-15R receptacle on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU. The L5-150R is intended to distribute 120V Generator Protected power for third party equipment in the rack. The L5-15R can be used to connect to a horizontal PDU or 1500VA UPS. **Rack 2** - Provide two (2) L6-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. One L6-30R will be used to provide input power into the UPS and the other will be used for a back-up ePDU.	**Rack 1** - Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L5-30Rs are intended to distribute 120V Generator Protected power for third party equipment in the rack. One L5-30R can be used to connect to a vertical PDU and the other can be used to connect to a 3000VA UPS. **Rack 2, 3 & 4** - Provide one (1) L6-30R receptacles on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU.	**Rack 1** - Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L5-30Rs are intended to distribute 120V Generator Protected power for third party equipment in the rack. One L5-30R can be used to connect to a vertical PDU and the other can be used to connect to a 3000VA UPS. **Rack 2, 3 & 4** - Provide one (1) L6-30R receptacles on Emergency Generator or Utility Power. Utility Power is acceptable only in Community Sites where Generator is not available. The L6-30R will be used for a back-up ePDU.
UPS	Provide a rack mount **5000VA UPS** (refer to Appendix C for appropriate model number) c/w: - L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations) - 2 x L6-20R and 2 x L6-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing. * If 1500VA UPS system is required to distribute 120V UPS Protected Power to third party equipment in the rack refer to Appendix C for appropriate model number.	Provide a rack mount **5000VA UPS** in Rack 2 (refer to Appendix C for appropriate model number) c/w: - L6-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations) - 2 x L6-20R and 2 x L6-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing. * If 1500VA UPS system is required to distribute 120V UPS Protected Power to the third party equipment in the rack refer to Appendix C for appropriate model number.	Provide a rack mount **8000VA** UPS in Rack 3(refer to Appendix C for appropriate model number) c/w - Direct feed or hardwired connection to the UPS from Emergency Generator or Utility power. - Three (3) L6-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing * If 3KVA UPS system is required to distribute 120V UPS Protected Power to third party equipment in the rack refer to Appendix C for appropriate model number.	Provide a rack mount **11000VA** UPS in Rack 3(refer to Appendix C for appropriate model number) c/w - Direct feed or hardwired connection to the UPS from Emergency Generator or Utility power. - Three (3) L6-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing * If 3KVA UPS system is required to distribute 120V UPS Protected Power to third party equipment in the rack refer to Appendix C for appropriate model number.
Extended Battery Modules	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes	If the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes
PDUs	Provide two monitored/metered ePDUs (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet) - Zero U ePDUs - ePDU #1 plugs directly into the 5000VA UPS unit - ePDU #2 plugs into the L6-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	Provide two monitored/metered ePDUs per rack (refer to Appendix C for appropriate model number), c/w L6-30P input cords (10 feet) - Zero U ePDUs - ePDU #1 plugs directly into the 5000VA UPS unit - ePDU #2 plugs into the L6-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	**Rack 2, 3 & 4** - Provide two monitored/metered ePDUs per rack, c/w L6-30P input cords (10 feet) - Zero U ePDUs - ePDU #1 plugs directly into the 8000VA UPS unit - ePDU #2 plugs into the L6-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	**Rack 2, 3 & 4** - Provide two monitored/metered ePDUs per rack, c/w L6-30P input cords (10 feet) - Zero U ePDUs - ePDU #1 plugs directly into the 11000VA UPS unit - ePDU #2 plugs into the L6-30R receptacle located above the Rack - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

APPENDIX B - HSSBC COMMUNICATIONS STANDARD - POWER DISTRIBUTION FOR ALL COMMUNICATIONS SPACES

Rack Mount UPS Power - Remote Sites		
Description	**Com. Room serving a wiring zone: 0-48 Drops**	**Com. Room serving a wiring zone: 49-96 Drops**
Input Power	Generator Protected Power. If Remote Site is not equipped with generator protected power, utility power is acceptable.	Generator Protected Power. If Remote Site is not equipped with generator protected power, utility power is acceptable.
Maintenance Receptacles	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.	5-20RA (on gen. protected power or utility power (see above)) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	1	1
Equipment Rack Receptacles	Provide two (2) L5-15R receptacles, each on dedicated circuits above the rack or on the wall on Emergency Generator Power or Utility Power. One L5-15R will be used to provide input power into the UPS and the other will be used for a back-up ePDU.	Provide two (2) L5-30R receptacles, each on dedicated circuits above the rack or on the wall on Emergency Generator Power or Utility Power. One L5-30R will be used to provide input power into the UPS and the other will be used for a back-up ePDU.
UPS	Provide a rack mount **1500VA UPS** (refer to Appendix C for appropriate model number) c/w: - 5-15P input cord (Contractor is expected to provide power adapter cord to connect 5-15P to L5-15R and a UPS input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations) - 8 x 5-15R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing	Provide a rack mount **3000VA UPS** in Rack 2 (refer to Appendix C for appropriate model number) c/w: - L5-30P input cord (Contractor is expected to provide input feed cord of sufficient length to plug into the UPS input receptacle. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards. Refer to C-STD drawings for receptacle locations) - 6 x 5-20R and 1 x L5-30R output receptacles - Four post rack mount kit - Temperature Probe - Network Card - Monitoring software and licensing
Extended Battery Modules	if the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes	if the UPS is unable to support the load by itself for the required runtimes, EBMs are required. - Runtime when input power is generator protected: 10 minutes - Runtime when input power is utility: 30 minutes
PDUs	Provide two monitored/metered ePDUs (refer to Appendix C for appropriate model number), c/w 5-15P input cords - 1 RU horizontal ePDUs - ePDU #1 plugs directly into the 1500VA UPS unit - ePDU #2 plugs into the L5-15R receptacle located above the Rack or on the wall. Contractor is expected to provide power adapter cord to connect 5-15P to L5-15R. - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.	Provide two monitored/metered ePDUs per rack (refer to Appendix C for appropriate model number), c/w L5-30P input cords (10 feet) - Zero U ePDUs or 1 RU horizontal ePDUs - ePDU #1 plugs directly into the 3000VA UPS unit - ePDU #2 plugs into the L5-30R receptacle located above the Rack or on the wall. - All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.

Centralized <u>Network (Low Voltage System) Dedicated</u> UPS Power - New Acute Sites and Existing Acute Sites (undergoing major power retrofit)	
Description	**Com. Room**
Input Power	**Input 1:** Generator Protected Power for maintenance receptacles and back-up power to equipment racks The electrical distribution panel for generator protected power is located inside the Communication Room. **Input 2:** Centralized Network Dedicated UPS power for equipment racks. The distribution panel for this source is located in the MER/MC room.
Maintenance Receptacles	5-20RA (on gen. protected power) receptacles mounted on the wall (305mm AFF) located every 1.8 m (6 ft) around perimeter walls.
Equipment Rack	4 - 7 (TRs, MERs and MC Rooms)
Equipment Rack Receptacles	**Vendor or Third Party Equipment Rack** - Provide two (2) L21-30R receptacles, each on dedicated circuits above the rack on Centralized Network Dedicated UPS power. **Health Authority Equipment Racks** - Provide two (2) L21-30R receptacles, each on dedicated circuits above each rack on Centralized Network Dedicated UPS power. Provide two monitored/metered ePDUs, c/w L21-30P input cords (10 feet) per rack. Equip one ePDU in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards.
UPS	Centralized Network Dedicated UPS + Distribution must be sized to meet the aggregate load, future growth and network runtime requirements of all the communication rooms in its serving area. If linking multiple buildings in a campus environment to a single centralized network dedicated UPS infrastructure is not feasible, it is permissiable to create mutliple serving areas each equipped with its own dedicated centralized network UPS infrastructure. Input power source for a centralized network dedicated UPS is always Generator Protected Power.
External Wrap Around Bypass	Yes
PDUs	**Health Authority Equipment Racks** - Provide two monitored/metered ePDUs, c/w L21-30P input cords (10 feet) per rack. Equip one ePDU in the centre of line-up with a temperature probe. All power cords are to be properly dressed and secured as per acceptable cable management practices and standards (refer to Appendix C for appropriate model number).

APPENDIX C - HSSBC COMMUNICATIONS STANDARD – UPS EPDU

Rack and Tower format UPS							Battery (Approx)		Input	SNMP			
Part Number	**Description**	**U Space**	**Number of Switches**	**Input**	**Output 1**	**Output 2**	**at full load**	**Ext. Bypass**	**Input Cord**	**Web Card**			
5PX1500RTN	Eaton 5PX 1440va/1440w	2U		120V 5-15P	120V (8) 5-15R		3	Optional	10 foot	Included			
5PXEBM48RT	Eaton 5PX Battery 48V (1000-2200va)	2U					**See Chart**				BATTERY Runtime Chart	(aprroximate, depends on load power factor)	
											5PX1500RT	+1EBM: 21min, +2EBM: 41min, +3EBM: 62min	@ 1.0pf
5PX3000RTN	Eaton 5PX 3000va/2700w	2U		120V L5-30P	120V (6) 5-20R	120V (1) L5-30R	4	Optional	10 foot	Included			
5PXEBM72RT2U	Eaton 5PX Battery 72V (3000va)	2U					**See Chart**				BATTERY Runtime Chart	(aprroximate, depends on load power factor)	
											5PX3000RT2U	+1EBM: 19min, +2EBM:	@ 1.0pf
9PX5K	Eaton 9PX 5kva / 4.5kw	3U		208V L6-30P	208V (2)L6-30R	208V (2)L6-20R, Hardwired	4	Optional	10 foot	Included			
9PXEBM180RT	Eaton 9PX 5/6kva Battery	3U					**See Chart**				BATTERY Runtime Chart	(aprroximate, depends on load power factor)	
9PX8K	8kva / 7.2kw	6U		208V: Hardwired	208V Hardwired & (3)L6-30R		6 minutes	Included	Hardwire	Included			
9PX11K	11kva / 10kw	6U		208V: Hardwired	208V Hardwired & (3)L6-30R		3 minutes	Included	Hardwire	Included			
9PXEBM240RT	External Battery	3U					+1 EBM = 16 min +2 EBM = 26 min +3 EBM = 38 min						
116750224-001	Temp&Hum Probe			connects to SNMP card									
Rack and Tower format ePDU													
Part Number	**Description**		**Metered/ Monitored**	**Input**	**Output 1**	**Output 2**							
PW101MI1U221	EPDU MI 15A	1U	Metered	120V 5-15P	120V (12) 5-15R				10 foot				
PW102MI1U160	EPDU MI 20A	1U	Metered	120V L5-20P	120V (12) 5-20R				10 foot				
PW103MI1U161	EPDU MI 30A	1U	Metered	120V L5-30P	120V (12) 5-20R				10 foot				
PW105MI2U402	EPDU MI 30A	2U	Metered	208V L6-30P	208V C13(20)				10 foot				
EMI101-10	EPDU MI 16A	Zero U	Metered	120V L5-20P(c\w 5-20P adapter)	120V 5-20R (24)				10 foot				
EMI102-10	EPDU MI 24A	Zero U	Metered	120V L5-30P	120V 5-20R (30)				10 foot				
EMI104-10	EPDU MI 24A	Zero U	Metered	208V L6-30P	208V C13(36) - C19(6)				10 foot				
Rack ePDU for Centralized UPS System													
Part Number	**Description**		**Metered/ Monitored**	**Input**	**Output 1**	**Output 2**							
EMI331-10	G3 METERED INPUT	Zero U	Metered	120-208V L21-30P 3PH 30A	120V (6) 5-20R 208V C13(24) C19(3)				10 foot				

Lower Mainland Facilities Management – Systems & Support

CAD Standards For Consultants

Please direct any questions or comments about this document to the address below.

Lower Mainland Facilities Management – Systems and Support (LMFM)
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Contents

Purpose and Use of the CAD Standards for Consultants

Purpose
The Consolidated Lower Mainland Facilities Management Systems and Support (LMFM), CAFM Services facilitates the continuity, quality control, and communication of Computer Aided Drafting (CAD) and Computer Aided Facility Management (CAFM) information for over 2 million square metres (20 million square feet) of space across the Lower Mainland, which is critical to the CAFM systems ability to manage LMFM real property and capital assets.

By the standardized collection of information for all owned and leased property through close contact with Consultants and LMFM Facilities Services employees, CAFM Services will:

- Consult on and monitor the compliance with the LMFM Facilities Services CAD/CAFM Standards and procedures
- Integrate Project Record/Asbuilt construction drawings into the LMFM existing condition drawings and update department changes to LMFM's centralized CAFM system
- Provide consultants with access to the current LMFM record/as-built drawings for use as a base for future facility projects
- Provide customers with updated information on LMFM's facilities as requested.

Use
This document has been written with specific instructions to consultants for producing and delivering Record/Asbuilt CAD drawings, and establishes the standards and guidelines to organize the data captured in the LMFM CAD and CAFM floor plan drawings. CAD Floor Plan Drawings are a 'stripped down" version of the Project As-built drawings and typically contain only 20 to 30% of the information on the project drawings. They are maintained as the current status of a building, and used as Xref (reference) files for the CAFM drawings. They are updated by using information from consultant's project asbuilt drawings as construction projects are completed and can then be provided back to the consultants for use as background information for future construction projects. CAFM Floor Plans - are further simplified drawings that contain only ARCHIBUS facility asset information

It is necessary to establish these standards to promote the sharing of information and to maintain the integrity of the CAFM system. CAD drawings are required for all projects, regardless of the size, or complexity of the project.

Definition of CAD Project As-Built Drawings
A final, complete set of drawings at the completion of a project that have been field verified after completion of the construction of the project and then revised as required to accurately incorporate any changes that were made to the original design during the construction period. These drawings are considered the archived record of the actual design and construction of the project and are saved in their original format as an historical record of the project.

Note: LMFM requires that consultants provide as-built CAD drawings on electronic media at the completion of each project. LMFM recognizes that these CAD files should not be used in whole or in part for the design and construction of other projects, and also, the consultants are not responsible for any subsequent changes made to the CAD files by LMFM. However, LMFM does reserve the right to use these CAD files as a source to generate CAD and CAFM floor plans for LMFM purposes.

Deliverables for CAD Project As-built Drawings

The following deliverables are to be provided by design consultants for all CAD drawings and are required for all projects, regardless of the size, or complexity of the project

Electronic File Format
CAD drawings must be submitted to Lower Mainland Facilities Management (LMFM) in AutoCAD 2010 format and in full compliance with Autodesk AutoCAD software (file extension = .DWG). Throughout this document, the use of the name AutoCAD always implies "Genuine Autodesk Software" unless otherwise noted. Include all relevant CTB files and Plot style tables.

DXF files submitted in place of DWG's, will not be accepted at project closeout as a substitution for DWG CAD file deliverables.

Policy on CAD File Translation
Error-free AutoCAD Drawing Deliverables:
LMFM recognizes that many of its construction service providers do not use the same CAD systems as LMFM CAD/CAFM Services. However, LMFM expects that service providers who work with non-AutoCAD file formats will submit DWG formatted CAD files upon project closeout that are fully compliant with all of the standards outlined herein, and which have no significant loss of drawing entities or project data that can result from standard CAD file translation procedures.

All DWG files and CAD drawing entities submitted at the end of a project must be able to be manipulated using standard AutoCAD drafting procedures***. Non-compliance with this policy may result in the rejection of CAD files submitted at project closeout in addition to delayed rendering of final project payment***.

For firms translating their native CAD file format into AutoCAD format also concerned about delivering error-free CAD files to LMFM upon project closeout, it is strongly recommended that thorough file translation testing be conducted before the drawing development phase of the project. This will assure early detection of file conversion issues, if any, and allow for corrective measures to be taken before the project closeout period.

Use of Revit
Firms using Autodesk Revit, are required, at the project completion, to submit the complete Building Information Model (BIM) in Revit format (.RVT) and additionally all floor plans must be exported to AutoCAD .DWG format files.

Scale, Units and Tolerances
All CAD drawings must be drafted at full scale in metric units, in that one drawing unit equals one millimeter. For Construction Projects, tolerances for construction drawings are implicit within professional service contracts. Drawings completed in Imperial units must be "hard converted" to Metric i.e. 25.4mm = 1 inch.

Fonts & Text Styles
Text styles and fonts may vary, but the use of font ROMANS.shx for most applications is preferable. Non Standard AutoCAD fonts are not acceptable.

Blocks & Attributes
Consultants may use their own standards for blocks and symbols as long as they are created as follows. Entities, which have been translated from non-AutoCAD based CAD systems, often fail to meet this requirement.

1. *All entities within a block must be created on layer 0.*
2. *Entities must be assigned colour by layer*
3. *Drawing entities translated into AutoCAD blocks from non-AutoCAD systems must revert to layer 0 when exploded within AutoCAD.*
4. *Nested blocks should not be used*
5. *Blocks should be inserted onto their appropriate discipline layer*
6. *Blocks should be created with an insertion angle of 0 degrees and have an insertion point attached appropriately to the block*
7. *File translations from non-AutoCAD systems, which result in wall blocks within AutoCAD, are unacceptable.*

Title Blocks
Consultants may use their own titleblocks. Each drawing should have only one title block inserted in paper space, with its lower left hand corner point inserted at a coordinate location of (0,0,0). The drawing's title block should contain the information listed below.

Project Information:

- Firm Name - representing the drawing author
- Project Name - **as specified by LMFM**
- Building Code/Number - **as specified by LMFM.**
- Building Name - *specify only if the project name does not include this information already, and the project is building specific*
- LMFM Project Number - **assigned by LMFM**
- Vendor Project Number - **assigned by vendor**
- LMFM Logo

Drawing Information:

- Drawing Title - **indicate the drawing content, e.g. floor plan, section, detail, etc**.
- Drawing Number – Use industry standard practice of including the discipline code as a pre-fix in the file name e.g. A-01, M-01 etc. See Section on Layering
- Date of Drawing - original drawing date, plus any significant revision dates
- Record Drawing Stamp – dated and signed
- Drawing Scale - representing the intended plot scale of the drawing with the title block
- North Arrow

Policy on Model Space and Paper Space

- Ensure that all items (title block, drawing, etc.) in the layout tab are within the selected paper size.

LMFM Site and Building Codes
Contact your LMFM Project Manager for the building identification codes and names that pertain to your project.

Policy on External Reference Files (XREFs)
LMFM will not accept the submission of any CAD drawing deliverable which contains references to external source drawing files. All externally referenced data sources that were used during the CAD drawing production phase should be purged, inserted, bound and retained as a block within a single drawing file, with no loss of layer naming, and include the title block, upon project completion and prior to drawing delivery to LMFM. All file types used such as logos, images, excel spreadsheets, etc. should be embedded. Use the Bind Insert command so that xref layers keep their original name.

Electronic Media
A full set of field verified Project Record As-built drawings for all disciplines must be submitted upon project completion. **Note:** As-built date stamp on all drawings is mandatory.

CAD Files*	All drawings on CD format
PDF** (Raster Files)	All drawings on CD format
Drawing Catalog Info	All information in ASCII format
Prints (Hardcopy)	All drawings, one set of full size and one set of ½ size (confirm with LMFM Project Manager). O&M manuals; Specifications etc.(if applicable)

Notes
***** If some CAD drawings cannot be submitted due to Intellectual Property rights, they must be submitted in PDF. However, all floor plans MUST be submitted in CAD (DWG) format. No Exceptions!

** The PDF files MUST match and display the same as the CAD file.

The CD label should contain the following information:
- LMFM Project Number
- LMFM Project Name
- LMFM Project Manager
- Consultant Name
- Date Submitted
- Content: Record Dwgs; PDF; Excel

Drawing Catalog Information in Microsoft Excel Format
The Consultant is required to provide drawing catalog information (Drawing List) in a Microsoft Excel spreadsheet file. A separate record or line must be created for each drawing sheet submitted. If a sheet has information for more than one floor or building, create another record. Excel version to be compatible with the version used by LMFM.

An example Microsoft Excel spreadsheet follows:

HSDA Code	Site Code	Bldg Code	Project Name	Dwg Description	Discipline	Dwg #	File Name	Heath Area Project #	Consultant	Dwg Date

Example with information entered:

HSDA Code	Site Code	Bldg Code	Project Name	Dwg Description	Discipline	Dwg #	File Name	Heath Area Project #	Consultant	Dwg Date
FHA	303	0796	EAGLE RIDGE HOSPITAL EXTENDED CARE	DRAWING LIST, LEGEND, INSTALLATION HEIGHTS	ARCH	A-0	A-0	1994-1050	STANTEC	1994-05-30
RHS	650	0050	RICHMOND HOSPITAL PHASE 2 PROJECT	GROUND LEVEL DETAILS	STRUCT	S100	S100	1997-6010	BUSH BOHLMAN	1997-11-12
VA	303	0796	MEDICAL STUDENT & ALUMNI CENTRE	SITE PLAN	MECH	M-1	M-1	1993-3221	KEEN ENGINEERING	1996-10-24

Note the following:

- Text must be all CAPS.
- Contact your LMFM Project Manager to obtain the HSDA Code, Health Area Project #, Site Code, and Bldg Code for the project.
- Project Name as provided as specified by LMFM.
- Discipline must be one of the following:
    - ARCH (Architectural)
    - CIVIL (Civil services, topography, survey, contour lines)
    - COMM (Low power communication and auxiliary)
    - ELEC (Electrical power and lighting)
    - EQUIP (Equipment, IE: food services, elevators, and radiology equipment)
    - FIRE (Fire protection, IE: low power sensors and sprinklers)
    - LAND (Landscaping)
    - MECH (Mechanical, IE: HVAC and some plumbing)
    - PLUMB (Plumbing, including medical gases)
    - STRUCT (Structural and seismic)
- The file name should have the sheet number.
- The drawing date is the Record/As-built drawing date and not the date drawn. Format is YYYY-MM-DD.

CAD LAYERING STANDARDS

Background
LMFM has adopted the guidelines for layer name and use rules recommended by the "AIA CAD Layer Guidelines" 2005. This manual is published by the AIA (American Institute of Architects) and was developed through a task force comprising of representatives from the AIA, IFMA (International Facility Management Association), the American Consulting Engineers Council, the American Society of Civil Engineers and three U.S. Government agencies. It is a guideline for CAD layer designations which can be used to create drawings suitable for architectural, engineering and facility management applications. Where noted, LMFM has supplemented the AIA guidelines with its own rules and standards.

Purpose
This section contains a partial list of AIA core layers to be used when producing CAD Project Asbuilt construction drawings for LMFM. The layering standards have been designed to:

- Ensure that all future CAD based design drawings completed for all LMFM facilities are structured and formatted on a consistent basis for archival and retrieval purposes.
- Organize drawing information in layers which can be used for both initial project development and on-going facility management purposes.
- Organize graphical information so that it can be effectively grouped and manipulated for display, editing and plotting purposes.

CAD/CAFM Core layers that are identified below by a diamond symbol (◆) should be used as the basis for construction drawings and supplemented as necessary by other layers in the expanded list.

The concepts are as follows:

- **Layer Names** - Layers must be identified by name, but may have a numeric suffix. This standard is based on the premise that layer names provide more flexibility in data organization and allow optimum user recognition of the layer content.
- **Layer Formats** - Two formats are commonly used to name layers. The long format uses 6 to 16 characters and provides better user recognition of the layer content. The short format uses an abbreviation of the long format within 3 to 8 characters, LMFM uses the abbreviated version.

Layer Name Formatting

Major Groups (Discipline Codes)

A-	Architectural	M-	Mechanical
C-	Civil	P-	Plumbing
E-	Electrical	Q-	Equipment
F-	Fire Protection	S-	Structural
G-	General	T-	Telecommunications
H-	Hazardous Materials	U-	(LMFM defined)
I-	Interiors	X-	Other disciplines
L-	Landscape	Z-	Contractor / shop drawings

Minor Groups
This group designation is a 4 four-character designations used to subdivide the major groups on the basis of construction components or building contents (e.g., walls, doors, ceilings, furniture, **equipment, etc.). Layers which are designated by a major and minor group only are referred to** as **"CORE LAYERS"** and are shown on page 12. e.g. A-DOOR; A-WALL

Modifiers
This is an optional, four-character field for further differentiation of major groups. For example, partial height walls (A-WALL-PART) might be differentiated from full height walls (A-WALL-FULL). The use of a modifier is optional and is not required if the major and minor group designations for a layer are sufficient.

Modifiers can also be used to differentiate phases of new construction from remodeling and existing to remain, and can be used in place of or in addition to a minor group designation, such as A-WALL-NEWW or A-WALL-FULL-NEWW. In either case, the modifier is always the last four-characters of the layer name.

Information Layers - The layer names for each major group are further divided into two categories for CAD layer management purposes.

Building Information layers - generally represent physical aspects of the site and buildings such as walls, doors, site improvements, diffusers, etc. Identification labels such as room numbers are also included in this category. This type of information is often shared between drawings.

Drawing Information layers - comprise notes, dimensions, and similar information. This type of information is usually associated with a specific drawing. Other specialty requirements such as riser diagrams and schematic diagrams are also included in this category.

Special Groups
The designations ELEV, SECT and DETL are used as either minor groups or modifiers to identify elevations, sections and details. These special groups are not used in this layering standard as this information is not required for CAD and CAFM floor plans. However, these special groups may be used by consultants as required for design and construction drawings. The "Read-me" layer (x-RDME) may be used with all major groups to provide reference information on file organization. This layer is for user reference only and is not plotted.

Annotation and Title Blocks:
The major group ANNO consisting of Annotation and other elements on CAD drawings that do not represent physical aspects of a building, can be combined with any discipline code,
e.g. ANNO-DIMS (dimensions) *asterisk represents any major group (discipline code)

Elevations, Sections, and Three-Dimensional Drawings:
Minor groups may be added to the major groups or used as modifiers of master layers: elevations, section, details, and three-dimensional views. e.g. *DETL-PATT (detail textures & hatch patterns) *asterisk represents any major group (discipline code):

The minor group ELEV can also be added to any major group layer to identify information only seen in 3D views. This facilitates integrating three-dimensional CAD models with two-dimensional plans, e.g. A-WALL (walls in plan view); A-WALL-ELEV (wall surfaces in 3D view).

LMFM EXPANDED LAYERS (Construction Projects)

CORE	LAYER Name	Description
	Architectural	
◆	A-ANNO-TEXT	General Text
	A-ANNO-REDL	Redlines
	A-ANNO-SYMB	Symbols
	A-ANNO-LEGN	Legends and schedules
	A-ANNO-DIMS	Dimensions
	A-ANNO-TTLB	Border and Title Block
	A-ANNO-NOTE	Job Notes
	A-ANNO-NPLT	Construction lines, nonplotting information, viewports
	A-ANNO-KEYN	Key notes
	A-AREA	Area calculation boundary lines
	A-AREA-IDEN	Room numbers, tenant identifications, area calcs
	A-AREA-OCCP	Occupant or employee names
	A-AREA-PATT	Area cross hatching
	A-CLNG	Ceiling information
	A-CLNG-GRID	Ceiling grid
	A-CLNG-PATT	Ceiling patterns
	A-CLNG-SUSP	Suspended elements
◆	A-DOOR	Doors
	A-DOOR-IDEN	Door number, hardware group, etc.
◆	A-EQPM	Equipment - built in
	A-EQPM-CLNG	Ceiling-mounted or suspended equipment
	A-EQPM-FIXD	Fixed equipment
	A-EQPM-IDEN	Equipment identification numbers
	A-EQPM-MOVE	Moveable equipment
	A-FLOR	Floor information
	A-FLOR-CASE	Casework (manufactured cabinets)
◆	A-FLOR-EVTR	Elevator cars and equipment
◆	A-FLOR-HRAL	Stair and balcony handrails, guard rails
◆	A-FLOR-IDEN	Room numbers, names, targets, etc.
◆	A-FLOR-LEVL	Level changes, ramps, pits, depressions
	A-FLOR-PATT	Paving, tile, carpet patterns
	A-FLOR-SIGN	Signage
	A-FLOR-SPCL	Architectural specialties (accessories, etc.)
◆	A-FLOR-STRS	Stair treads, escalators, ladders
◆	A-FLOR-TPTN	Toilet partitions
	A-FLOR-WDWK	Architectural woodwork (field-built cabs/counters)
◆	A-GLAZ	Windows, curtain walls, glazed partitions
	A-GLAZ-FULL	Full-height glazed walls and partitions
	A-GLAZ-IDEN	Window number
	A-GLAZ-PHRT	Windows and partial-height glazed partitions
	A-GLAZ-SILL	Window sills
◆	A-ROOF	Roof
	A-ROOF-LEVL	Level changes

	A-ROOF-OTLN	Roof outline
	A-ROOF-PATT	Roof surface patterns, hatching
◆	A-WALL	Walls - general
	A-WALL-INTR	Interior Building Wall
	A-WALL-FIRE	Fire wall patterning
	A-WALL-FULL	Full-height walls, stairs and shaft walls
	A-WALL-EXTR	Exterior Building Wall
	A-WALL-HEAD	Door / window headers (on reflected ceiling plans)
	A-WALL-JAMB	Door / window jambs (on floor plans only)
◆	A-WALL-MOVE	Moveable partitions
	A-WALL-PATT	Wall insulation, hatching and fill
	A-WALL-PRHT	Partial-height walls (on floor plans only)

CORE ◆	LAYER Name	Description
	Civil	
	C-ANNO-DIMS	Dimensions
	C-ANNO-LEGN	Legends and schedules
	C-ANNO-NOTE	Notes
	C-ANNO-SYMB	Symbols
	C-ANNO-TEXT	General Text
	C-ANNO-TTLB	Border and Title Block
◆	C-BLDG	Proposed building footprints
	C-COMM	Site communication/telephone poles, boxes, towers
	C-FIRE	Fire protection-hydrants, connections
	C-NGAS	Natural gas-manholes, meters, storage tanks
	C-NGAS-UNDR	Natural gas-underground lines
◆	C-PKNG	Parking lots
	C-PKNG-ISLD	Parking islands
◆	C-PKNG-STRP	Parking lot striping, handicapped symbol
◆	C-PROP	Property lines, survey benchmarks
	C-PROP-BRNG	Bearings and distance labels
	C-PROP-CONS	Construction controls
	C-PROP-ESMT	Easements, rights-of-way, setback lines
◆	C-ROAD	Roadways
	C-ROAD-CNTR	Center lines
◆	C-ROAD-CURB	Curbs
	C-SSWR	Sanitary sewer-manholes, pumping stations
	C-SSWR-UNDR	Sanitary sewer-underground lines
	C-STRM	Storm drainage catch basins, manholes
	C-STRM-UNDR	Storm drainage pipe-underground
	C-TOPO	Proposed contour lines and elevations
	C-TOPO-RTWL	Retaining wall
	C-TOPO-SPOT	Spot elevations
	C-WATR	Domestic water- manholes, pumping, storage
	C-WATR-UNDR	Domestic water-underground lines

CORE ◆	LAYER Name	Description
	Electrical	
	E-ANNO-TEXT	General Text
	E-ANNO-SYMB	Symbols
	E-ANNO-LEGN	Legends and schedules
	E-ANNO-DIMS	Dimensions
	E-ANNO-TTLB	Border and Title Block
	E-ANNO-NOTE	Job Notes
	E-1LIN	One-line diagrams
	E-ALRM	Miscellaneous alarm system
	E-AUXL	Auxiliary systems
	E-CCTV	Closed-circuit TV
	E-COMM	Telephone, communications outlets
	E-CTRL	Electric control system
	E-CTRL-DEVC	Control system devices
	E-CTRL-WIRE	Control system wiring
	E-INTC	Intercom system
	E-LITE	Lighting
	E-LITE-CIRC	Lighting circuits
	E-LITE-CLNG	Ceiling-mounted lighting
	E-LITE-EMER	Emergency lighting
	E-LITE-EXIT	Exit lighting
	E-LITE-FLOR	Floor-mounted lighting
	E-LITE-IDEN	Luminaire identification and text
	E-LITE-JBOX	Junction box
	E-LITE-NUMB	Lighting circuit numbers
	E-LITE-ROOF	Roof lighting
	E-LITE-SPCL	Special lighting
	E-LITE-SWCH	Lighting-switches
	E-LITE-WALL	Wall-mounted lighting
	E-POWR	Power
	E-POWR-BUSW	Busways
	E-POWR-CABL	Cable trays
	E-POWR-CIRC	Power circuits
	E-POWR-CLNG	Power-ceiling receptacles and devices
	E-POWR-EQPM	Power equipment
	E-POWR-FEED	Feeders
	E-POWR-IDEN	Power identification, text
	E-POWR-JBOX	Junction box
	E-POWR-NUMB	Power circuit numbers
	E-POWR-OTLN	Power outline for backgrounds
	E-POWR-PANL	Power panels
	E-POWR-SWBD	Power switchboards
	E-POWR-URAC	Underfloor raceways
	E-POWR-WALL	Power wall outlets and receptacles
	E-RISR	Riser diagram
	E-SOUN	Sound/PA system

CORE ◆	LAYER Name	Description
	Fire Protection	
	F-ANNO-TEXT	General Text
	F-ANNO-SYMB	Symbols
	F-ANNO-LEGN	Legends and schedules
	F-ANNO-DIMS	Dimensions
	F-ANNO-TTLB	Border and Title Block
	F-ANNO-NOTE	Job Notes
	F-CO2S CO2	system
	F-CO2S-EQPM	CO2 equipment
	F-CO2S-PIPE CO2	Sprinkler piping
	F-HALN	Halon
	F-HALN-EQPM	Halon equipment
	F-HALN-PIPE	Halon Piping
	F-IGAS	Inert gas
	F-IGAS-EQPM	Inert gas equipment
	F-IGAS-PIPE	Inert gas piping
	F-PROT	Fire protection systems
	F-PROT-ALRM	Fire alarm
	F-PROT-EQPM	Fire system equipment (hose cabinet/extinguishers)
	F-PROT-SMOK	Smoke detectors/heat sensors
	F-SPRN	Fire protection sprinkler system
	F-SPRN-CLHD	Sprinkler head-ceiling
	F-SPRN-OTHD	Sprinkler head-other
	F-SPRN-PIPE	Sprinkler piping
	F-SPRN-STAN	Sprinkler system standpipe
	F-STAN	Fire protection standpipe system
	Interior	
	I-ANNO-TEXT	General Text
	I-ANNO-SYMB	Symbols
	I-ANNO-LEGN	Legends and schedules
	I-ANNO-DIMS	Dimensions
	I-ANNO-TTLB	Border and Title Block
	I-ANNO-NOTE	Job Notes
	I-EQPM	Equipment
	I-EQPM-MOVE	Moveable equipment
◆	I-FURN	Furniture
	I-FURN-CASE	Cabinetry / casement
	I-FURN-CHAR	Chairs and other seating
	I-FURN-FILE	File cabinets
	I-FURN-FREE	Furniture - freestanding (desks, credenzas, etc.)
	I-FURN-IDEN	Furniture numbers
	I-FURN-PLNT	Plants
	I-FURN-PNLS	Furniture system panels
	I-FURN-POWR	Furniture system-power designation
	I-FURN-WKSF	Furniture system work surface components

CORE ◆	LAYER Name	Description
	Landscaping	
	L-ANNO-TEXT	General Text
	L-ANNO-SYMB	Symbols
	L-ANNO-LEGN	Legends and schedules
	L-ANNO-TTLB	Border and Title Block
	L-ANNO-NOTE	Job Notes
	L-PLNT	Plant and landscape materials
	L-PLNT-BEDS	Rock, bark, and other landscaping beds
	L-PLNT-GRND	Ground cover and vines
	L-PLNT-PLAN	Planting plants
	L-PLNT-TREE	Trees
	L-PLNT-TURF	Lawn areas
	L-SITE	Site improvements
	L-SITE-BRDG	Bridges
◆	L-SITE-DECK	Decks
	L-SITE-FENC	Fencing
	L-SITE-FURN	Site furnishings
	L-SITE-PLAY	Play structures
	L-SITE-POOL	Pools and spas
	L-SITE-SPRT	Sports fields
	L-SITE-STEP	Steps
	L-SITE-WALL	Walls
	L-WALK	Walks and steps
	L-WALK-PATT	Walks and steps-cross-hatch patterns
	Mechanical	
	M-ANNO-TEXT	General Text
	M-ANNO-SYMB	Symbols
	M-ANNO-LEGN	Legends and schedules
	M-ANNO-TTLB	Border and Title Block
	M-ANNO-NOTE	Job Notes
	M-CMPA	Compressed air systems
	M-CMPA-CEQP	Compressed air equipment
	M-CMPA-CPIP	Compressed air piping
	M-CMPA-PEQP	Process air equipment
	M-CMPA-PPIP	Process air piping
	M-CONT	Controls and instrumentation
	M-CONT-THER	Thermostats
	M-CONT-WIRE	Low voltage wiring
	M-CWTR	Chilled water systems
	M-CWTR-EQPM	Chilled water equipment
	M-CWTR-PIPE	Chilled water piping
	M-EXHS	Exhaust system
	M-EXHS-DUCT	Exhaust system ductwork
	M-EXHS-EQPM	Exhaust system equipment
	M-EXHS-RFEQ	Rooftop exhaust equipment

	M-FUME-EQPM	Fume hoods
	M-FUME-EXHS	Fume hood exhaust system
	M-HOTW	Hot water heating system
	M-HOTW-EQPM	Hot water equipment
	M-HOTW-PIPE	Hot water piping
	M-HVAC	HVAC system
	M-HVAC-CDFF	HVAC ceiling diffusers
	M-HVAC-DUCT	HVAC ductwork
	M-HVAC-EQPM	HVAC equipment
	M-HVAC-ODFF	HVAC other diffusers
	M-HVAC-RDFF	Return air diffusers
	M-HVAC-SDFF	Supply diffusers
	M-MDGS	Medical gas systems
	M-MDGS-EQPM	Medical gas equipment
	M-MDGS-PIPE	Medical gas piping
	M-SPCL	Special systems
	M-SPCL-EQPM	Special equipment
	M-SPCL-PIPE	Special piping
	M-STEM	Steam systems
	M-STEM-CONP	Steam systems condensate piping
	M-STEM-EQPM	Steam systems equipment
	M-STEM-HPIP	High pressure steam piping
	M-STEM-LPIP	Low pressure steam piping
	M-STEM-MPIP	Medium pressure steam piping

CORE	LAYER	
◆	Name	Description
	Plumbing	
	P-ANNO-TEXT	General Text
	P-ANNO-SYMB	Symbols
	P-ANNO-LEGN	Legends and schedules
	P-ANNO-TTLB	Border and Title Block
	P-ANNO-NOTE	Job Notes
	P-ACID	Acid, alkaline, oil waste systems
	P-ACID-PIPE	Acid, alkaline, oil waste piping
	P-DOMW	Domestic hot and cold water systems
	P-DOMW-CPIP	Domestic cold water piping
	P-DOMW-EQPM	Domestic hot and cold water equipment
	P-DOMW-HPIP	Domestic hot water piping
	P-DOMW-RISR	Domestic hot and cold water risers
	P-EQPM	Plumbing - miscellaneous equipment
◆	P-FIXT	Plumbing fixtures, toilets, sinks
	P-SANR	Sanitary drainage
	P-SANR-EQPM	Sanitary equipment
	P-SANR-FIXT	Plumbing fixtures
	P-SANR-FLDR	Floor drains
	P-SANR-PIPE	Sanitary piping
	P-SANR-RISR	Sanitary risers

	P-STRM	Storm drainage system
	P-STRM-PIPE	Storm drain piping
	P-STRM-RFDR	Roof drains
	P-STRM-RISR	Storm drain risers

CORE ◆	LAYER Name	Description
	Structural	
	S-ANNO-TEXT	General Text
	S-ANNO-SYMB	Symbols
	S-ANNO-LEGN	Legends and schedules
	S-ANNO-DIMS	Dimensions
	S-ANNO-TTLB	Border and Title Block
	S-ANNO-NOTE	Job Notes
	S-BEAM	Beams
◆	S-COLS	Columns
	S-FNDN	Foundation
	S-FNDN-PILE	Piles, drilled piers
	S-FNDN-RBAR	Foundation reinforcing
◆	S-GRID	Column grid
	S-GRID-DIMS	Column grid dimensions
	S-GRID-EXTR	Column grid outside building
	S-GRID-IDEN	Column grid tags
	S-GRID-INTR	Column grid inside building
	S-WALL	Structural bearing or shear walls
	Telecomm	
	T-ANNO-TEXT	General Text
	T-ANNO-SYMB	Symbols
	T-ANNO-LEGN	Legends and schedules
	T-ANNO-TTLB	Border and Title Block
	T-ANNO-NOTE	Job Notes
	T-CABL	Cable plan
	T-DIAG	Diagram
	T-EQPM	Equipment plan
	T-JACK	Data/telephone jacks
	T-JACK-AP	Wireless Access Point
	T-JACK-CAM	Security camera
	T-JACK-MISC	Nurse call, BMS, elevator phone, metre clock ciruit, Hydro utility metre, Bell, panic button, etc.
	T-JACK-VD	Voice/Data

Project Closeout Steps

Before a project can be closed out all specified materials must be submitted to the appropriate LMFM Project Manager or representative in accordance with production standards and specific instructions described in this document. A **signed copy of the Closeout Checklist,** included at the end of this document must also be submitted with the CAD drawings, PDFs and hard copies delivered at the closeout phase of all projects. When a CAD Closeout Checklist has been signed and submitted, the vendor (architect, engineer, contractor, etc.) is assuring that all materials adhere to the standards and guidelines set forth in this document.

1. Place the following files on a CD and send to the assigned LMFM Project Manager with a transmittal letter containing the specified information:

   a) All Record/As-built Drawings in an AutoCAD format (DWG).

   b) All Record/As-built Drawings in Raster format (PDF).

   c) Drawing Catalog Information file in Excel format (XLS).

2. Send the hard copy drawings to the assigned LMFM Project Manager with a transmittal letter containing the specified information.

3. Send the Closeout Checklist below signed and dated with the above submittals.

4. The LMFM Project Manager will forward the CD and Closeout Checklist to LMFM CAD/CAFM Services for review for compliance to the LMFM CAD Standards and for inclusion into the existing condition drawings.

   Note: If there are issues with the CD or if there are missing information, the CD will be forwarded to the LMFM Project Manager and the Project Manager will contact the Prime Consultant to resolve.

Project Closeout Checklist

☐ Properly Identified CD containing:

- ☐ All project Record/As-built CAD drawings (DWG format).
- ☐ All project Record/As-built Drawings in Raster Format (PDF format).
- ☐ Drawing catalogue file in MS Excel format.

☐ 2 sets of Hard Copy Drawings (1 Full Size and 1 Half Size)

☐ If applicable, a separate CD containing the Operation & Maintenance Manuals; Specification in MS Word format or Raster format (PDF).

CAD Quality Assurance Checklist

The consultant should use the following checklist to ensure that the submitted drawings conform to LMFM CAD Standards.

CHECKLIST

File Format and Setup

- ☐ Electronic File Format
- ☐ Scale and Units
- ☐ Tolerances
- ☐ Fonts and Text Styles
- ☐ Blocks and Attributes
- ☐ Title blocks
- ☐ Policy on Model Space and Paper Space
- ☐ Policy on External Reference Files (XREFs)

Layering

- ☐ Layer Name Formatting
- ☐ Layer Attributes (Colors, Pens, Linetypes)
- ☐ LMFM CAD/CAFM Core Layers
- ☐ LMFM Expanded Layers

File Name Conventions

- ☐ Building and Floor Identification Codes
- ☐ Discipline Identification Codes

Policy on CAD File Translation

- ☐ Full AutoCAD Compliance
- ☐ Translation Testing Procedures (if applicable)

Project Closeout

- ☐ Deliverables
- ☐ Project Record/As-built Drawings
- ☐ CD Format
- ☐ Drawing Catalog Information in Microsoft Excel Format
- ☐ Closeout Steps (including Closeout Checklist)
- ☐ CAD Quality Assurance Checklist

Name of Authorized Representative (please print): _____

Signature of Vendor Representative: _____

Phone Number: _____ Date: _____

BCCSS

BC Clinical and Support Services Society

COMMUNICATIONS INFRASTRUCTURE STANDARDS & SPECIFICATIONS

Addendum 01 September 2016

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Draft	0.1	August 2016	Edmund Goh	Issued for Review
Final	1.0	September	Edmund Goh	

Table of Contents

1. Purpose

The purpose of this Addendum is to correct, update and provide further clarifications to the HSSBC Communications Infrastructure Standard and Specifications, Version 1.0, issued on February 29, 2016.

2. BC Clinical and Support Services Society

On April 1, 2016 Health Shared Services BC (HSSBC), a former division of the Provincial Health Services Authority (PHSA) transferred to the BC Clinical and Support Services (BCCSS) Society. All references to "Health Shared Services BC" and "HSSBC" identified in Version 1.0 of the Communications Infrastructure Standard and Specifications issued on February 29, 2016 will now be replaced with "BC Clinical and Support Services Society" and "BCCSS".

3. Amendments

3.1. Section 27 00 01 – Communications Systems Overview

3.1.1. Part 1 – General, 1.4 Introduction

DELETE:

.3 Any new building shall be opened up for competitive pricing between AMP NetConnect and Belden systems. For existing building in a hospital or community site, if it is standardized on AMP NetConnect, then that system shall be implemented. If it is a Belden system, then that system shall be implemented.

REPLACE WITH:

.3 Any new building shall be opened up for competitive pricing between AMP NetConnect and Belden systems for fiber and copper cabling systems. For existing building in a hospital or community site, it shall be opened up for competitive pricing between AMP NetConnect and Belden systems for fiber cabling system. For copper cabling system, if the building has standardized on AMP NetConnect, then that system shall be implemented. If it has standardized on a Belden system, then that system shall be implemented.

3.1.2. Part 1 – General, 1.15 Communications Consultant

DELETE:

2.3.3. Mechanical – Coordinate with the Mechanical Engineer on environmental control and preferred cooling solutions for communications rooms. Provide the Mechanical Engineer with the BTU loads for each communications room considering network and vendor equipment as well as UPS. Mechanical equipment such as fan coils and associated supply and return air ducting that are providing dedicated cooling to communications rooms are to be located outside of the communications rooms unless otherwise approved by the Communications Consultant and or the HSSBC NE Representative).

REPLACE WITH:

2.3.3. Mechanical – Coordinate with the Mechanical Engineer on environmental control and preferred cooling solutions for communications rooms. Provide the Mechanical Engineer

with the BTU loads for each communications room considering network and vendor equipment as well as UPS.

3.2. Section 27 05 28 – Pathways for Communication Systems

3.2.1. Part 3 – Execution, 3.1 General

DELETE:

.7 Where raceway size is not specified, the raceway will be sized to not exceed a 28% fill ratio after all the cables are installed.

REPLACE WITH:

.7 Where conduit size is not specified, the conduit will be sized to not exceed a 28% fill ratio with no more than two 90º bends and after all the cables are installed at the time when a new facility becomes operational. Where there are zero bends in the conduit, the fill ratio may be increased to 40%.

3.2.2. Part 3 – Execution, 3.12 Surface Raceways Installation

DELETE:

.8 When installing cable in surface raceway, cable fill will not exceed 28%.

REPLACE WITH:

.8 When installing cable in surface raceway, cable fill will not exceed 28% .with no more than two 90º bends after all the cables are installed at the time when a new facility becomes operational. Where there are zero bends in the surface raceway, the fill ratio can be increased to 40%.

3.3. Section 27 05 53 – Identification for Communications Systems

3.3.1. Part 3 Execution, 3.1 Installation

ADD THE FOLLOWING:

12.2 Communications horizontal cables for wireless access points will be identified at each termination end with a unique number at the faceplate (outlet jack), at the patch panel and on both ends of the cable jacket.
Patch Panel in TR (originating end)

i.e.	NCC-01A-R1P1-01(WP)
NCC	Represents combined site/building code in campus setting or standalone building code only.
NCC-01A	Represents MER 1st floor Communications room A.
R1	Represents Rack #1.
P1	Represents Panel #1.
01	Represents Port #1.
(WP)	Represents Wireless Access Point.

Note:
The Architectural number of the destination room will be added to the associated port on the front of the patch panel

12.3 The unique number used to identify horizontal cables for wireless access points shall also be identified on the T-bar at the location of the ceiling outlet or, in the case of a solid

ceiling, on the access hatch co-located with the ceiling outlet. The label used in this instance shall be black with white alpha numeric characters.

3.4. Section 27 08 11 - Testing for Communications Fiber, Category 3

3.4.1. Part 1 – General, 1.3 Testing

ADD THE FOLLOWING:

.3 Optical Loss Testing - Contractor will set up their Fluke OLTS in custom settings with the maximum loss parameters identified in these specifications for MPO, LC and Fiber cable. Tester Pass or Fail results will be based on the Project Specifications for maximum dB loss which is 0.50 dB per mated pair of connectors, not the Industry Standards of a maximum 0.75 dB loss for mated pairs. The pre-terminated OM4 fiber product specified for the CCH is a maximum connector pair loss of 0.35 dB (0.20 dB for MPO and 0.15 dB for LC).

3.4.2. Part 3 – Execution, 3.1 Fiber Testing Scope

DELETE:

.1 Initially test every fiber strand within the Fiber optic cable with a light source and power-meter utilizing procedures as stated in ANSI/TIA -526-14-B, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant, and ANSI/TIA-526-7 (currently Standard Proposal Number 2974-B): OFSTP-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant. Measured results will be within manufacturers' cable and HSSBC's loss budget calculations. If loss figures are outside this range, test cable again with Optical Time Domain Reflectometer (OTDR) to determine cause of variation. Correct improper splices and replace damaged cables or connectors at no cost to the Owner.

REPLACE WITH:

.1 Initially test every fiber strand within the Fiber optic cable with a light source and power-meter utilizing procedures as stated in ANSI/TIA -526-14-B, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant, and ANSI/TIA-526-7 (currently Standard Proposal Number 2974-B): OFSTP-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant. Measured results will be within manufacturers' cable and HSSBC's loss budget calculations.

3.4.3. Part 3 – Execution, 3.3 Acceptance of Fiber Test Results

REPLACE the following table in this section as follows:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5	1300	1.2
Multimode 50/125 µm OM2	850	3.5	1300	1.2
Multimode 50/125 µm OM3	850	3.25	1300	1.0

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 50/125 µm OM4	850	3.0	1300	1.0
Single-mode (Inside plant)	1310	0.5	1550	0.5
Single-mode (Outside plant)	1310	0.5	1550	0.5

3.5. Section 27 11 00 – Communications Rooms Fittings

3.5.1. Part 1 – General, 1.3 Communications Room Design

DELETE:
2.4 Communications rooms or adjoining walls will not have drain pipes, plumbing pipes or water-cooled fan-coil units located in the ceiling space.

REPLACE WITH:
2.4 Communications Rooms or adjoining walls will not have drain pipes, sprinkler risers and plumbing pipes located within them.

DELETE:
3.4.1 Determined by the size of the building, 80-meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application-specific work areas and spaces.

REPLACE WITH:
3.4.1 Determined by the size of the building, 80 meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application specific work areas and spaces. Example: The location of the TR is based on the 80m maximum length of cable required to reach the extremities of a building's interior space, for current and future outlets.

DELETE:
4.4.1 Determined by the size of the building, 80-meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application-specific work areas and spaces.

REPLACE WITH:
4.4.1 Determined by the size of the building, 80 meter coverage area (based on a maximum permissible permanent link length of 80m), and density of drops in application specific work areas and spaces. Example: The location of the TR is based on the 80m maximum length of cable required to reach the extremities of a building's interior space, for current and future outlets.

3.5.2. Part 2 – Products, 2.1 Equipment Racks and Cabinets

DELETE:
1.3 Uniform Building Code 1997 Zone 4 certified.

REPLACE WITH:
1.3 Seismic Zone 4 NEBS Telcordia GR-63-CORE certified.

3.5.3. Part 2 – Products, 2.3 UTP Patch Panels

ADD THE FOLLOWING:

.5 For all existing Acute sites, migrating from an existing Cat.6 or Cat.5e cabling system to Cat.6A system provide the following:
- .1 A 1U 24 port Cat.6A patch panel (fully loaded) on the upper most suitable position on a rack (P1).
- .2 A 1U 48 port Cat.6A patch panel (fully loaded) for all other panels (P2, P3, etc.) located below P1 on a rack.

.6 Provide a manufacturer's patch cord extraction tool for each rack c/w a seven foot tether (rope or chain) attached to the top of the rack.

3.5.4. Part 2 – Products, 2.4 Optical Fiber Patch Panels

ADD THE FOLLOWING:

.7 The minimum fiber connector count for a 1U optical fiber panel will be 96.

3.5.5. Part 3 – Execution, 3.10 HVAC

ADD THE FOLLOWING:

.8 Mechanical equipment such as fan coils and associated supply and return air ducting that are providing dedicated cooling to communications rooms are to be located outside of the communications rooms unless otherwise approved by the Communications Consultant and or the HSSBC NE Representative).

3.6. Section 27 13 13 – Communications Copper Backbone Cabling

3.6.1. Part 3 – Execution, 3.1 Installation

ADD THE FOLLOWING:

3.3 Terminate all 25 pairs on GigaBix 25-pair connector. Terminate the other end on the rack mount 24-port patch panel on discreet RJ45 jacks. Terminate 1 pair per port, pins 4 and 5. Terminate pair #24 and pair #25 on port #24 (pins 4 and 5, and pins 3 and 6).

3.7. Section 27 13 23 – Communications Fiber Backbone Cabling

3.7.1. Part 2 – Products, 2.1 Fiber Backbone Cabling

DELETE:

2.1.1.2 The fiber will support 100 GIGABIT ETHERNET (100GBASELR4). It will have maximum attenuation of 0.7 dB/km at 1310 nm and 0.7 dB/km at 1550 nm wavelengths.

REPLACE WITH:

2.1.1.2 The fiber will support 100 GIGABIT ETHERNET (100GBASE-LR4). It will have maximum attenuation of 0.5 dB/km at 1310 nm and 0.5 dB/km at 1550 nm wavelengths.

3.7.2. Part 2 – Products, 2.2 Fiber Optic Cable Construction

DELETE:

6.6.1.1 AMP NetConnect Violet;

REPLACE WITH:

6.6.1.1 AMP NetConnect Violet stripe;

DELETE:

6.6.2 Singlemode: Yellow will be used on all armoured singlemode cable (inner/outer interlocking jacket) and for inner duct containing singlemode cable without exception.

REPLACE WITH:

6.6.2 OS2 Colours: The following colours will be used on OS2 (inner/outer interlocking armoured jacket):

.1 AMP NetConnect Yellow stripe;
.2 Belden Yellow.
.3 Yellow inner duct containing OS2 will be used without exception.

3.7.3. Part 2 – Products, 2.3 Termination Equipment

DELETE:

.1 High Density Optical Fiber Patch Panels
- .1 Patch panels for Fiber Optic cabling will be AMP NetConnect or Belden newest released high density 1U modular unit. If additional capacity is required substitute with newest released 4U panels.
- .2 Patch panels are to come complete with cover, frames, adapters and LC connectors at each end.
  - .1 Equip with 12-fiber, 24-fiber or 36-fiber Duplex LC adapter Plates/Frames
- .3 If wall mount unit is required due to rack or equipment mounting restrictions then AMP NetConnect or Belden wall mount enclosure/panel will be used.
- .4 Splice tray kits integral to the fiber patch panel

REPLACE WITH:

.1 High Density Optical Fiber Patch Panels
- .1 Patch panels for Fiber Optic cabling will be AMP NetConnect or Belden newest released high density 1U modular unit. If additional capacity is required, substitute with newest released 4U panels.
- .2 Patch panels are to come complete with cover, LC connectors at each end and all other components required to terminate, splice, store and identify the fiber
- .3 1U Fiber Optic patch panels shall be capable of supporting a minimum density of 96 LC connectors and a maximum density of 144 LC connectors and accept MPO/LC cassettes.
- .4 If wall mount unit is required due to rack or equipment mounting restrictions then AMP NetConnect or Belden wall mount enclosure/panel will be used.
- .5 Splice tray kits shall be integral to the fiber patch panel. A 1U fiber patch panel shall have the capacity to include splice trays.

3.7.4. Part 3 – Execution, 3.1 Installation

ADD THE FOLLOWING:

1.1.6 Fiber optic cable slack is required for all fiber cable installs, whether it is a tie cable between racks within the same room or a backbone cable between rooms.

Under Section 1.1, **RENUMBER** items ".6", ".7" and ".8" to ".7", ".8" and ".9".

3.8. Section 27 15 00 – Horizontal Cabling

3.8.1. Part 2 – Products, 2.3 Communications Connectors

ADD THE FOLLOWING:

.1 Jacks shall be of the latest and most reliable termination modules.

Under Section 2.3, **RENUMBER** items ".1" and ".2" to ".2" and ".3".

3.9. Section 27 21 33 – Data Communications Wireless Access Points

3.9.1. Part 3 – Execution, 3.2 Installation (Indoor)

DELETE:

3.1.8 Label the wireless access point, faceplate, patch cords and the access hatch.

3.3.7 Label the wireless access point, faceplate and patch cords.

REPLACE WITH:

3.1.8 Label the wireless access point, faceplate, patch cords and the access hatch. For identification requirements, refer to Section 27 05 53.

3.3.7 Label the wireless access point, faceplate and patch cords and the T-bar ceiling grid. For identification requirements, refer to Section 27 05 53.

APPENDIX 1J(I)

RCH MHSU Large Multipurpose Room Specifications

1 PURPOSE

This Appendix sets out specifications and requirements, in addition to those generally listed for Multi Media rooms in Section 7.9.9 of the Statement of Requirements, for the design and construction of the one hundred and twenty (120) seat large multipurpose room and the Projection and Control Room adjacent.

2 OVERVIEW

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2.1 Large Multipurpose Room (Type 4) Multimedia Overview

The Type 4 room will be equipped with permanently installed Audio Visual and Video (AV) Conferencing (VC) systems. The VC system will have two VC projectors facing two, fixed, side by side projection screens for the simultaneous display of electronic images including video, document camera, computer based digital slides, computer presentation, computer based X-ray, broadcast television signal feeds, as well as multimedia image/sources from remote locations. The AV system will project images and video from a third projector onto a motorized screen on the centre line of the audience seating.

A custom-built lectern on the dais or stage will be one of two systems control points, the other being an operator's console in the adjacent Projection and Control Room. The lectern provides a work surface for presenters. It will house components that include a DVD player, a computer interface, microphones, a systems control touch screen and a document camera. The lectern will also have a "write on" surface providing electronic annotation capabilities. This will provide the presenter with the ability to annotate the computer-generated image displayed on the local, as well as the remote location screens.

Additionally, there will be two LCD preview/confidence monitors to provide presenters with the ability to move freely about the dais or stage while still seeing the selected sources and remote participants.

The Large Multipurpose room will sometimes be used for purposes that do not require AV and Video Conferencing. Therefore, the dais or stage, ramp, lectern, tables, chairs, power and data connections to the lectern and dais or stage, microphones and other non-fixed multimedia components are to be of a type that enables an easy disconnection, removal and transport for storage in the adjoining "Staging/Preparation" Room leaving the Multipurpose room as a large, clear, flexible event space with no obstructions or impediments. Likewise, the items stored in the Staging/Preparation room must be easy to transport, re-assemble and reconnect in the Type 4 room when it is converted back and setup for multimedia purposes

The room's audio systems perform two key functions: playback of multimedia material from various sources, and capture, processing and playback of local live audio. There will be one wired lectern microphone and two wireless presenter microphones. One push-to-talk table-top microphone will be shared between each pair of audience seats. These microphones will be wired or wireless gooseneck type microphones placed on the mobile tables in the audience. The AV and VC playback systems will use loudspeakers flanking the large screen displays located on the front wall with further reinforcement in the ceiling as necessary to provide even audio playback levels throughout the room.

The centrepiece of the audio systems will be a centralized Digital Signal Processor (DSP) and matrix mixer/router system that will allow the various microphone and AV source inputs to be sent to the appropriate signal paths with suitable signal processing. Automixers will be used to mix all microphones to manage feedback and will be simultaneously mixed and processed with automatic gain control and digital echo-cancelling. This process will also be used for the video conference feeds.

The AV source inputs will be routed to the AV playback speakers, video conference sends and archival feeds as required. The DSP will also handle equalization, signal delays, compression, limiting, level adjustment and other required audio functions.

The control system will integrate the function of the many devices in the room's AV and VC systems. All of the required remote-controllable devices will be connected to central processors, allowing control to be from a control touch panel housed in the lectern, or through the operator computer located in the Projection and Control Room. This will also be connected to the LAN using the control system web interface.

For the purpose of connecting to remote sites, the room will be equipped with full HD videoconferencing capability, allowing simultaneous transmission of up to two video and two high resolution graphics channels. This will be accomplished locally via two videoconferencing CODECs and one KVM VNC server collaboration application data link (or similar). These systems will be controlled from the control system touch panels, or the network interfaces from the operator computer.

2.2 Projection and Control Room Overview

The Projection and Control Room will house three ceiling mounted video/data projectors, a VC camera, inbound and outbound signals routing, playback devices, processing equipment, patching matrixes, input and output devices, and other controls equipment. This Projection and Control Room will also have an operator position to allow an operator to monitor and support the videoconference sessions. The Projection and Control Room will house the equipment racks that hold videoconference and AV system equipment for the Type 4 room and will have desk space sufficient for two operators, and a lockable metal AV cabinet for storing batteries, microphones, cables, adapters and connectors, spare parts, spare projection bulbs and similar items that form part of the AV and video conferencing systems. The Projection and Control Room will also house equipment racks and the processors, switches and other multimedia equipment for the Type 2 rooms.

3 GENERAL REQUIREMENTS

3.1 Mechanical

Protection from Water Damage

(1) These two rooms will be designed and constructed to protect the contents and equipment from damage caused by plumbing failures and excessive condensation.

(2) Multimedia equipment racks must not be located directly beneath plumbing lines. Racks and equipment will be shielded from any potential non-sprinkler related water damage.

3.2 Heat Load

(1) There is a significant amount and variety of equipment used in AV and VC systems, such as projectors, computers, video displays, amplifiers, switching units, and other signal processing equipment. This equipment generates a substantial heat load. Accordingly, the Design-Builder will provide heating, ventilation, and air-conditioning (HVAC) systems for the Projection and Control Room that are sized to handle the occupational and equipment loads of the room and meet the required operating parameters of the equipment. .

(2) Temperature and humidity requirements for the Projection and Control Room, above and beyond those defined elsewhere are as follows:

(A) The long term ambient room temperature target for this room to operate in is 21 degrees Celsius.

(B) The maximum short-term sustainable ambient temperature for this room is 26 degrees Celsius.

3.3 Acoustics

(a) Interior Acoustics

(1) Design and construct the Type 4 room with appropriate acoustical conditions to make the room functional for large meetings, multimedia AV presentations, and video conferencing. Ambient noise including HVAC and ballast noise will be controlled, and appropriate acoustical treatment will be installed to control reverberation, minimize reflections, flutter echo and other acoustical issues that may adversely affect the microphones pickup.

(2) Hard reflective wall or ceiling surfaces within 2500mm of lectern or table top microphones will be avoided, and may require the addition of absorption or diffusion materials as the reflections from these surfaces will create audible artefacts or lower feedback thresholds.

(3) Provide fabric covered medium density fibreglass panels at 1000 mm AFF and extending to 1600 mm AFF on the two sidewalls and rear wall. The panel construction will be:

(A) Minimum 50 mm thick pre-finished acoustic panels on the rear wall. Minimum Noise Reduction Coefficient (NRC) 0.95 rating.

(B) Minimum 25 mm thick pre-finished acoustic panels on the side walls. Minimum NRC 0.85 rating. The side wall panels could be staggered rather than continuous.

(C) Contiguous application over certain areas as may be required to meet the requirements of this Appendix.

(D) An acoustic ceiling is required. It will have a minimum NRC rating of 0.70 and a minimum Ceiling Attenuation Class (CAC) rating of 35. In addition, the ceiling will be back loaded with batt insulation (bagged, if necessary) to broaden the sound absorbing range.

(b) Background Noise

(1) Noise control measures will be undertaken to achieve a background noise criterion of NC25 for the Type 4 room (except the Projection and Control Room, which must achieve NC-35), in order to provide good speech intelligibility for both local and remote listeners. This includes noise from HVAC and lighting ballasts.

(2) To reduce the noise generated by the airflow of the HVAC system, a maximum airflow of 1.52 metres per second at the face of the diffusers and 1.8 meters per second at the face of the return air grilles will be allowed for, diffusers selected for low noise levels, and open diffusers with no dampers (or the dampers placed upstream of the diffuser by at least 3m) and the duct downstream of the dampers lined with fibreglass duct liner. Dampers will never be closed down to less than 80% of the maximum opening to prevent excess turbulence-generated noise.

(3) Selection of noise rating of the HVAC diffusers will be based on the actual design airflow, and the Design-Builder will not presume that they will meet their noise rating at any airflow. The Design-Builder will take into consideration the total number of diffusers understanding that each doubling of the number of diffusers increases the overall noise level by 3dB. Diffusers must be selected to be 10 NC points lower than the NC rating for the room.

(4) Care will be taken in locating return air elbows in systems that are not ducted. Acoustically lined return air elbows must be located in non-critical acoustical walls (i.e. walls with doors, typically), must contain minimum 25 mm thick acoustic insulation and must be designed to block the line of sight through the elbow as per the "Good Design" shown in Figure 1 below.

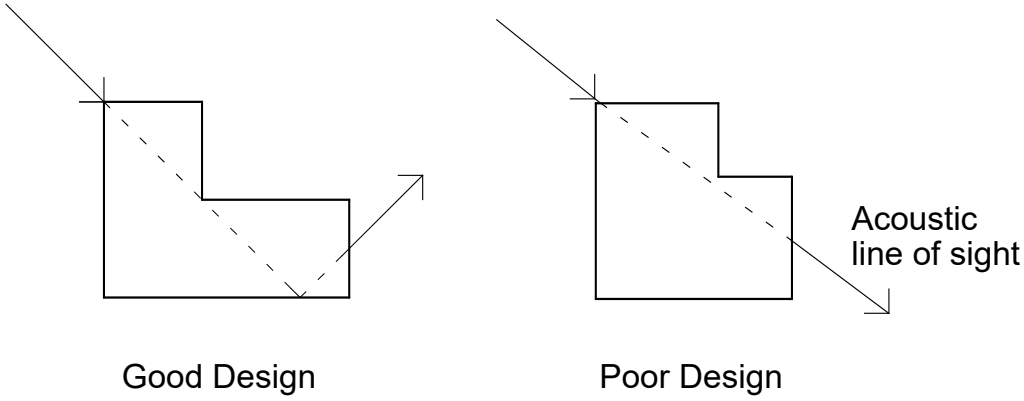

Figure 1: Design considerations for acoustic elbows.

(5) The return air grilles in the rooms will be located an optimum distance from the return air elbow to reduce the potential for cross-talk.

(6) It is essential that all noise-producing HVAC equipment including mixing boxes, fan powered mixing boxes, and fan coil units be located outside the room and not within ceiling plenum spaces.

(c) Sound Isolation – Interior

(1) One of the key issues is achieving adequate sound isolation between the Type 4 room and adjacent spaces. Such adjacent spaces might include but are not limited to offices, storage spaces, lobby spaces, meeting rooms, washrooms, corridors etc.

(2) In order to achieve the proper sound isolation, all perimeter walls of the Type 4 room must achieve a Sound Transmission Class (STC) rating of STC 55. The laboratory STC ratings of all such perimeter walls must meet the requirements of ASTM E90-09: *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements,* and must be based on test results obtained within the last 15 years and on results from an accredited and current test facility.

(d) Noise Isolation - Doors and other Entryways

(1) Where a single door (non-vestibule) opens to a noisy corridor, lobby or waiting area, a single width purpose-built acoustic door with a minimum STC 50 rating will be used.

(2) For all other situations (including vestibule doors):

(A) Use solid core wood or filled metal doors.

(B) Ensure use of properly selected acoustic seals equal to or better than Pemko Type Silicon Seal S-88 plus Pemko Type 350 around the perimeter.

(C) Install automatic drop down threshold closers equal to or better than Pemko Type 430.

(D) Install all such doors/door systems so that light will not pass through the doors/door systems.

(e) Noise Isolation – Floor/Ceiling

(1) The location of the Type 4 room is important not only from a horizontal noise perspective, but also in terms of the floor/ceiling acoustic performance.

(2) The airborne noise isolation between vertically stacked spaces will meet minimum STC 50 rating.

(3) Impact noise including footfall noise, movement of goods or equipment, chair scraping etc. can have a significant impact to the room acoustics. Where there is occupied space above the Type 4 room it may be necessary to include a full acoustic ceiling in the room to help control impact noise.

(f) Noise Isolation – Exterior Noise Impact

(1) The maximum noise level due to exterior noise will be 35 dBA.

(2) To meet low ambient noise levels requirements, the Type 4 room will not be located adjacent to mechanical or electrical rooms, exercise areas, washrooms, or elevators. To the extent possible, the Type 4 room will not be located next to exterior walls adjacent to busy roadways, transit routes, helicopter pads, major exterior equipment (such as cooling towers, chillers, emergency generator sets), or below floors which contain major equipment in order to avoid sonic or subsonic vibration.

(g) Lighting

(1) 3500 degrees Kelvin colour temperature is required. Different lights/colour temperature will not be mixed.

(2) Any fluorescent light ballasts will be remote mounted and integral transformers of low voltage lighting will be potted to prevent airborne or structure borne transformer noise from being introduced.

(3) The lighting dimmer controller will provide remote control access capability via serial or Ethernet protocol to control lighting ON/OFF and preset recall control from the AV control system.

(4) For videoconferencing and AV modes the dais or stage at the front of the room directly in front of the projection screens and approximately 2000mm deep is to be a low light area. The light level in these areas will be as low as possible to avoid washing out the image of the presenter. Such areas will be on a separate switch. During panel discussions, this area requires full illumination.

(5) Light reflecting off projection screens and video display surfaces must be avoided.

(6) Lighting style and colour temperature will be carefully designed, such that the overhead lighting has an angle of incidence to eliminate “raccoon eyes” and dark shadows under the chin/nose and achieve the proper reproduction of skin tones in the video images.

(7) For videoconferencing, perception (visibility, intelligibility and comfort) becomes an important factor of the design. Instructors/presenters will not feel comfortable in an overly illuminated or glaring environment and where they cannot see easily.

(8) The AV lighting system will be zoned on separate circuits and controls from the regular room lighting system.

(9) The reflected light from the walls will be slightly less than that from the faces of the individuals on camera. This is to provide some contrast while not creating exposure level difficulties for the camera.

(10) The room lighting that falls on projection screen surfaces or video display surfaces will be separately switched.

(h) Interior Design

(1) The colour of the walls will be either grey or solid blue to provide visual definition to the presenter relative to the background. The purpose of the solid colour is to avoid adding unnecessary bandwidth to the video conferencing signal, and to avoid the reflected light from the background affecting colour quality of the images.

(2) The colour of the table and lectern surfaces will be either antique white or a light grey colour to allow the 45-degrees light to bounce off the surface and reflect upward. This helps to illuminate the faces of the presenters and eliminate the dark shadows under the chin/nose.

(3) The cameras require wall and/or ceiling positioning for appropriate image angles, and for complete visual coverage for all different usage scenarios. Specific, designated positions in the walls are required to accommodate the cameras. The cameras also require appropriate housing for protection from theft and damage.

4 ROOM SPECIFIC REQUIREMENTS

4.1 Large Multipurpose Room (Type 4)

(a) Architectural

(1) The room will be a single contiguous space, with unobstructed sightlines, and will not be sub-dividable.

(2) The room dimensions shall provide for the minimum required audience size of one hundred and twenty (120) audience seats with microphones on worktables when in videoconference mode.

(3) For acoustical purposes the floor and ceiling must not be parallel with each other and the side walls must not be parallel with each other. Offset should be a minimum of 6% for each surface, or 12% overall. The Design-Builder is to confirm actual required offset percentage of each opposing surface with the acoustical consultant.

(4) The side walls to front/back wall layout aspect ratio of the Type 4 room will be as close to 1:1 as possible to maximize the functionality of the space for videoconferencing and reduce additional AV and VC equipment costs necessitated by compensating for the drawbacks of long narrow rooms.

(5) The ceiling height at the front wall from the top of the dais or stage to the underside of the finished ceiling must be high enough to accommodate projection screens of a sufficient size, and at an elevation that provides comfortable, unobstructed views from all seats and leaving a small clearance above the screens.

In a flat floor scenario, a raised dais or stage across the front presentation wall, at a height sufficient to provide clear sightlines from the presenter(s) to all seated participants in the room, and from all seated participants in the room to standing or seated presenters will be required. The dais or stage must have a ramp for wheelchair access with a rise no greater than 1:12. The dais or stage requires two flush floor boxes on the centreline containing 120v power outlets, 4x network data drops, and connections for 6 wired microphones. The required minimum clearance of the front wall from the top of the finished dais or stage to the bottom of the projection screens will be no less than 2000mm.

(6) Placement of screens and cameras will provide unobstructed sightlines from seats to screens and to video cameras.

(7) The back wall will have three fixed, glazed projection ports and one openable operator window from the Projection and Control Room.

(8) The Type 4 room must have projection paths clear of any obstructions or items suspended from the ceiling between the projection booth at the back to the front wall, with the bottom of the projection path to be a minimum of 2000mm AFF (above finished floor) at any point along the path, including the dais or stage.

(9) A motorized projection screen for AV presentations is to be centred on the centreline of the seating and in line with the centre projection port

(10) Two permanently-mounted, side-by-side video conference projection screens located at the front wall will be made of Level 5 drywall plaster with a smooth finish. The projection surfaces will be even and clean.

(11) The two fixed projection surfaces will be coated with a suitable projection paint, providing a matte white finish and a light reflection of a minimum 1.1.

(12) All three projection screens and all display monitors will have a 16:9 aspect ratio.

(13) The two fixed projection screens will be at a vertical angle of approximately 4.8 degrees, with the angle to be confirmed as part of the design process. The projection screens will be aligned to be parallel with the Projection and Control Room ports.

(14) The horizontal distance from the projection screens to the closest viewer seated in the front row will be greater than 1.05 times the single image screen width.

(15) Ratio of the distance from the projection screens to the most distant viewer in the room to screen height will not exceed a factor of 6.7 (distance to most distant viewer, MDV, divided by a single screen height, SH) for 95% of all seats. A maximum of 5% or six seats may be at a maximum MDV to SH factor of 7.2.

(16) The horizontal viewing angle will be up to a maximum of 85 degrees of axis for 95% of all audience seats. Up to 5% or six seats may be up to a maximum of 100 degrees horizontal viewing angle.

(17) The vertical viewing angle will be up to a maximum of 30 degrees for 95% of all audience seats. Up to 5%, or six audience seats may be up to a maximum vertical viewing angle of 37 degrees.

(18) The front wall will provide a minimum of 1200mm to the left and the right of the two fixed projection screens for the wall mounted playback speakers. Speaker placement will be coordinated with the Authority as part of the design process.

(19) The wall mounted playback speakers will be mounted at approximately 4000mm AFF. The mount locations will be equipped with plywood backing of a minimum of 1200mm x 1200mm in size, to support a minimum of 200 pounds.

(20) Provide a fixed lectern on the dais or stage that meets or exceeds the requirements. The Design-Builder will submit shop drawings of the lectern for review by the Authority prior to fabrication. A mock-up of the proposed lectern will be provided if requested by the Authority.

(21) The lectern will be located to the right (stage right/house left) of the room’s centre line.

(22) The distance from the front wall to the lectern will be no less than 1600mm.

(23) The distance from the lectern to the front row of audience seating/tables will be a minimum of 2400mm.

(24) The architectural design will allow for an audience camera to be located on the house right (stage left) wall. The camera location will be 2500mm above stage finished floor, and set back by 6000mm from the front wall corner.

(25) The front wall will accommodate a wall-mounted audience camera at the bottom of the projection screens.

(26) Provide a millwork housing for the presenter's confidence monitors, located at the front of the first audience seating/table row. The Design-Builder will submit shop drawings of the confidence monitor housing for review by the Authority prior to installation.

(b) Interior Acoustics

(1) Concave curved wall and ceiling surfaces focus sound and are to be avoided. Any concave curved surface must be treated with suitable broadband acoustic treatment to absorb or diffuse the sound wave front.

(2) The 100% occupied reverberation time will not exceed 0.6 seconds (mid-band), and the 70% occupied reverberation time will not exceed 0.7 seconds (mid-band), in the room.

(3) The room may require a full or partial acoustic ceiling in order to meet the reverberation time criterion.

(c) Noise Isolation - Entry Vestibules

(1) Entry vestibules must be carpeted and must contain acoustic ceilings with a minimum Noise Reduction Coefficient, NRC, of 0.70.

(2) All doors will be solid core wood or filled metal and properly fitted to affect a reasonably good perimeter seal and be cut close to the carpet.

(d) AV Systems Electrical Infrastructure Minimum Requirements

(1) The Type 4 room will be equipped with a suitable conduit/cable-tray and back-box infrastructure to support the low voltage AV system connectivity requirements.

(2) Four 27mm conduits and two 54mm conduits will connect the lectern location with the Projection and Control Room equipment rack location (home run). Provide one empty conduit 54mm with pull string for future use. The conduits will be stubbed into the lectern from below.

(3) One 27mm conduit will connect the audience camera location at the front wall with the Projection and Control Room equipment rack location (home run). The conduit end at the camera location will terminate into a recessed, 87mm deep single gang box.

(4) Three 54mm rigid conduits will connect the confidence monitor millwork location with the Projection and Control Room equipment rack location (home run). The conduit end at the confidence monitor millwork location will terminate into a recessed, 87mm deep four gang box mounted inside the confidence monitor millwork.

(5) One 27mm conduit will connect the side camera location at the side wall with the Projection and Control Room equipment rack location (home run). The conduit end at the camera location will terminate into a recessed, 87mm deep single gang box.

(6) Two 27mm conduits will connect the playback speaker locations at the front wall with the Projection and Control Room equipment rack location (home run). The conduit end at the playback speaker location will terminate into recessed, single gang boxes mounted at approximately 4000mm AFF at the front wall. The playback speaker back boxes will be located 1000mm to the left and to the right of the projection screen locations.

(7) One 21mm conduit home run will connect the Projection and Control Room AV equipment rack location to each ceiling loudspeaker zones. All zones will be laid out in the same direction as the audience seating/tables in video conference mode. The conduit will connect the speakers for a total of up to eight speakers per zone.

(8) Install suitable sized loudspeaker cable to connect the audio amplifier mounted in the AV equipment racks located in the Projection and Control Room to all speakers.

(9) One 54mm rigid conduit will connect the Projection and Control Room equipment racks with the location of the Type 4 room's lighting system dimmer controller.

(10) Two 54 mm rigid conduits will connect the Projection and Control Room equipment racks with a data/communication closet on the same floor as the Type 4 room.

(11) Where possible, adequately sized basket cable tray may be used to combine individual conduit runs. Any such cable trays must provide suitable compartments to separate video, audio and control signal wiring.

(12) Conduit runs with more than 90 degree turns require cable pull boxes to be inserted in the proper locations.

(13) All conduits require being equipped with pull-strings.

(14) Provide the following power receptacles for the support of the audiovisual systems:

1. Two 15-amp Quad AC receptacles with one 120V 15Amp circuit per quad receptacle, mounted inside the lectern millwork.

2. One 15-amp Dual AC receptacle with its own 120V 15Amp circuit, mounted at the lectern face plate.

3. Two 15-amp Quad AC receptacles with one 120V 15Amp circuit per quad receptacle, mounted inside the confidence monitor millwork.

4. One 15-amp Dual flip-open AC receptacle with powered USB receptacles for each pair of audience seats. These receptacles will be recessed into the floor boxes which are to be located under the front edge of audience tables when the room is configured in video conference mode.

5. Two 15-amp Quad AC receptacles with one 120V 15Amp circuit per quad receptacle, each mounted inside a flush floor box on the centreline of the dais or stage.

(15) All AC receptacles to be utilized for the AV systems will have a very low impedance connection to the ground plane of the building.

(e) Videoconference System Data and Telephone Outlet Minimum Requirements

(1) Provide network data drops at the lectern as follows:

(A) Two for the presenters' PCs.

(B) One for VNC remote access.

(C) One AV Control System.

(D) One for VOIP phone.

(E) One for audio network.

(F) One for document camera.

(G) One auxiliary.

(f) Lighting

(1) The presenter area will have an illuminated level of 80 foot candles at face level, with lighting reflecting off the lectern surface at an approximate 15 – 20-degree angle, and will be dimmable on a separate switch.

(2) The audience lighting areas will have illumination requirements of 50 – 60 foot candles at face level with lighting reflecting off the table surfaces at an approximate 15 – 20-degree angle. The lighting will be dimmable, zoned on a separate switch.

(g) Interior Design

(1) The front wall will be finished in a uniform, matte, light blue or grey color to provide a suitable video camera backdrop.

(2) Videoconference acoustic echo cancelling relies on minimizing the number of loudspeakers in the room. Loudspeaker positioning will be based on providing optimum uniformity and coverage. Grilles or speaker covers must be acoustically transparent and free of obstructions larger than 19mm square as these create shadows in the coverage area.

(3) There will be speech reinforcement loudspeakers distributed in the ceiling to provide uniform speech levels for general presentation purposes. This is necessary to eliminate the problem of having excessive sound levels at the front of the room in order to achieve adequate sound levels at the back. The flush mount ceiling speakers will be at locations determined during the design process based on the design builders approved acoustical modeling of the architectural design and table layout.

4.2 Projection and Control Room

(a) Architectural

(1) The side walls of the Projection and Control Room will be at least 2600mm deep. The room will be at least 6500mm wide.

(2) The Projection and Control Room will be centered on the center-line of the Type 4 room.

(3) The Projection and Control Room will have a total of four windows into the Type 4 room: three projection ports, and one operator window.

(4) It is critical that there be a clear projection path between the projection windows and the projection screens at the front wall. For example, lighting fixtures, ducts, sprinkler heads or other ceiling devices in the Auditorium must be taken into account.

(5) The projection ports will be at least 450mm high x 750mm wide each.

(6) There will be a clearance of 2100mm from the finished floor to the bottom of the projection windows.

(7) The projection windows will utilize glare-free glass, and there will be no glass seams within the light path of the projectors.

(8) The operator position window must provide a clear sightline to the front of the Type 4 room. This window will utilize one-way, see-through security glass. The window will be located approximately 1000mm AFF, and be at least 600mm high x 800mm wide. The window shall be able to be opened, swinging out from the Projection and Control Room.

(9) The Projection and Control Room ports and window do not require blackout blinds.

(10) Provide all necessary structural support for the wall mounted equipment..

(b) Interior Acoustics

(1) A full suspended acoustic tile ceiling will be included in the Projection and Control Room with minimum NRC 0.70 and CAC 35-39 ratings.

(c) Background Noise

(1) There will be maximum airflow of 2.5 m/s at the face of the supply air diffusers and 3 m/s at the face of the return air grille.

(2) The NC rating for the Projection and Control Room is NC35.

(d) AV Systems Electrical Infrastructure Minimum Requirements

(1) The Projection and Control Room will be equipped with an overhead cable tray running around the perimeter of the room, mounted at 2300mm AFF. All conduits connecting into the projection room will terminate into the overhead cable tray. The cable tray will be equipped with three separate compartments.

(2) The cable tray will provide three 100x 50mm sleeves into the equipment racks in the Projection and Control Room.

(3) One 54mm and one 27mm rigid conduit will connect the Projection and Control Room equipment racks with the Projection and Control Room operator's position. The conduit end at the operator's desk location will terminate into a recessed, 87mm deep triple gang box mounted at approximately 900mm AFF. The operator desk box location will be located at the projection room wall, adjacent to the Type 4 room, and be located near the desk location by the operator window.

(4) Two 54mm rigid conduits will connect the Projection and Control Room equipment racks with the Facilities low voltage cable tray.

(e) AV Systems Power Loads and Minimum Requirements

(1) The Projection and Control Roomwill have substantial power and heat loads for the audiovisual and videoconference systems. The electrical and mechanical design and supply is to anticipate:

(A) The AC load requirement for the equipment racks in the Projection and Control Room is typically 4,500 watts per rack in operation and 1200 watts at idle.

(B) The AC load requirement for the ceiling mounted projectors in the Projection and Control Room is typically 1,200 watts per projector in operation and 200 watts at idle

(C) Provide the following power receptacles for the support of the audiovisual systems:

1. One 15-amp Dual AC receptacle, with its own 120V/15amp circuit, ceiling or wall mount near the centre AV projector location in the Projection and Control Room.

2. One 15-amp Dual AC receptacle, with its own 120V/15amp circuit, ceiling or wall mount near the left projector location in the Projection and Control Room.

3. One 15-amp Dual AC receptacle with its own 120V 15Amp circuit wall mount for the instructor camera near the left projection window location in the Projection and Control Room.

4. One 15-amp Dual AC receptacle with its own 120V 15Amp circuit ceiling or wall mount near the right projector location in the Projection and Control Room.

5. Two 15-amp Quad AC receptacles (per rack), with one 120V/15Amp circuit per quad receptacle, mounted either below the overhead cable tray or inside the AV equipment racks inside the Projection and Control Room.

(2) All AC receptacles to be utilized for the AV systems will have a very low impedance connection to the ground plane of the building.

(3) All AC receptacles for the AV equipment racks require the provision of a ground point termination bar.

(f) Projection and Control RoomData Outlet - Minimum Requirements

(1) Provide:

(A) Three data outlets at the operator position, terminated at operator desk location.

(2) Allow for:

(B) Minimum of four data outlets to be terminated inside each AV and VC rack (total quantity dependent upon final approved design and layout).

APPENDIX 1J(II)

Clinical Education and Applied Research Space Infrastructure Specifications

1 PURPOSE

This Appendix sets out specifications for clinical education and applied research spaces using standards and specifications in the attached three documents.

2 ATTACHMENT 1: FOM SPECIFICATION AND REQUIREMENTS FOR CLINICAL EDUCATION FACILITIES

Refer to companion document with file name FOM Spec and Req Education Fac.

This specification applies to the following spaces:

All rooms in the Mental Health and Substance Use Clinical Education and Applied Research Program.

All rooms identified as G1.1 and their subsidiaries

3 ATTACHMENT 2: FOM INFRASTRUCTURE SPECIFICATIONS FOR CLINICAL ACADEMIC FACILITIES – VIDEOCONFERENCE

Refer to companion document with file name FOM Infra Spec Clin Academic Fac – VC.

This specification applies in particular to the following spaces:

G1.1.1.1 (Video Conference Room)

G1.1.1.2 (Multipurpose Room)

G1.1.1.3 (Seminar / Small Group Therapy Room)

4 ATTACHMENT 3: FOM DESIGN GUIDELINES FOR LEARNING SPACE AV SYSTEMS AND ASSOCIATED CLINICAL SKILLS ROOMS

Refer to companion document with file name FOM Design Guide Learn AV Infra CSR.

This specification applies in particular to the following spaces:

G1.1.5.1 Clinical Exam / Observation Room

G1.1.5.2 Consult / Exam Room

G1.1.5.3 Exam/Procedure Room

G1.1.5.4 Testing Rooms

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THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine

Specification and Requirements for Clinical Education Facilities

March 8, 2016

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THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine

Specification and Requirements for Clinical Education Facilities

This document is for initial costing only and further information and details will be provided by the UBC FoM Project Team; In this document, UBC FoM Project Team henceforth, “UBC”; UBC FoM AV equipment list henceforth "AV Equipment

Room Name	Rooms Design and Specification	Equipment & Furniture	power	Data and network	Acoustics	Operating Hours
General for all UBC rooms	The UBC FoM is the sole approver of all rooms configurations and design of infrastructure, materials, furniture, colours and any finishes for all Clinical Academic facilities (UBC Space). Any changes made after UBC approval must be re-approved by the UBC FoM. The UBC space need to be secured 24/07. All facilities to include corner guards, acoustical ceilings, proper lighting, doors kick plates. All light switches to be located by the room's entrances unless otherwise specified. If not specified, the design of all the rooms, shall follow the Hospital standard to equivalent facility with the additions as outlined in this document. For Technology Enabled rooms, this document needs to be read in conjunction to the appropriate **"UBC FOM Design Guidelines for Learning Space AV Systems and Associated Infrastructure"** as provided by the UBC FoM Project Team.	All furniture and equipment list to be developed with UBC FoM Project team and final signed off before purchasing by UBC FoM Project team. All equipment need to be secured and locked to prevent theft.	The exact quantities and locations of all power plugs and conduits (in the ceiling, walls and floors) to be determined by the UBC FoM Project Team	Wireless coverage: All spaces where Learners are working and learning need to be covered by wireless and connected to either UBCSECURE or Eduroam. Heat map to be provided to and for UBC FoM approval. The exact quantity and locations of all data and conduits (in the ceiling, walls and floors) to be determined by the UBC FoM Project Team	Acoustical consultant need to be engaged at the beginning of the project. The acoustical consultant will provide the acoustical design, A/M/E design instructions, construction validation and post construction testing and verification. Acoustical report to be submitted to UBC sign off for each stage	
Workstation	Access to daylight is highly recommended. Need to be secured and location to be separated from Learners areas.	Furniture/millwork desk, Chair w/ arms on wheels, guest chair w/o arms, computer, phone, lockable 4 Drawer with cushion top, garbage/recycle bin, blinds	Hospital standard. Access to power above desk.	Data drops to hospital standard UBC & Hospital Network. Access to data above desk.	Hospital standard	0600-1800 7 days/wk
Study station		Furniture/millwork desk, Chair w/arms sled-base or wheels , computer, garbage/recycle bin	Hospital standard. Access to power above desk.	Data Drops to hospital standard UBC & Hospital Network Access to data above desk.	Hospital standard	24/7
Office / Administration space	Access to day light recommended. Need to be secured and location to be separated from Learners areas. Door mounted coat hook Blinds	Furniture/millwork desk, Meeting desk 30" Diameter, Chair w/ arms on wheels, 4x Participant w/ arms and wheels, computer with 2 displays, phone, Bookcase, lockable file cabinet, lockable 4 Drawer, whiteboard, garbage/recycle bin,	Hospital standard + for guests. Access to power above desk.	Data Drops to hospital standard UBC & Hospital Network Access to data above desk.	Enable confidential conversation and no noise transfer between adjacent offices and to the corridors	0600-1800 6 days/wk
Waiting area/ LT Lobby	Follow Hospital's standards.	Millwork and/or Furniture, Coffee table, sofa/ Chairs W/arm and or shelf for Laptop, Phone	Half of waiting chairs	Hospital standard	Hospital standard	0600-1800 6 days/wk
Reception	Need to be secured and location to be separated from Learners areas. Follow Hospital's standards.	Furniture/millwork desk, Chair w/ arms on wheels, lockable 4 Drawer, computer, phone, garbage/recycle bin	Hospital standard. Access to power above desk.	Data Drops to hospital standard UBC & Hospital Network Access to data above desk.	Hospital standard	0600-1900 6 days/wk
Storage, Files	Need to be secured and location to be separated from Learners areas. Follow Hospital's standards.	Upper & lower lockable cabinet and/or shelving, wall backing for shelves	2xDuplex on each wall - 16 in total	2 data drops	Hospital standard	24/7
Work Area, Print room/Stationary	Need to be secured and location to be separated from Learners areas. Follow Hospital's standards.	Printer/FAX/Scanner, lockable Millwork , Shelving ; Storage, large recycle bin, wall backing for shelves	2xDuplex on each wall - 16 in total	Hospital standard + for printer	Hospital standard	24/7
Staff Kitchenette	Follow Hospital's standards.	Dining tables, chairs w/Wheels, upper and lower lockable cabinets, sink, soap dispenser, paper towel dispenser, dishwasher, fridge, water cooler, microwave, coffee machine, kettle, garbage bin	Hospital standard + For equipment as per list	Hospital standard	Hospital standard	0600-1900 6 days/wk
Team conference room / Conference Room / Residents Room / Education Room / Seminar Room /	Secured access with card reader Wall backing for equipment Door: Glass hatch w/ integral blinds, door holder/stopper, width to accommodate patient bed Chair rail	Large monitor , computer station w/ access Hospital network, hospital dictation system, table tilted on wheels w/ round corners, chairs w/arms stackable on wheels, 4'x8' whiteboard, polycom teleconference phone and regular phone, garbage/recycle bin, poster with space for slide-in size 8"x11".	Hospital standard, conduit from the monitor to the room centre - Floor box, power plugs for each attendee	Data drops to hospital standard + 3 data ports in the floor box. Hospital and UBC Network	STC 55 ; NC30 Further instruction to be provided by Acoustical Consultant and UBC FoM Project Team	24/7
Video Conference Room - up to VC 20 seats(number of attendees for local seminar to confirm with UBC FoM Project Team)	Secured access with card reader Wall backing for Equipment +Acoustical panels + chair rail, Blackout blinds Flooring to be carpet HVAC: Individual temp controller, heat load to include up to 50 participants with personal & VC equipment. Lighting: Submit photometric map for the UBC Project Team final approval Door: Glass hatch w/ integral blinds, door holder/stopper, width to accommodate patient bed	AV equipment - separate list Polycom teleconference phone and regular phone, digital wall clock, stackable/ side tilted semi-gloss tables w/ round corners+ wheels + modesty panels , chairs w/arms w/back flex stackable w/wheels, 4'x8' whiteboard, room signage with letter size page Insert, poster with space for slide-in size 8"x11"	AV requirements (separate equipment list)+ Hospital standard + as per number of attendees for local sessions. # of Floor boxes and locations to be determined by the room size and the # of local attendees.	Data drops to hospital standard+ for AV requirement (separate equipment list) + half of number of local session attendees + in the floor boxes. UBC & Hospital Network	STC 55; NC30 Further instruction to be provided by Acoustical Consultant and UBC FoM Project Team	24/7

Room Name	Rooms Design and Specification	Equipment & Furniture	power	Data and network	Acoustics	Operating Hours
Video Conference Room - larger than 20 seats (number of attendees for local seminar to confirmed with UBC FoM Project Team)	Secured access with card reader Wall backing for Equipment + acoustical panels + chair rail, blackout blinds Flooring to be carpet HVAC: Individual temp controller, heat load to include up to 30 participants with personal equipment. Lighting: Submit photometric map for the UBC Project Team final approval Door: Glass hatch w/ integral blinds, door holder/stopper, width to accommodate patient bed	AV equipment - separate list Polycom teleconference phone and regular phone, digital wall clock, fixed millwork, semi-gloss tables w/round corners and modesty panels , chairs w/arms w/back flex stackable w/wheels, 4'x8' whiteboard, room signage with letter size page Insert, poster with space for slide-in size 8"x11", garbage/recycle bin Lectern millwork (custom made as per UBC FoM AV millwork shop drawings), presenter chair w/arms back flex on wheels.	AV requirements (separate equipment list) + Hospital standard + as per number of attendees. # of Floor boxes and locations to be determined by the room size and the # of local attendees. Power to lectern and to tables millwork.	Data drops to hospital standard+ for AV requirement (separate equipment list) + Floor boxes (Pending on the room size) and data to the tables millwork + For Lectern. UBC & Hospital Network	STC 55; NC30 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7
Central VC Operator / Observation room / Projection Booth / Control Room / Rack Room /	Secured access with card reader. AV rack to be separated from the operator for acoustically and temperature. Two way communications. One-way mirror with integral blinds. HVAC: dedicated HVAC unit and temperature control , cooling 24/07. Width of door to accommodate a patient bed	AV equipment - separate list Furniture/millwork desks, computers with 2 displays each (the number of computers and desks are pending on the number of rooms supported) , Chairs, phones, garbage/recycle bin	Hospital standard+ AV requirement (separate equipment list), above and below millwork	Hospital standard+ for AV requirement (separate equipment list). UBC & Hospital Network	STC 45; NC25 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7
Clinical Skills Room and Clinical Instruction, regular + Bariatric	Secured access with card reader All Walls to have backing for AV+Medical Equipment + Wall mounted computer + wall protection, blackout blinds HVAC: Individual temp controller, heat load to include up to 12 participants with personal+medical+AV equipment Lighting to be coordinated with the AV/ debriefing system, dimmable, controlled also from the Ob rooms Door: Glass hatch w/ integral blinds, door holder/stopper, width to accommodate patient bed, 8 coat hooks Sink upper and lower cabinets/ lockable privacy curtain around exam bed	AV equipment - separate list, Large monitor (as per DG), PC/wall mounted - Height adjustable, small sideway tilted desk on wheels, phone/ wall mounted, soap dispenser, paper towel dispenser, Medical diagnostic equipment panel including Blood Pressure cuff (left side), otoscope (with tip dispenser) ophthalmoscope (right side) and wall mounted thermometer, Exam light, digital wall clock, exam stool on wheels, examination bed 90° Fowler backrest and footrests, sharp container, patient stepper, , 4'x8' whiteboard, 18" X 24" Tack board, 9 w/o arms stackable w/wheels chairs, stand for recording and playback equipment, poster with space for slide-in size 8"x11" , room signage with 8"/11" size page Insert, garbage bin, disposable clinical supplies . Two way communications For Bariatric add patient lift	As per AV requirements (Separate Equipment list) + Smartbed+Hospital standard+ medical equipment list + number of attendees. Final quantities and location to be determined by UBC FoM Project Team during Design	Plugs as per AV requirements (Separate Equipment list) + Smartbed+Hospital standard+ medical equipment list. Final quantities and location to be determined by UBC FoM Project Team during Design UBC & Hospital Network	STC 55; NC30 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7
Clinical Skills Resource Room / PBL	Secured access with card reader Wall backing for Equipment , Chair rails, blackout blinds HVAC: Individual temp controller, heat load to include up to 30 participants with personal equipment. Door: Glass hatch w/ integral blinds, door holder/stopper, width to accommodate patient bed, 8 coat hook	AV equipment - separate list Polycom teleconference phone, digital wall clock, 10 w/o arms stackable w/wheels chairs, 4'x8' whiteboard, stackable/ side tilted table/s w. round corners, Large Monitor/mounted, room signage with letter size page Insert, Garbage/recycle bin, poster with space for slide-in size 8"x11".	As per AV requirements (Separate Equipment list) + Smartbed+Hospital standard+ Medical equipment list + number of attendees. Final quantities and location to be determined by UBC FoM Project Team during Design	Plugs as per AV requirements (Separate Equipment list) + Hospital standard+ medical equipment list. Final quantities and location to be determined by UBC FoM Project Team during Design UBC & Hospital Network	STC 55; NC30 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7
On-call room	Access with immediate adjacency to non-public washrooms and showers and 5 minutes secured walk to inpatient units. For Delivery rooms the on-call needs to be on the ward. Distress connection to security with flashing red light on the outside HVAC: Individual temp controller. Door: dead bolt on the inside with occupy/vacant indicator on the exterior , coat hook Light control of the room from the bed Blackout blinds	Long bed, desk, chair w/arm on wheels, mirror, goose neck task lamp (to cover desk and bed OR 2 task lamps), phone, alarm clock backed up with batteries, locker with digital lock, garbage/recycle bin, poster with space for slide-in size 8"x11"	Power plug above desk + above bed + by mirror	Data above bed and desk UBC & Hospital Network	STC 55; NC30 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7
Locker Room	Secured access with card reader	Full height Lockers: width 300mm / depth 400mm / height 1800mm with electrical lock, full height mirror, benches, garbage bin	Hospital standard, plug near mirror	Hospital standard	Hospital standard	24/7
Shower Room		Each shower divided to wet and dry area, bench, 2x towel bar/hook, full height mirror, lockable shower door	Hospital standard, plug near mirror		Hospital standard	24/7
Lounge	Secured access with card reader, access to natural light , access with immediate adjacency to non-public washrooms and showers upper and lower lockable cabinet millwork + Sink Chair rail blinds	Study stations (equipment list as per above), lounge/dining tables w/round corners, lounge chairs, sofa, Kitchenware, soap dispenser, paper towel dispenser, dishwasher, fridge, plumbed water cooler, microwave, plumbed, coffee machine, kettle, wall mounted television with Cables connection, 4'x8' W/B, bulletin board, wall mounted phone, phone, wall clock, large garbage bin, recycle bin,	Hospital standard + number of intended users	Hospital standard. UBC & Hospital Network	Hospital standard	24/7
Library/Learning Commons	Secured access with card reader Access to natural daylight is highly recommended sink for librarian office separate washrooms for librarian blinds	Study stations (equipment list as per above), phone, wall clock, book stacks, large recycle bin, garbage bin	Hospital standard + number of intended users. Access to power above desk.	data for librarian + as per number of PCs. UBC & Hospital Networks	STC 55; NC30 Further instruction be provided by Acoustical Consultant and UBC FoM Project Team	24/7

FACULTY OF MEDICINE

Infrastructure Specifications for Clinical Academic Facilities – Videoconference

MARCH 7, 2016

Version	Date	Author(s)	Description of Change
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1.2	December 7, 2015	Frenklach, Housden, Stockman	Edits based on N. Wilcox comments
1.3	January 13, 2016	Frenklach, Housden, Stockman	Submitted to N. Wilcox
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OVERVIEW

This document sets out infrastructure requirements for the design and construction of University of British Columbia (UBC) Faculty of Medicine (FoM) Clinical Academic Facilities (CAFs), specifically videoconference rooms.

Additional requirements, specifications, AV/IT equipment, furniture and millwork required to design, construct and outfit CAFs are described in the following documents:

- UBC FoM Specifications and Requirements for Clinical Education Facilities
- Statement of Requirements (SoR)
    - Design and Construction Specifications
    - Clinical Space Specifications
    - Equipment Functional Specifications
- UBC FoM Design Guidelines for Learning Space AV Systems & Associated Infrastructure: Clinical Skills Rooms

These documents are intended to complement one another and should be consulted in conjunction.

INTERPRETATION

This document is written as an output specification and defines what the Design-Builder (D-B) must achieve in the design and construction needed to support the CAFs as specified in the approved Functional Program or Space List.

Except as expressly stated otherwise, the D-B will carry out the design, construction, testing and commissioning of the infrastructure for the CAFs (in cooperation with the UBC FoM Project Team) as required and contemplated by each provision of this document whether or not the provision is written as an obligation of the D-B or is stated in the imperative form.

The following acronyms and definitions are used in this document:

- AFF – Above the Finished Floor
- AV/IT – Audio/Visual and Information Technology
- CAC – Ceiling Attenuation Class
- CAFs – Clinical Academic Facilities
- D-B – Design Builder
- FSR – Flexible Seminar Room
- FSTC – Field Sound Transmission Class
- FP – Functional Program
- GWB – Gypsum Wall Board
- HA – Health Authority
- HVAC – Heating, ventilation, air conditioning
- IIC – Impact Insulation Class
- IT – Information Technology
- M&O – maintenance and operations
- MDV – Most Distant Viewer
- NC – Noise Criterion
- NRC – Noise Reduction Coefficient
- NSM – Net Square Meters
- SH – Screen Height
- SoR – Statement of Requirements
- SSR – Small Seminar Room
- STC – Sound Transmission Class
- VC – Videoconference

- Infrastructure – includes but is not limited to Ceilings, Drywall, Electrical, Flooring, HVAC, Lighting, Network, Wireless Access Points and Security.

ROLES AND RESPONSIBILITIES

The UBC FoM Project Team includes representation from both the Facilities and the IT groups. Based on past experience implementing similar projects across the province, the UBC FoM project team has adopted a phased-project approach that aligns with the UBC FoM Capital Infrastructure portfolio and the Design-Build facility construction management processes. The D-B, in coordination with the UBC FoM, will design, construct, procure, deliver, setup, install, test and commission all infrastructure required to complete the UBC FoM rooms, with the exception of what is outlined as UBC FoM responsibilities. The UBC FoM will design, procure, deliver, install and commission all AV/IT equipment required for the CAFs.

Recognizing the close partnership required to deliver the project scope, the roles and responsibilities of the UBC FoM and the D-B have been identified in the table below. The purpose of this table is to ensure clarity around project scope, to improve project communication and to ensure all design requirements are achieved.

The UBC FoM will be the sole approver of all room configuration, design, infrastructure, materials, furniture, colours, and finishes for all CAFs. Any changes made after approval must be re-approved by the UBC FoM Project Team.

Phase	UBC FoM Responsibility	Design-Builder Responsibility
Project Initiation	• Develop and identify CAFs, AV/IT requirements stemming from the SoR, Specifications, Equipment List, etc., as well as the location and funding provided • Ensure proposed location and space meets requirements as outlined in the SoR • Develop and manage AV/IT (not including computers) technology budget and schedule	• Provide adequate location and space per SoR requirements
Project Planning (Schematic Design to Issue for Construction Drawings)	• Develop AV/IT designs based on functional requirements for the spaces • Coordinate with the D-B and HA AV/IT specialist for the specific technology solution • Prepare and submit AV/IT infrastructure drawings to the HA • Review, evaluate and approve all drawings and specifications for each project stage to ensure all UBC FoM requirements are met • Approve furniture and equipment selection • Follow UBC FoM change management processes	• Meet regularly with UBC FoM Point of Contact • Design UBC FoM rooms in accordance to the SoR, design guidelines, and specifications, in coordination with UBC FoM • Submit report from acoustical consultant to UBC FoM at every design stage • Coordinate with HA AV/IT specialist to ensure UBC FoM AV/IT technology are aligned with HA technology • Provide CAD files to UBC FoM project team, throughout the design phase • Obtain UBC FoM sign-off at the end of each project phase before proceeding to next phase • Obtain UBC FoM approval for any changes to the design, drawings, plans or schedule • Select non-VC equipment and furniture according to UBC FoM specifications with the UBC FoM
Facilities Construction	• Conduct site visits to ensure compliance with UBC FoM requirements • Validate that AV/IT and clinical equipment infrastructure requirements are correctly provisioned during construction • Approve installation of equipment, furniture and signage according to UBC FoM specifications • Participate in final deficiency clearance approval before move-in	• Obtain UBC FoM approval for any changes to the designs, drawings, plans or schedule • Provide access to UBC FoM for site inspections at critical construction milestones, as specified during the design stage • Confirm with acoustical consultant that acoustic performance requirements in all CAFs are achieved and submit final report to UBC FoM for approval • Install signage according to UBC FoM and HA guidelines. • Ensure deficiencies are cleared prior to move-in and start of AV/IT installation by UBC FoM

AV/IT Equipment Procurement and Implementation	• Confirm wired and wireless (e.g. Eduroam®) network and requirements (i.e. IP, VLAN, and switch configurations) • Liaise with HSSBC to confirm network configuration schedule • Prepare, issue, and award tender for AV/IT equipment, installation, testing and commissioning • Manage integration of all AV/IT systems with selected AV/IT contactor	• Liaise with UBC FoM AV/IT project manager regarding any construction-related issues that affects AV/IT implementation
Move-in, Transition-to-operations and Project Close-out	• Update space in the UBC FoM Academic Space Inventory • Upload shared spaces to Resource Scheduler • Facilitate operational training • Submit handover AV/IT Technology documentation • Ensure Eduroam solution transition to operations process is followed	• Provide "as built" drawings • Ensure CAFs are clean, secured and ready for handover to new owners • Conduct training/orientation for UBC FoM technical and administration staff and end-users

UBC FOM VC ROOMS

The descriptions in this section are provided to give the D-B an understanding of the features and functionality that will be implemented in VC rooms.

FUNCTIONAL REQUIREMENTS

A core tenet of distributed medical education is the ability for all participants (both in the same physical space as the presenter as well as at a remote space) to have the same academic experience and ability to interact with one another, regardless of location. The UBC FoM uses VC technology to connect a group of people with other groups of people in other VC-enabled rooms across the province.

All UBC FoM VC-enabled rooms must adhere to the following functional requirements:

- Enable all participants (located at all connected sites) to see, hear, and speak to the other participants with distant sites.
- Participants must be able to display content for all participants (at all connected sites) from a laptop. A lectern PC and/or DVD/Blu-ray player and/or document camera or other ancillary source device may be provided in some cases.
- Ubiquitous wireless network connectivity throughout any facilities where patient care is being delivered, providing access to educational resources and clinical reference information at the point of care to meet current and future accreditation requirements.

In addition, UBC FoM VC-enabled rooms must be designed subject to the following considerations:

- Rooms have active AV/IT equipment 24 hours per day, 7 days per week (24/7). These rooms will be primarily used during business hours (Monday-Friday, 6am-6pm), but can be used at any time.
- Rooms have multiple uses, including loose seating without tables. The maximum number of participants will therefore need to be appropriate to the size of the room.

FLEXIBLE/SMALL SEMINAR ROOM (FSR/SSR) TECHNICAL REQUIREMENTS

A Flexible/Small Seminar Room (FSR/SSR) is a teaching and learning space, designed for both local and VC-enabled use for up to 20 participants at a room for a videoconference session and minimum of 35 participants for a local session. These types of rooms are used to connect a group of people with other groups of people in other VC-enabled rooms. FSRs are located at university sites and clinical academic campuses, and are used by students, instructors, and hospital medical staff for core curriculum delivery, administration, professional continuing education and training, as well as by UBC FoM for management and development meetings. The descriptions in this section are provided to give the D-B an understanding of the technical requirements that will be implemented in FSR VC rooms.

ARCHITECTURAL AND INTERIOR DESIGN

A. General Description
    1. 20-seat FSRs will be a minimum of fifty (50) NSM, rectangular, with an aspect ratio of side walls to front/back walls of 1:1.13. Site lines to the main screen at the front of the room will be unobstructed from all seats.
    2. The floor will be flat and for videoconferencing, the seating will be configured with tables in a U-shaped configuration. More tables will be required for other local uses. The minimum distance from the front wall to the closest participant will be 1600mm.
    3. The horizontal viewing angle for all seats will not exceed sixty (60) degrees for both displays.
    4. The display wall will be reinforced to permit secure mounting of approximately 275kg of equipment (exact weight load will be provided at the design process).
    5. The entrance will be at the back of the room (opposite the wall with the displays and camera). Door placements will be approved by UBC FoM during the design process.
    6. Minimum 90% acoustical blackout blinds are required on all windows.

B. Camera Requirements
    1. The cameras require appropriate protection from theft and damage.
    2. Walls and partitions demising adjoining spaces will be carefully selected to avoid structural borne vibration. High Definition cameras have a low tolerance for structure-borne vibration, and magnify the problem when using the zoom function. If there is any detectable vibration, the D-B at its own expense, will use vibration dampening materials to stabilize the image.

C. Furniture
    1. The UBC FoM will inform the project team on what table sizes and finishes will be required for the seating arrangement that best suits the seating capacity and geometry of the space.
        a. The requirement for grommets in tables (to facilitate microphone and video cable pass through) will be decided on a case-by-case basis.
    2. Floor box and floor conduits quantities and placement will be validated by the UBC FoM to ensure the infrastructure supports the functionality of the room.

D. Colours
    1. The colour of the walls, carpeting and chairs will be light grey to provide visual definition to the participants relative to the background. The UBC FoM project team will provide the pantone information as required.
    2. The colour of the table surface will be either antique white, light grey or light maple and in a matte finish.

MECHANICAL

A. FSR space HVAC designs will account for maximum occupancy, with all AV/IT equipment running including an allowance for personal electronic devices used by participants in order to maintain temperatures comfortable for occupants and safe for AV/IT equipment. Maximum occupancy will be the greatest number of participants utilizing the space with no furniture. This will be considerably greater than the heat load from 20 seated videoconference participants
    1. Long-term ambient room temperature target for these rooms to operate is 21 degrees Celsius with a humidity level of 30-50%.
    2. Maximum short-term (approx. one-hour) sustainable ambient temperature for these rooms is 24 degrees Celsius with a humidity level of 30-50%.
B. FSR AV/IT equipment can require up to 6000 Btu/hour of cooling capacity, depending on equipment.
C. The location of the HVAC mechanical devices must not interfere with the acoustical requirements and must not introduce vibration into any wall or bulkhead that supports a camera.
D. Design and construct FSR to protect the AV/IT equipment from damage caused by plumbing failures, water ingress, and excessive condensation.
E. Each FSR will have a dedicated, local temperature control.

ELECTRICAL

Electrical infrastructure, power receptacles, and data/telephone requirements specified in this section are for the specific needs of the VC system, and represent the minimum requirements. The D-B will provide larger conduits, additional power and data outlets required to support other systems and equipment as outlined in the specifications and requirements documents and the statement of requirements.

A. Lighting
    1. Light reflecting off the table surface will be set at an appropriate 15-20 degree angle.
    2. Colour temperature will be 3500 degrees Kelvin in a VC room. Different lights/colour temperature must not be mixed.
    3. Lighting will provide a minimum brightness of 80 foot candles at one (1) meter AFF.
    4. Lights within 1.5m of the video display surfaces will be separately switched.
    5. All lighting zones and circuits will be dimmable from 100% to 1%. Linear dimming is required, step dimming is not acceptable
    6. The D-B to submit photometric map for UBC FoM approval.
B. Power Outlets
    1. The AC load from AV/IT equipment located in the FSR is approximately 1800w in operation and 200w at idle.
    2. Each display on the front wall:
        a. For rooms using displays smaller than 80”, one 20Amp duplex is required behind the left display, and one 20Amp quad behind the right display. These two outlets can share a common dedicated circuit.
        b. For rooms using 80” displays or larger, one 20Amp duplex is required behind the left display, and one 20Amp quad behind the right display. These outlets must have independent dedicated 20Amp circuits.

c. Convenience power plugs in addition to those requires as part of the AV/IT requirements will be provided along the walls and in the floor boxes, per UBC FoM instructions.

3. Power and data for each participant in a non-VC session along the walls and in the floor boxes. Exact locations and quantities to be provided by the UBC FoM during the Design Development phase.

C. Conduits and Cable Pathways

1. The FSR will be equipped with a conduit/cable-tray and back-box infrastructure to support the low-voltage AV/IT system connectivity requirements.
2. The following quantity and size of conduits are required to facilitate AV/IT, and power cable runs between the AV/IT pull box and the opposite display (for video and speaker audio).
    a. Two (2) 27mm conduits from the AV/IT pull box to the AV/IT-enabled floor boxes, identified in the Design Development phase.
3. Conduit runs with more than three 90-degree turns require cable pull boxes to be inserted in the proper locations.

D. Wi-Fi, Data & Telephone

1. Rooms design will account for number of data outlets per specifications for AV/IT equipment and per the number of occupants in the walls and floor boxes.
2. Wi-Fi coverage for the CAFs will be designed with sufficient density for the number of occupants and number of devices per the number of occupants.
    a. The D-B must submit a “heat map” for the Wi-Fi coverage for UBC FoM approval.
    b. Wi-Fi coverage throughout the patient care facilities is required as teachers, learners and researches will be working where patient care is being delivered.
3. For the FSR, the following will be placed behind left display:
    a. Two (2) RJ45 data outlets (one must be assigned on the video conferencing VLAN).
4. Floor box data outlets minimum requirements:
    a. One (1) RJ45 data outlet per floor box.
5. The following to be placed opposite the display wall (directly opposite the video conference camera)
    a. One (1) RJ45 data outlets (connects to house switch (requires POE).

E. Security

1. Access to rooms through secure card access.

ACOUSTICAL

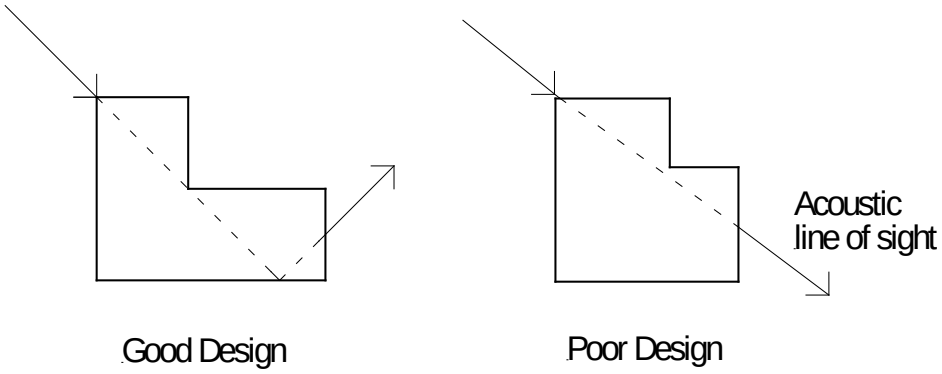
A. Interior Acoustics

1. The D-B will engage an acoustical consultant (subject to UBC FoM approval), as part of the design team from the beginning of the design until final testing and commissioning of the CAFs.
    a. The acoustical consultant will be involved and approve all aspects of the design, construction, testing, and commissioning, including architectural, structural, and mechanical.
    b. The acoustical consultant will submit a report to the D-B and copy UBC FoM for each design stage, after shop drawings submittal, during construction and after commissioning and testing of the mechanical and lighting systems and acoustical testing.

2. Design, construct, test and commission all of the CAFs and adjacent spaces in accordance with the requirements as outlined in the following paragraphs and as instructed by the acoustical consultant to provide appropriate acoustical conditions to make the rooms functional for presentations, video conferencing, and/or monitoring.
    a. Ambient noise including HVAC and ballast noise will be controlled, and appropriate acoustical treatment will be installed to control reverberation, minimize reflections, and flutter echo and other acoustical issues that may adversely affect the microphone pickup.
3. Hard reflective wall or ceiling surfaces within 2500mm of lectern or tabletop microphones will be avoided, and may require the addition of absorption or diffusion materials. The reflections from these surfaces will create audible artefacts or lower feedback thresholds.
4. Acoustical wall treatment to be coordinated with UBC FoM:
    a. As a minimum, unless required differently by the acoustical consultant, the wall treatment will consist of fabric covered acoustic panels that are minimum 25 mm thick with a minimum NRC 0.85 rating.
5. The CAFs require a full acoustic ceiling, minimum NRC rating of 0.70 and a minimum CAC rating of 35. In addition, the ceiling will be back loaded with batt insulation (bagged, if necessary) to broaden the sound absorbing range.

B. Background Noise
1. Noise control measures will be undertaken to achieve a background noise criterion of NC-25 for all of the CAFs, in order to provide good speech intelligibility for both local and remote listeners. This includes noise from HVAC and lighting ballasts.
2. To reduce the noise generated by the airflow of the HVAC system, a maximum airflow of 1.52m/s at the face of the diffusers and 1.8m/s at the face of the return air grilles will be allowed for, diffusers selected for low noise levels, and open diffusers with no dampers (or the dampers placed upstream of the diffuser by at least 3m) and the duct downstream of the dampers lined with fibreglass duct liner. Dampers will never be closed down to less than 80% of the maximum opening to prevent excess turbulence-generated noise.
3. Selection of noise rating of the HVAC diffusers will be based on the actual design airflow, and the D-B will not presume that they will meet their noise rating at any airflow. The D-B, in consultation with its acoustical consultant, will take into consideration the total number of diffusers understanding that each doubling of the number of diffusers increases the overall noise level by 3dBA. Diffusers must be selected to be 10 NC points lower than the NC rating for the room.
4. Care will be taken in locating return air elbows in systems that are not ducted. Acoustically lined return air elbows must be located in non-critical acoustical walls (e.g. walls with doors), must contain minimum 25mm thick acoustic insulation and must be designed to block the line of sight through the elbow per the “Good Design” shown below.

Fig. 1: Design considerations for acoustic elbows



Acoustic Elbows - Minimum Acoustic Requirements

5. The return air grilles in the rooms will be located an optimum distance from the return air elbow to reduce the potential for cross talk.
6. It is essential that all noise-producing HVAC equipment including mixing boxes, fan powered mixing boxes, and fan coil units be located outside the CAFs and not within the ceiling plenum space.

C. Sound Isolation – Interior

1. One of the key issues is achieving adequate sound isolation between the CAFs and adjacent spaces.
    a. Adjacent spaces may include but are not limited to similar distance learning spaces, meeting rooms, lecture rooms, washrooms, corridors etc.
2. In order to achieve the proper sound isolation, all perimeter walls of the CAFs must achieve a minimum rating of STC 55. The laboratory STC ratings of all such perimeter walls must meet the requirements of ASTM E90-09: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements, and must be based on test results obtained within the last 15 years and on results from an accredited and current test facility.
3. Party walls must be full height.
4. If a stud wall design is used:
    a. Non-load bearing studs must be maximum 25ga. and will be spaced at minimum 600o.c. For all single stud walls, the lab STC rating is based on these details unless otherwise stated.
    b. Walls rated at STC 55 and higher must be, at a minimum, double stud (i.e. two rows of studs and not staggered studs on a common base or complex single stud constructions). Stud gauge is not an issue for double stud walls.
    c. Resilient channel will not be used.
5. FSTC results meeting ASTM E336-09: Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings will be required for a random sample of partitions. For all such tests, results within five (5) FSTC points of the lab STC rating for the partition in question must be achieved.

6. In order to achieve the required minimum FSTC results, the following measures will be undertaken, as a minimum:
    a. Carefully seal all penetrations of the party walls;
    b. Active (i.e. those components containing moving air and/or water) ducts and pipes will not be grouted into party walls, but are free of the GWB, with a maximum 6mm gap caulked light tight with a non-hardening mastic caulking material (e.g. Tremco Acoustical Sealant or equivalent fire-rated sealant);
    c. Seal all cable trays which pass through key party walls;
    d. Electrical boxes, etc. will not be installed back-to-back (i.e. have at least one complete insulated stud space separation);
    e. Caulk all floor and header tracks; and
    f. Seal party wall/mullion details in such a way that the overall FSTC rating of the partition is not unduly compromised.

D. Noise Isolation - Doors and other Entryways
    1. Where a single door (non-vestibule) opens to a noisy corridor, lobby or waiting area, a single width purpose-built acoustic door with a minimum STC 50 rating will be used.
    2. For all other situations (including vestibule doors):
        a. Use solid core wood or filled metal doors;
        b. Ensure use of properly selected acoustic seals such as Pemko Type Silicon Seal S-88 plus Pemko Type 350 around the perimeter;
        c. install automatic threshold closers similar to Pemko Type 430 which close over wood or metal sill plates which are levelled and caulked or grouted in place;
        d. Install all such doors/door systems so that light will not pass through the doors/door systems.

E. Noise Isolation – Floor/Ceiling
    1. The location of the CAFs is important not only from a horizontal noise (i.e. not locating such rooms next to the main mechanical room, etc.) perspective, but also in terms of the floor/ceiling acoustic performance.
    2. The airborne noise isolation between vertically stacked spaces will meet minimum STC 50 rating.
    3. Impact noise including footfall noise, chair scraping etc. can have a significant impact to the room acoustics. If there is occupied space above any of the CAFs, it will be necessary to include a full acoustic ceiling in the room to help control impact noise.
    4. While the floor/ceiling STC rating of a room might meet the required STC rating without an acoustic ceiling, impact noise might be problematic for rooms with exposed structural ceilings. Further, the room above must be carpeted or must have an Impact Insulation Class, IIC, (i.e. ASTM E492-09: Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine) rating exceeding 70. In the field, the rating must be FIIC 65 or higher (re ASTM E1007-04e1: Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures).
    5. Fluorescent light ballasts will be remote mounted in an adjacent room to minimize noise in the room. If there are any low voltage lighting devices in the room with integral transformers, they will be potted to prevent airborne or structure borne transformer noise from being introduced.

F. Noise Isolation – Exterior Noise Impact

1. For all CAFs, the maximum noise level due to exterior noise will be 35dBA.
2. To meet low ambient noise levels requirements, none of the CAFs will be located adjacent to mechanical or electrical rooms, exercise areas, washrooms, elevators, exterior walls adjacent to busy roadways, airports, helicopter pads, major exterior equipment (such as cooling towers, chillers, emergency generator sets), or below roofs which contain major equipment or helicopter pads.

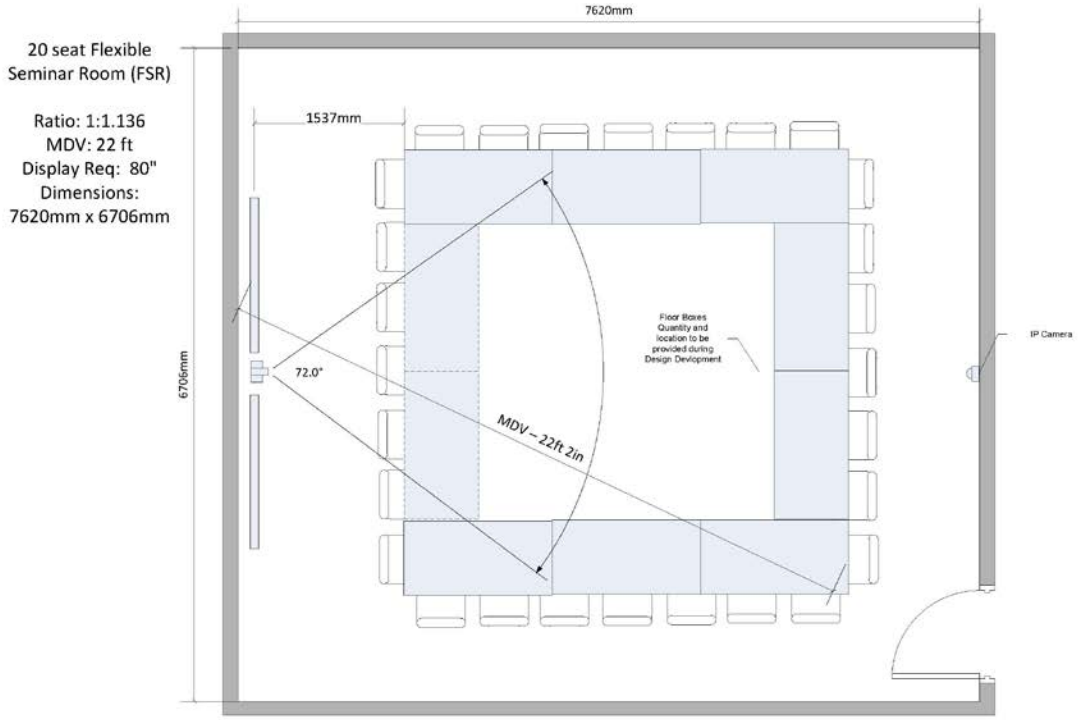
REFERENCES

The following information is provided for reference.

FLOOR PLAN

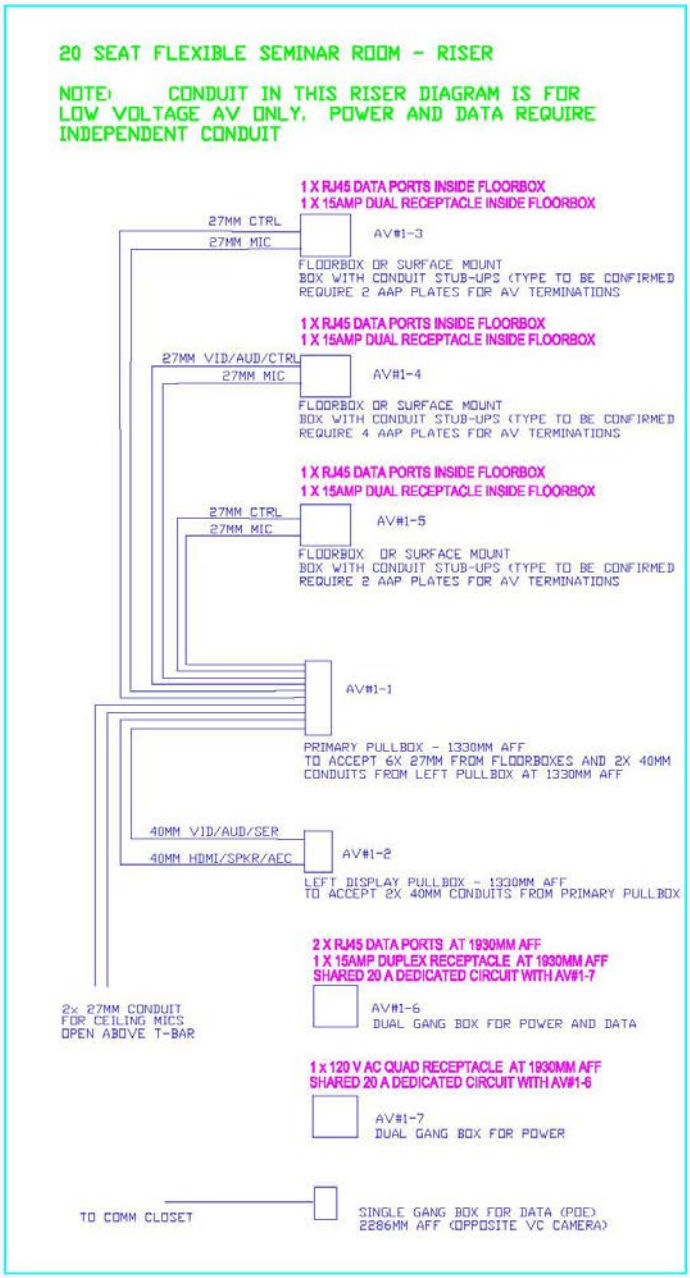
Sample UBC FoM 20-seat FSR Floor Plan

The plan shows ideal placement of displays and furniture. The final quantities and locations of infrastructure (e.g. floor boxes), equipment and furniture will be determined by UBC FoM Project team during the design phase.



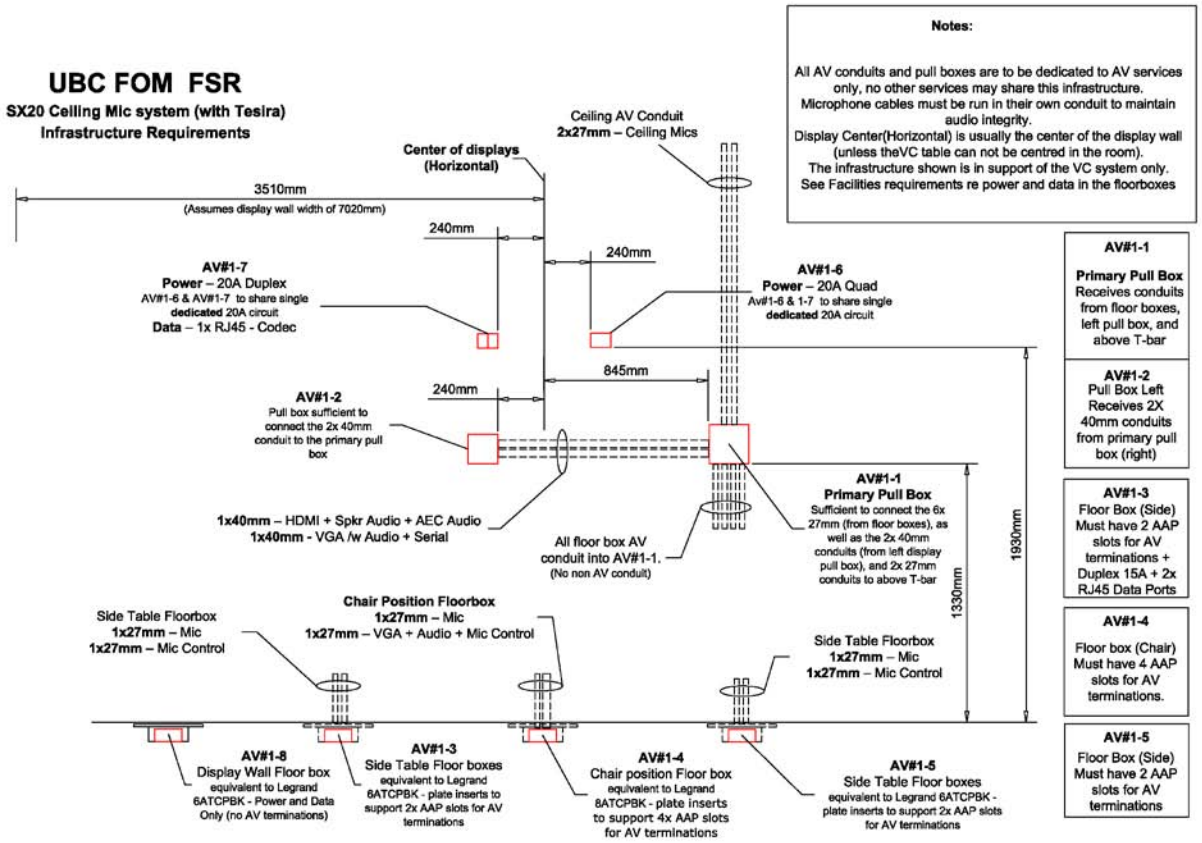
RISER DIAGRAM

Sample UBC FoM 20-Seat FSR Riser Diagram



AV/IT INFRASTRUCTURE REQUIREMENTS

Sample UBC FoM 20-Seat FSR AV/IT Infrastructure Requirements



FACULTY OF MEDICINE

Design Guidelines for Learning Space AV Systems & Associated Infrastructure Clinical Skills Rooms

JANUARY 16, 2016

Version	Date	Author(s)	Description of Change
Draft-v0	October 12, 2012	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Separated from enhanced CS document
Draft-v0a	October 19, 2012	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Document updates
Draft-v0b	October 24, 2012	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Document updates
Draft-v0c	December 7, 2012	Amanda Jones	Document updates
Draft-v0d	December 11, 2012	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Document updates
V1	December 11, 2012	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Released to production
V2	January 11, 2013	Izaak Housden, Anthony Knezevic, Jo-ann Chubb, Gabriel Rose	Updated w feedback from Mickey Frenklach
V3	January 16 2016	Updated & Peer reviewed by (Ferooz Sekandarpoor, Chris Bateman, Frenklach, Mickey, Izaak, Housden)	Lesson learned updates from other projects

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1 INTRODUCTION

1.1 FACULTY OF MEDICINE DISTRIBUTED MEDICAL PROGRAM

In 2004, the University of British Columbia (UBC) Faculty of Medicine (FOM) initiated its Distributed Medical Program (DMP), the purpose of which is to provide equal access to medical teaching and training for students, residents, and practicing physicians across BC. The DMP is made possible by technology-enabled learning spaces located at university sites (UNBC, UBCO, UVic, and UBC) as well as Clinical Academic Campuses and Affiliated Regional Centres located across the province. Many of these spaces are also videoconference (VC)-enabled and are connected to each other via the central VC Bridge, all of which rests on a dedicated network called the Distributed Medical Program Audiovisual (DMP-AV) network.

1.2 DOCUMENT PURPOSE

Guideline document with high-level information about that space type. As, more detailed information is required for each room, the UBC FOM Project Team (FoM Team) will be engaged to further provide details and designs. Please see section 4 for contact information.

The **Clinical Skills Room CSR** Guidelines are generally used in the early stages of a facilities project, along with the Functional Program and/or Project Plan, to align various stakeholders around a common, high-level vision of a given space. Where a functional plan includes technology-enabled rooms, the corresponding **Clinical Skills Room CSR Design** Guideline document(s) should accompany it. Once, a project is approved, FoM Team will be engaged to provide subsequent design and information

This document in particular presents high-level guidelines for clinical skills rooms (CSRs) which are used for years 1-4 and beyond for clinical skills teaching and examination techniques and competence testing.

The **CSR** Design Guidelines are intended to encourage and facilitate conversation between designers and the UBC FOM project team to confirm that all designs match the intended use of the space. Information contained in this document should be considered guidelines[1]. In every case, the project design team must consult with the UBC FOM's project team to clarify requirements and develop and approve designs specific to the space. The contents of this document will never supersede UBC project team decisions, a specification document, detailed design, or any other source that is considered by UBC to be more directly relevant to the project at hand. Furthermore, the contents of these documents must not be used as contract language.

1.3 ROOM USAGE DESCRIPTIONS

CSRs are used in different ways throughout the medical program. In years 1 and 2, CSRs are used by 2-9 students and, more typically at the Vancouver site, by, 8 students, plus 1 instructor/clinician and 1 volunteer or

[1] A guideline is a general rule, principle, or piece of advice. As used in this project, guidelines are not considered mandatory. They are to be used to determine a course of action and are intended to enable alignment towards common designs. (Oxford Dictionaries Online: http://oxforddictionaries.com/definition/english/guideline?q=guideline)

standardized patient and sometimes 1 family member. In years 3 and 4, they are generally used by fewer students. CSRs are generally located at clinical academic campuses.

Clinical skills rooms are used by students and residents to practice performing clinical procedures within a safe learning environment. Procedures are usually conducted on volunteer or standardized patients (actors), or for more sensitive procedures, on task trainers or advanced clinical skills devices. Clinical skills rooms are also used to conduct exams, such as the objective structured clinical exam (OSCEs) for years 1 - 4. Clinical skills rooms are regularly used by students in years 1 & 2 for "Clinical Skills" and, at some distributed sites for "Doctor, Patient and Society" courses.

Technology is used to support the delivery of clinical skills education by enhancing access to materials that students can use to prepare, review, and debrief. However the primary objective and focus is always on the student's interaction with the patient, building communication skills, rapport, learning new skills and refining approach to clinical encounters, preparing students for medical practice.

1.4 FUNCTIONAL REQUIREMENTS

In a clinical skills room, the participants should be able to:

- Interact with a volunteer or standardized patient as they would in a real doctor's office, including access to an examination table, head wall with diagnostic equipment, and supplies such as sutures and gloves.
- Display electronic material from either their laptop or a room-based computer so that all participants in the room can see it.
- Have access to a mounted whiteboard
- Access internet-based resources from a room-based computer.
- Access and play online videos, and DVDs .
- Record their interactions with each other and with 'patients'.
- Play back the interaction recordings immediately.
- Store the recordings for later play back.
- Not see the observer(s) located outside of the clinical skills room.
- Not hear discourse from/between the observer(s) located outside of the clinical skills room.
- Have an indication (e.g.: a small light) that outside observers are able hear discussion in the clinical skills room.

In addition to the above requirements, an evaluator or instructor should be able to:

- Observe the clinical skills session from an enclosed position outside of the room, without being seen by the participants in the room.
- Hear the clinical skills session from a position outside of the room and be able to increase, decrease, or mute the volume.
- Comment on the clinical skills session from a position outside of the room without being heard by the participants in the room.

If the physical space constraints allow it, it is preferable to have observation pairs to meet the observation requirements. The spaces should also have infrastructure to support IP cameras to enable recording of interactions

that take place within the room for student learning. Consult with the UBC FOM project team to determine the best solution combination for a given project and space.

This document specifies infrastructure to support these functional requirements. Specific systems (e.g.: IP cameras, recording systems, etc.) are not included in this document.

2 OVERVIEW OF TECHNICAL SOLUTION

Some attributes of clinical skills rooms are:

- High definition digital display – This is used to review procedural instruction videos, prior to launching into a clinical skills class; review exhibits to enhance the students' ability to correlate diagnostic information with case history (x-rays, lab results, photographs, medical records, etc). Increasingly these items are accessed in digital format within the clinical settings. Students and educators can also refer to other information to help with their learning during these sessions.
- Recording cameras – Recording a student conducting their procedure provides unparalleled capability to provide feedback objectively. The ability for a student to record their procedure, and immediately playback for debriefing enables the student to collect important feedback, just-in-time, when the learning opportunities are still present. Recording also allows for the educator to annotate comments for the student to consider during self-study reflection or for exam preparation.
- Computer station - The computer will be connected to the Hospital network to enable students and instructors access to patient files
- Observation room – Just like recording, observation room allow for students and educators to watch and listen to a colleague during a presentation, and make notes for learning opportunities whilst the procedure is taking place. The use of observation rooms allows the student performing the procedure to do so without the distraction of their colleagues looking on in the room, and also provides a level of comfort for the patient. Learning opportunities are very similar to recording.

The room should closely model a patient examination room, (e.g.: sink, soap, and paper towels are required for hand washing, cleaning materials, and teaching specific procedures, such as dialysis). Please see the functional program and the non-AV equipment list for additional information regarding these non-AV/IT requirements.

The room should also have-appropriate architecture, acoustical treatments, wall and furniture colours, lighting, cooling, power and data ports, and cable pathways. The following sections describe guidelines for additional aspects of room and AV system design. Spaces are primarily used during business hours (6am-6pm Monday-Friday), but secure and safe access is required 24/07. Exams typically occur on weekends which needs to be considered.

AV equipment in this space has a life cycle. The best practices included herein consider renewal as part of this.

3 TECHNICAL SOLUTION DESCRIPTION

The following content is divided into trade specific sub-sections related to specific infrastructure needed in order for the AV system to function as intended. The sections are as follows:

1. Architecture & Interior Design
2. Mechanical
3. Electrical
4. Data & Telephone
5. Acoustics
6. AV System

The information contained in this **Clinical Skills Room CSR** Design Guideline is high-level and intended to be used for early project planning (e.g.: budget estimates, functional program and test fit) and to create a common understanding of what is necessary for a **Clinical Skills Room CSR** to be fit for intended use. Once a project has been approved, the FoM Team will be engaged to provide subsequent design and information.

3.1 ARCHITECTURE & INTERIOR DESIGN

3.1.1 GENERAL DESCRIPTION

- CSRs hold up to 11 people (8 students + 1 tutor + 1 patient + 1 family member).
- The floor space should be 20 net square meters (NSM).Observation room will be minimum 10 NSM.
- Columns or other obstructions within the room envelope will increase the NSM requirement. This is necessary to maintain the usability and orientation of the space
- Each clinical skills room should have a door with a push button code with key override or key card access with key override lock.
- There should be a whiteboard permanently installed in each clinical skills room. Minimum whiteboard size is 6'x4'.
- One of the walls should be able to accommodate a large flat panel display,
  the UBC FOM project team will specify the location and size of all equipment, subject to the functional requirements.
- In existing facilities, where walls haven't been designed to accommodate the load of a flat panel display, ¾" plywood may be installed. This plywood should be attached to at least 3 studs and should be painted the same colour as the wall. In some areas, plywood may need to be treated with appropriate finish to meet infection control specifications.
- The clinical skills room require shelving or cabinetry for small items used in clinical procedures such as hospital linens, hospital gowns, gloves, otoscope tips, tongue depressors, sutures, etc. Shelving/cabinetry should not be mounted directly below the flat panel display.
- Clinical skills room will require one wall to be dedicated as the 'head wall' where the diagnostic set, examination table, and ample standing room are available. The display, window, and whiteboard should not impede this area.

It is preferable that clinical skills rooms have no exterior windows except for the observation position, to preserve patient privacy.

- If non-observation windows are unavoidable, adequate wall space for headwall, display, whiteboard, and anatomical charts should be provided.
- If non-observation windows are unavoidable, appropriate window coverings (e.g.: blinds) should be provided. Blinds should be 100% blackout to ensure patient privacy whilst changing and for privacy during examination procedures.

3.1.2 OBSERVATION ROOM

Designers should consult with the UBC FOM project team on each project to determine which rooms require observation windows.

For the rooms CSR where the Observation functionality is required:

- One of the walls of a clinical skills room will have a window to an observation position or adjacent clinical skills room, with one-way glass between the "observation" room and the "activity" room. The window dimensions should be 8' wide by 4' high. The bottom edge of the frame should be 30" above finished floor.
- The observation window should have retractable blinds on both sides of the window for patient confidentiality. A horizontally retractable whiteboard is an acceptable solution, in which case the whiteboard should be large enough to cover the window.

3.1.3 FURNITURE

3.2 MECHANICAL

3.2.1 HVAC AND HEAT LOAD

- Cooling systems should be designed for a heat load from the specified equipment and a team of up to eleven performing intensive work and one person dressed only in a hospital gown inside the room for one or more hours with all doors closed. An individual temperature control within each room is required. This is especially important when students are working in smaller groups with one patient, the patient becomes very cold if the temperature cannot be adjusted to a comfortable level for someone dressed only in a hospital gown.
- If the observation room include an AV rack, a separated standalone HVAC unit is required for the observation room to provide cooling 24/07 and not operated by occupancy.

3.2.2 PROTECTION FROM WATER DAMAGE

- All AV equipment should be protected from damage caused by plumbing failures and excessive condensation.
- If overhead water pipes exist, the designs should include a mitigation strategy in the event of a leak.

3.3 ELECTRICAL

3.3.1 LIGHTING

- The clinical skills room lighting should meet or exceed classroom standards.
- Both the observation room and the clinical skill room should have dimmable lighting so that the one-way glass is effective. Location of the switches will be provided by UBC FoM Team during the design phase.

3.3.2 POWER OUTLETS

Location and quantities for all power outlets will be provided by the UBC FoM Team during the design phase. High lever overview of some of the requirements:

- T One, standard duplex power outlet on the wall for the display.
    - The power outlet for the display should be behind the display.
    - If the power outlet for the display cannot be located behind the display, the power cord should be hidden behind surface-mounted Panduit or wire mold.
- Two standard, duplex power outlets above the ceiling tiles on the observation window wall in each clinical skills room (for an IP camera and audio system, as needed).
- In addition to the above, clinical skills rooms should have sufficient power outlets to accommodate:
    - A portable recording/playback device;
    - PC Computer
    - Participants' laptops.
    - The diagnostic set
    - Examination light.
    - Examination bed (depending on the bed specifications, some have a heated drawer for instruments) and some may require power assisted height adjustments.
    - Task trainer (computerized simulator).

3.3.3 CONDUITS AND CABLE PATHWAYS

Floor boxes quantities and locations will be provided by the FoM Team during the design process

- There should be no visible cabling in the room; surface-mounted Panduit or wire mold is an acceptable option for renovated existing facilities with no drywall (or where in-wall conduit is not feasible).
    - Surface-mounted Panduit or wire mold should be screwed in place rather than glued. Square or rectangular Panduit is preferable to round Panduit.

- There should be a mud ring on either side of the wall above the ceiling tile on the observation window wall to accommodate the microphone cable and the low-voltage cable for the light in the activity room (see audio system section for details).
- In the observation room, there should be a location for volume control (usually to the right of the observation window) with conduit for low-voltage wires up into the ceiling space in the observation room.

3.4 DATA & TELEPHONE

Location and quantities for all data plugs will be provided by the UBC FoM Team during the design phase. High lever overview of some of the requirements:

- Room design should account for Wifi coverage with sufficient density for the number of participants and multiple devices per participant (UBC Secure or eduroam). Further information regarding eduroam can be found - http://medit.med.ubc.ca/initiatives/eduroam-access-to-educational-resources.
-
- There should be a single data jack above the ceiling tiles in each clinical skills room to accommodate an IP camera.
- There should be at least two data ports in each clinical skills room to accommodate computers.

3.5 ACOUSTICS

3.5.1 BACKGROUND NOISE

- Noise control measures must be undertaken to achieve a background noise criterion of NC 30-35 for the clinical skills rooms.

3.5.2 NOISE ISOLATION

- Clinical skills room must achieve a Sound Transmission Class (STC) rating of STC 50-54.
    - Groups of students in adjoining rooms should be able to converse at normal levels and not interrupt their colleagues in adjacent rooms.
    - Appropriate sealant of observation windows should be in place to increase noise isolation. The observation windows themselves should also meet this STC rating.
    - Two layers of 16 mm thick Type X gwb on each side with 25 gauge studs is generally sufficient to achieve this STC rating.
    - Solid core wood or filled metal doors with full perimeter acoustic seals including an automatic door bottom should be provided.

3.6 AV SYSTEM

The AV system will be designed by the UBC FoM Project Team. Infrastructure requirements necessary to support the AV system will be provided to the Construction Project Team during the Design Phase of the project.

3.6.1 AUDIO

- All ECSRs should have side-mounted speakers attached to the displays (provided by the display manufacturer) for audio produced by display connected devices.
- Two ceiling speakers will be installed near the center of the room to facilitate voice audio from the control room microphone (commonly referred to as “voice of god” (VOG)).
- A boundary microphone will be installed into the ceiling above the buffer zone, and tied back to the DSP.
- A 3.5mm audio output will be installed in the head wall at plinth height to facilitate “Voice of Patient” (VOP) audio (to be output to a speaker that will be placed under the neck area of the task trainer).

3.6.1.1 CONTROL ROOM

- A push-to-talk microphone in the control room to send audio to the ceiling speakers or task trainer.
- Two ceiling mounted speakers will be installed in the control room to playback audio from the CSR
- When speaking into the microphone, the audio system will ‘duck’ the audio in the control room to prevent the possibility of a feedback loop.
- An AAP box will be used in the control room below the observation window to house:
    - The control room audio volume knob (for the overhead speakers)
    - The audio switch box/button (to select microphone destination)
    - The PC input plate (for the ECSR patient monitor and side display),
    - 3.5mm audio input (to be mixed into control room output)
    - Two headphone jacks (with independent volume controls),
    - and the exit/entry point for the control room microphone cable.
    - A mesh conduit will be used to connect this box back to the equipment rack.
      The full design for the system will be provide by UBC FoM design team.

3.6.2 DISPLAYS

- All clinical skills rooms should have a flat panel display mounted to one wall, UBC FoM will provide the location, elevation and size of the displays.
- There should be a VGA/HDMI cable for any participant to be able to connect their laptop, and the display should be ready for digital connections (i.e.: HDMI).
    - The cable should be neatly stored while not in use – it may be hung on a hook on the wall below the display.
    - The cable must be long enough to reach to any participant’s laptop within the room.

4 CONTACT

If you have questions or require additional information, please contact Ferooz Sekandarpoor, UBC FoM Simulation Technology Specialist, at ferooz.sekandarpoor@ubc.ca or 604-376-2390.

5 REFERENCE DIAGRAMS

Figure 1: Display diagram

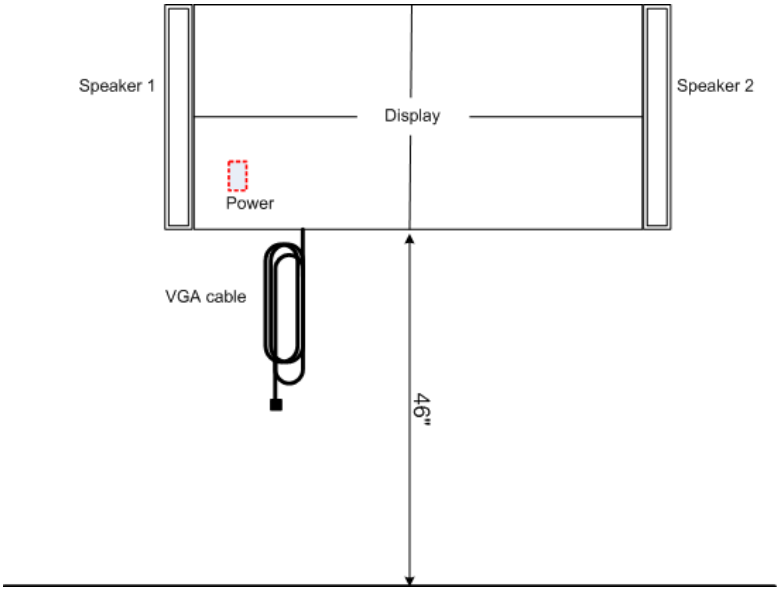
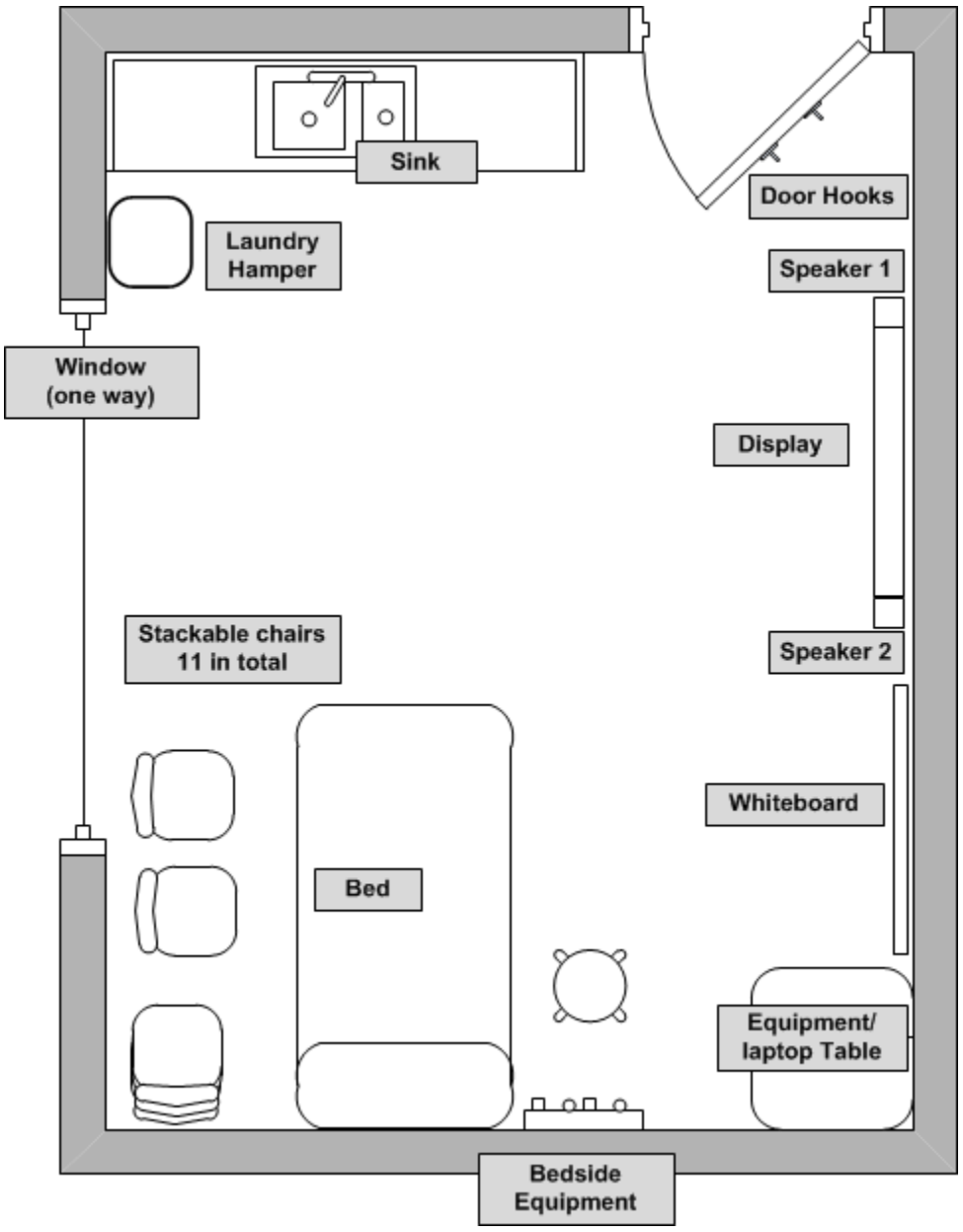
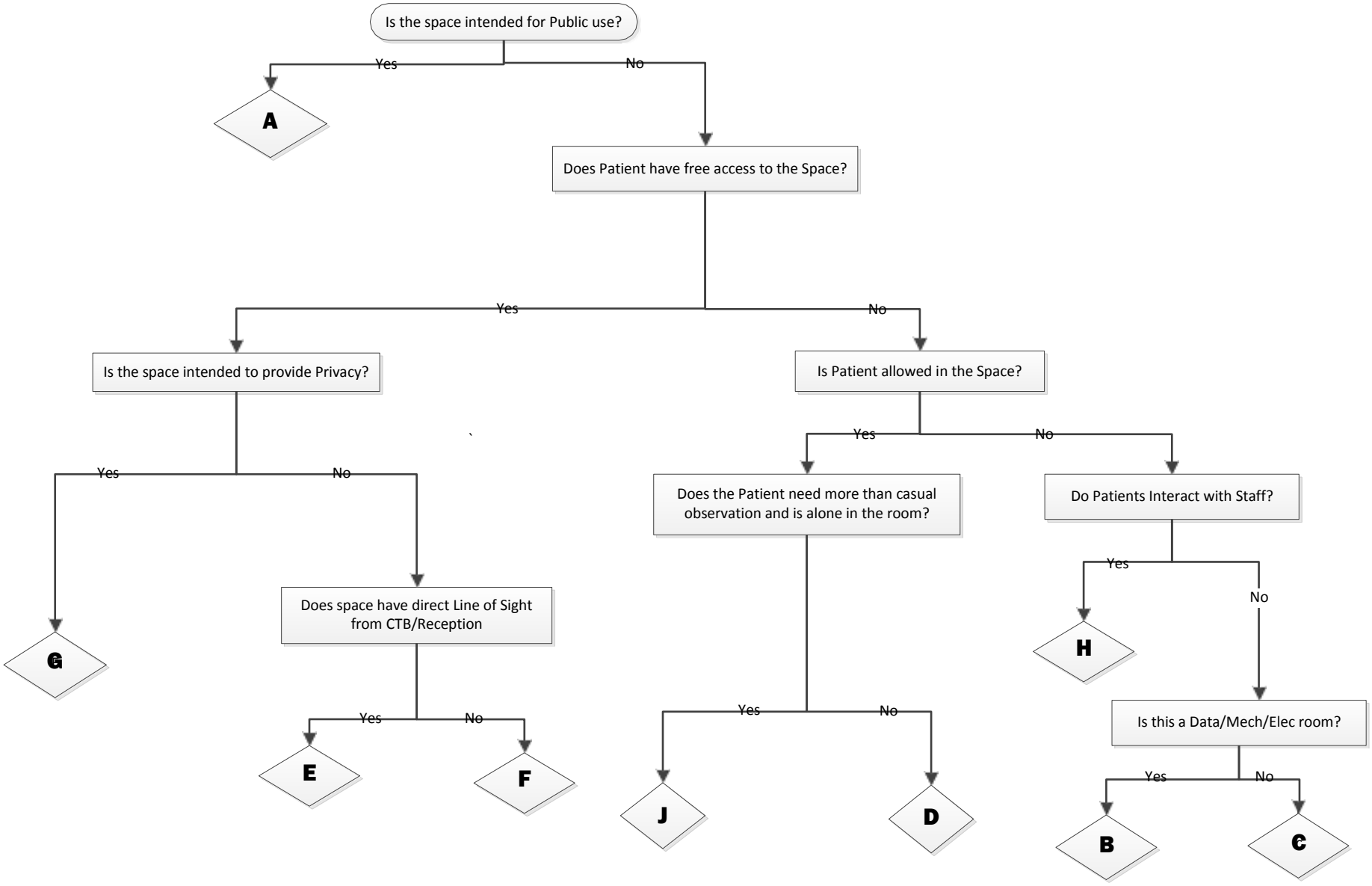


Figure 2: Birds-eye floor plan layout



Please note: Placement of the display and the window and general the room layout will depend on room geometry and other structural constraints. Please contact us for additional information.

Appendix 1K Risk Assessment Matrix



fraserhealth

2016
DESIGN STANDARDS

ROYAL COLUMBIAN HOSPITAL REDEVELOPMENT PROJECT

Appendix 1L – RCH Campus Design Standards (Royal Columbian Hospital Redevelopment)

Design-Build Agreement

TABLE OF CONTENTS

INTRODUCTION

1. Overview

The Royal Columbian Hospital is one of BC's largest and most specialized hospitals. It's the only hospital in the province with trauma care, cardiac care, neurosciences, high-risk obstetrics, neonatal intensive care, and mental health care all on one site. As BC's oldest hospital, and one of its busiest, it provides expert care for the most seriously ill or injured and is one of two adult trauma centres in the Lower Mainland.

People from all over BC come here. The Royal Columbian is one of three regional hospitals in Fraser Health, and also serves as the local community hospital for New Westminster and Coquitlam, and as a secondary referral hospital for people from Burnaby to Maple Ridge who need a higher level of care than their own community hospital can provide. As a University affiliated teaching facility, Royal Columbian physicians and clinicians play a prominent role in educating future health care providers both in medical specialties and advanced medical technology.

Redevelopment will allow us to provide the latest in patient-centred care and design, enhance the working environment for physicians and employees, and provide a significant increase in health care services and capacity for the communities we serve.

2. Handbook Purpose and Use

The Design Standards serves as a guiding reference for architects, planners, and designers for development and future projects on the Royal Columbian Hospital Campus. These standards provide the Hospital with consistency of design and ensure that the campus evolves to support the overall project vision and integrate appropriately with the surrounding community. The Handbook establishes design standards to guide urban design, site design, building massing and aesthetics, sustainability strategies, and interior concepts. This handbook sets guidelines specific to the Royal Columbian Hospital Campus, but are not necessarily dictated by industry standards or codes. All responsibility for compliance with the laws, code, and industry standards shall be borne by the design team. This Handbook is a living document and is intended to evolve as new technology, products, and healthcare delivery methods are created and evolve.

3. Project Vision

The Project Vision for this multi-phase, multi-year project is to create a world-class hospital: a state-of-the-art facility that provides uncompromising care and remarkable patient experiences. This redevelopment goes beyond rebuilding a hospital. The goal is transformational. Focused on revolutionizing the way health care is delivered so Royal Columbian Hospital can provide the very best care for its patients. A hospital that is in step with the needs of today and is designed with flexibility to meet the needs of the future. This redevelopment will help meet the needs of one of the largest, fastest growing, and culturally diverse health regions in the country—serving one in three British Columbians.

01 Community Interface Guidelines

SECTION 01 - COMMUNITY INTERFACE GUIDELINES

1. Urban Design Considerations

Royal Columbian Hospital is an integral part of the community and a critical component in the fabric of New Westminster. Future development and growth of the campus must both engage and respect the surrounding community and promote pedestrian, transit and bicycle route connections through the site.

A. CONNECTIVITY

- The Hospital site shall be permeable with strong pedestrian linkages through the campus to adjacent neighborhood amenities including parks, through fares, and transit stations.
- A strong relationship between RCH frontage and Sapperton Park shall be created to make the streetscape feel like an extension of the park with a consistent “green edge”.
- On site development shall orient and relate to adjacent street grid integrating urban fabric with the Hospital Campus.

B. PUBLIC REALM AND STREET INTERFACE

- Buildings shall address street edges with transparent facades and appropriate setbacks with good urban design to promote fluidity between indoors and outdoors.
- A strong sense of arrival shall be established on East Columbia Street and from the public street to the new main entrance to the Hospital.
- An appropriate transition shall be provided between institutional uses on site and surrounding residential to keep it high level.

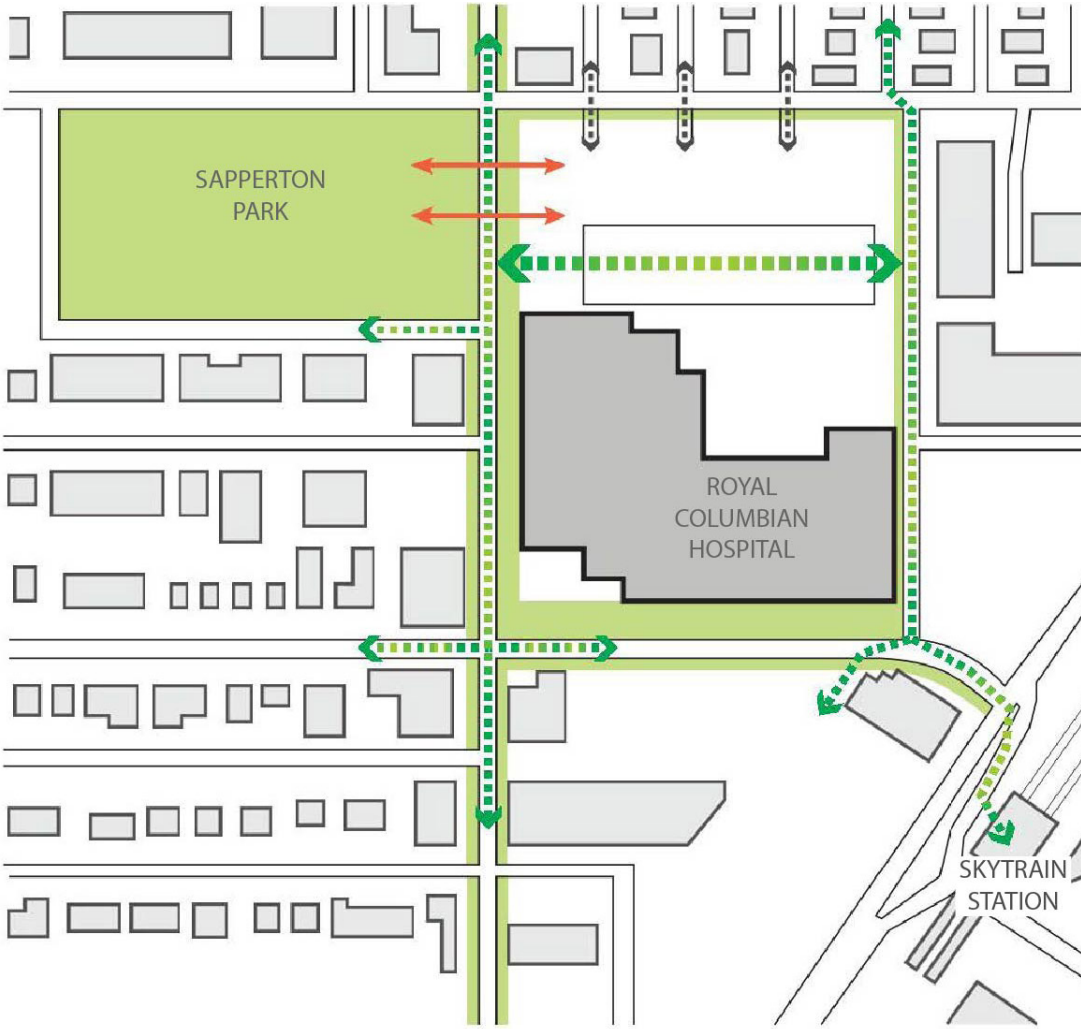
C. CIRCULATION

- The public realm on the periphery of the site shall be safe, attractive, convenient, and clearly identifiable to drivers, pedestrians, cyclists and those using transit.
- There shall be multiple vehicular access points to parking facilities to avoid congestion at any one location and these should be designed to minimize interference with pedestrians both on and off site.
- Pedestrian site access and connections shall incorporate Universal Accessible Design utilizing recognized standards such as ADA guidelines to enhance access to and across the site.

D. CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

Proper design and effective use of the built environment can reduce crime, reduce the fear of crime, and improve the quality of life. Natural surveillance and access control strategies limit the opportunity for crime.

- Windows shall be located overlooking sidewalks and parking lots.
- Points of entry shall be clear and easily identifiable.
- Mazes shall be incorporated in public restrooms to avoid the isolation produced by an anteroom or double door entry system.
- Design features that provide access to roofs or upper levels shall be eliminated.
- Low, thorny bushes shall be used beneath ground level windows. Rambling or climbing thorny plants shall be used next to fences to discourage intrusion.
- Amenities such as seating or refreshments shall be placed in common areas to help attract larger numbers of desired users.



PARK AND GREEN LANDSCAPED AREAS

PEDESTRIAN MOVEMENT

CONNECTION BETWEEN SAPPERTON PARK AND THE "GREEN EDGE"

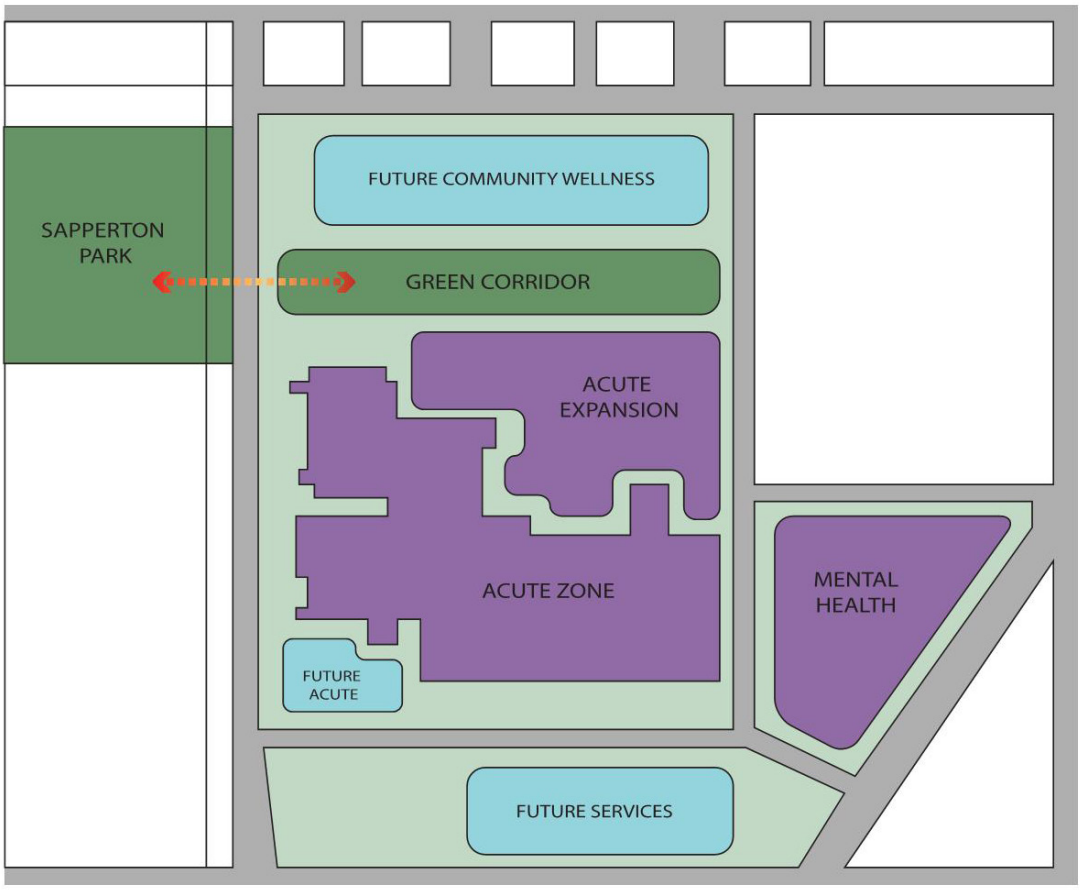
02 Campus Design Guidelines

SECTION 02 - CAMPUS DESIGN GUIDELINES

1. Campus Masterplanning

High Level Master Site Planning is a preliminary phase of hospital redevelopment that seeks to create a clear vision for the expansion, improvement and delivery of health care at the site. Once complete, the plan guides capital decisions for hospital improvements and future expansion opportunities. The current plan clearly articulates the precincts of the site into an Acute Care Precinct, a Future Community Wellness Precinct, and a Green Corridor. Future development shall be incorporated within this overall framework to ensure consistency with the project vision.

A. MASTERPLAN SITE ZONING



2. Sustainability Principles

Royal Columbian Hospital has a triple-bottom-line approach to sustainability, one that balances ecological, societal and economic imperatives and recognizes the link between a healthy environment and a healthy population. Economic and environmental sustainability is achieved through a reduction of resource consumption, improvements in facility design, and a culture of empowering staff to make daily decisions to improve processes and operational efficiencies. All new buildings should be designed to achieve LEED Gold standards for Leadership in Energy and Environmental Design. In addition to mmeting the minimum standards for LEED certification, the following sustainability goals should be advanced through the design of new buildings.

A. ENERGY EFFICIENCY

- To minimize environmental impact and create healthy communities promoting patient healing and wellness, energy efficient design shall be a top priority.
- Achieve climate neutral operations through energy conservation and efficiency, low carbon supply, and the purchase of carbon offsets
- Achieve a significant reduction in annual GHG emissions for domestic hot water and space heating with connection (fuel switch) to a low-carbon district heating system serving Royal Columbian Hospital and surrounding neighbourhood, earmarked for 2020.

B. SUSTAINABLE BUILDING PRACTICES

- Energy Modeling conducted at the concept and schematic design phases should be used to evaluate, at a minimum, the building's proposed geometry, massing, orientation, and fenestration size/location/configurations. Modeling conducted at the schematic design and design development phases will additionally evaluate the building's proposed Envelope Systems, HVAC Systems, and Lighting Systems.
- All new construction and renovation projects will incorporate CO2 monitors integrated with the building automation systems in high occupancy spaces to provide the optimum amount of outside air for comfort and learning.
- All new construction and renovation projects will require an Indoor Air Quality Management Plan during construction and before occupancy.
- All new construction and renovation projects will require advanced commissioning of buildingsystems to include HVAC Systems and all energy control and metering systems, Refrigeration Systems, Lighting and Day Lighting Controls, Domestic Hot Water Systems, and Renewable Energy Systems.
- All new construction and renovation projects will strive to minimize when feasible volatile organic compounds, formaldehyde, phthalates, dioxins, mercury, lead, cadmium, and other potentially harmful substances.

C. ON-SITE GENERATION AND RENEWABLE ENERGY

- Reduction of demand on the electricity grid through the use of on-site renewable energy generation systems including solar photovoltaic arrays should be explored. These systems should be supplemented by rigorous targets for energy use reduction though building and site design
- Provide dedicated parking for Low-Emitting, Fuel Efficient, and Carpool Vehicles no less than 5% of the total RCH campus parking capacity
- Preferred parking should be clearly marked by post mounted or building mounted signage
- Provide charging stations for Electric Vehicles for at least 2% of the RCH campus parking capacity.
- Secure bicycle racks should be provided to equal at least 5% or more of the total RCH campus parking capacity.

D. TRANSPORTATION AND COMMUTING

- Provide dedicated parking for Low-Emitting, Fuel Efficient, and Carpool Vehicles no less than 5% of the total RCH campus parking capacity.
- Preferred parking shall be clearly marked by post mounted or building mounted signage.
- Provide charging stations for Electric Vehicles for at least 2% of the RCH campus parking capacity.
- Secure bicycle racks shall be provided to equal at least 5% or more of the total RCH campus parking capacity. Bicycle rooms should be located at street level or on the P1 levels.
- Provide short-term bicycle parking facilities at building entrances.
- Provide end of trip facilities such as changing rooms and showers.
- Offer employer subsidiary program to encourage employees to take transit.
- Incorporate TDM strategies to reduce or redistribute demand for single-occupancy private vehicles.

E. WATER, WASTEWATER AND SUSTAINABLE LANDSCAPING

- To address pollution runoff and potable water consumption, storm water capture, storage, and treatment for reuse as irrigation water shall be implemented where feasible. Rainwater landing on paved surfaces and roof surfaces shall be the primary target of capture.
- Stormwater management best practices shall be applied for on-site and off-site landscaping design.
- Efforts shall be made to reduce impermeable paved surfaces in parking and walking areas.
- Concealed underground storage systems, typically located beneath surface parking, playing courts, or open yards, are preferred over open systems for long term storage.
- All new construction and renovation projects shall utilize low flow or ultra-low flow toilets, urinals, sinks, showers, and spray valves. Waterless urinals may also be used when drain lines are periodically flushed by upstream fixtures.

F. SOLID WASTE REDUCTION AND MANAGEMENT

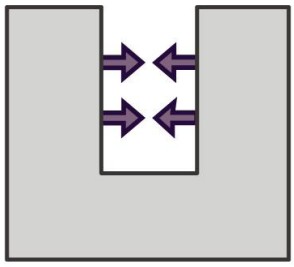
- An Integrated Waste Management Plan should be developed to facilitate improvement of recycling rates while streamlining the collection and handling of all waste streams. At a minimum, paper, cardboard, glass, plastics, and metals will be collected as a single recycling stream. Food waste may be collected as a separate stream

3. Site Design Guidelines

The Site Design Guidelines serve as a roadmap for the future development of the site. The intent is to promote the development of a unifying sense of place, clearly identifiable campus entry points, meaningful outdoor spaces, improved wayfinding and accessibility, and appropriate building siting and orientation.

A. ORIENTATION AND VIEWS

- Building orientations should maximize daylight and views.
- Building configurations should favor external views rather than views into internal narrow courtyards or narrow setbacks.



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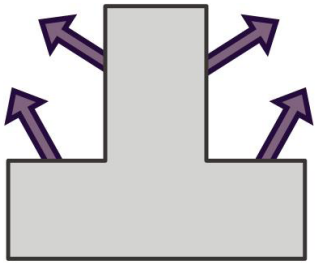


PREFERRED

B. ADJACENCIES AND RELATIONSHIPS

- New buildings should be organized to cluster and create relationships with similar existing campus usage.
- New buildings should relate to existing building masses to create meaningful outdoor in-between spaces.
- Considerations of relationships to public streets shall be made as follows (the information below is largely based on the City of New Westminster Streetscape and Front Yard Design Standards):

East Columbia Street :

Between Keary Street and Hospital Street:
• Minimum setback of 10 m from building frontage
• Incorporate pedestrian lighting (i.e. shielded contemporary LED pole lights)
• Consider location of bus shelter

Between Hospital Street and Existing Hospital Driveway Entrance:
• Include a 2m wide separated bike lane with retention of existing trees
• Incorporate pedestrian lighting (i.e. shielded contemporary LED pole lights)

Between the Existing Hospital Driveway Entrance and Sherbrooke Street:
• Minimum setback of 10 m from building frontage. The 10 m setback to be designed as a linear public plaza including special paving, street furniture, trees and pedestrian lighting (i.e.shielded contemporary LED pole lights).
• Interim parking lot to be setback 7m from property line (10m from back of curb) with a generous a generous green buffer between the sidewalk and the surface parking lot. Parking lot to include tree planting, generous landscaped areas, pedestrian walkways, bicycle parking, on- site stormwater management and use of sustainable materials and technologies.

Sherbrooke Street:

- South side of street to have a minimum 7.62m setback from building frontage. The 7.62m setback to include 3m sidewalk, street trees, integrated stormwater planters (that take advantage of the slope) and a landscaped edge from the building face to the sidewalk.
- Note: A portion of the sidewalk may be on hospital property and will be treated as an easement.

Keary Street

- Improve accessibility to and from SkyTrain Station and to existing elevator access to hospital. Improve general accessibility to hospital building frontage.
- Sidewalk to be a minimum of 3 m wide clear (i.e., excluding the required landscape boulevard) and to have an 'urban treatment' with street trees.
- Identify all pedestrian desire lines between hospital and adjacent properties, amenities and services. Explore crossing treatments that align with desire lines (i.e. raised crossings with special paving and/or colour). This treatment should also help calm traffic along Keary Street.
- Include improved pedestrian lighting (i.e. shielded contemporary LED pole lights).
- Include planted bulges/ stormwater planters at the crossings to narrow crossing distance for pedestrians and to help 'green' the street.
- Given the steep incline on Keary Street, explore resting points along the way.
- Include a special paving treatment on the sidewalk.
- Retain existing trees

Brunette Avenue:

- Treatment of the street is to be consistent with proposed Brewery district developments along Brunette Avenue with a landscaped edge that includes a 2m sidewalk separating the green edge of trees and shrub planting from vehicular traffic.

Allen Street:

- Sidewalk to be a minimum of 3 m wide clear (i.e., excluding the required landscape boulevard) and to have an 'urban treatment' with street trees.

C. CIRCULATION - PEDESTRIAN MOVEMENT

- Pedestrian circulation should be accessible, clearly identifiable, connect the campus with surroung community amenities.
- Pedestrian paths should be activated by transparent and vibrant building edges.
- Weather protection where practical

D. CIRCULATION - VEHICULAR MOVEMENT

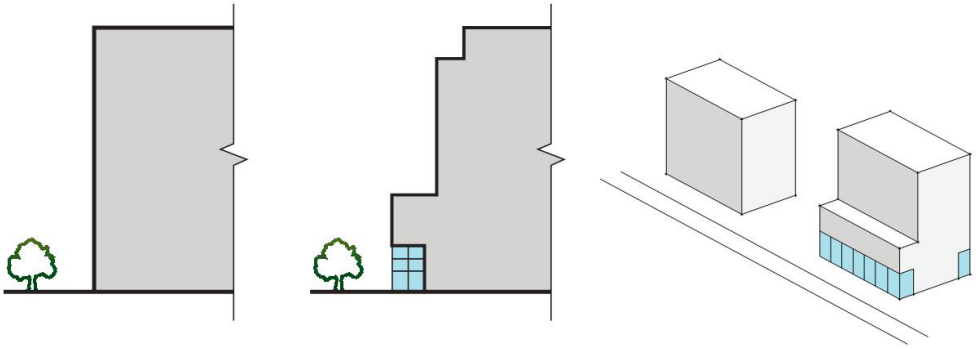
- Vehicular movement onto the site should be clear and direct providing access to key entry and drop-off points while maintaining a robust pedestrian realm.
- Separate entry points should be provided for public, service, and emergency vehicles.
- Multiple entry and exit points for the parkade should be provided.

E. CIRCULATION - BICYCLE MOVEMENT

- Vehicular access through the site shall be provided via dedicated or shared bicycle pathways and lanes adjacent to internal vehicular and pedestrian thoroughfares.
- Bicycle movement zones shall be clearly identified with markings and pavement patterns and be configured to minimize interference with on site emergency vehicle movement

F. MASSING

- Building massing should address the street edges at lower floors and step back at upper floors to minimize impact on surrounding low-rise development.
- Building mass should be sensitive to view corridors allowing pedestrian movement to be clear and direct.
- Massing should be articulated to create a sense of scale and integrate with the surrounding urban fabric.



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G. OPEN SPACE

- Usable open space should be provided between buildings to provide areas for healing gardens and outdoor activities and the preservation of view corridors.

H. LANDSCAPING

- Landscaping shall be sustainable utilizing characteristics of Northwest vegetation and plants.
- Pedestrian corridors shall be buffered from vehicular circulation with landscaping including shade trees.
- Open green spaces shall be distributed across the site along pedestrian spines.
- Plazas and drop-off areas shall feature shade trees and integrated seating.
- Special paving treatments on street and pedestrian areas at appropriate locations.

I. WAYFINDING AND SIGNAGE

- Wayfinding startegies should be integrated into the overall design and layout of the site to avoid excessive signage.
- Signage, where needed, should have a consistent look, be clearly legible, and enhance the sense of place through unifying graphics and fonts.
- Dementia friendly wayfinding strategies such as use of landmarks, decorative and architectural features, and changes in colour should be employed.

J. SITE LIGHTING

- Site lighting should provide adequate illumination levels for safety and wayfinding while minimizing its impact on the neighboring residential developments.
- Energy efficient, LED standard, white lighting should be utilized throughoyut the site.
- Full cut-off lighting shall be used throughout the site, including in public and service areas.

03 Building Design Guidelines

SECTION 03 - BUILDING DESIGN GUIDELINES

1. Overall Architectural Character

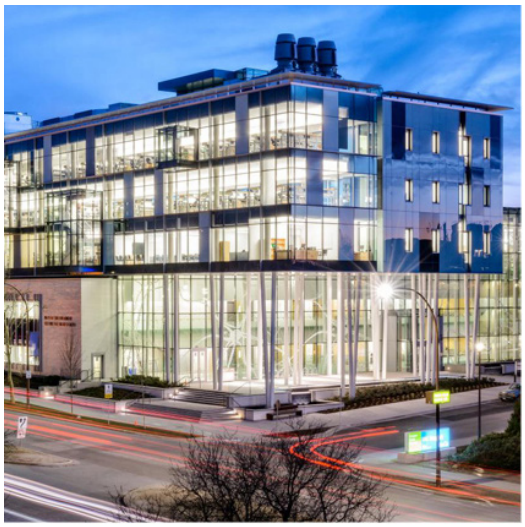
As the Royal Columbian Hospital Campus evolves and grows, an intelligent set of basic goals will contribute to retaining identity and sense of belonging. Guidelines for building expression provide the key to linking future projects to the culture and life of the surrounding community while alowing them to evolve with new advances in technology and materials.

A. HISTORY

The character of the Royal Columbian Hospital site has evolved over the decades from a collection of moderately sized historcal buildings in a park-like setting, into a dense urban campus comprised of large scale modern buildings extending to the surrounding street edges. Architecturally, these buildings are relatively indicative of the time they were constructed, and although stylistically nuanced they create a generally homogenous character for the campus. While the newer development has densified the urban site through massing and siting, the buildings present a relatively institutional character and offer little engagement with the pedestrian realm at the street edge.

B. MOVING FORWARD

As the campus continues to evolve, new building shall create a sense of identity for Royal Columbian Hospital Campus and respond appropriately to the urban context and surrounding community. New buildings shall be contemporary, representative of our time, and promote openness and transparency. New buildings shall avoid the institutional character associated with traditional medical facilities in favor of a more accessible and inviting expression responsive to the goal of integrating the campus into the life and vitality of the urban fabric. Buildings shall respond to human scale through massing, articulation, materiality, and fenestration. At lower floors where buildings engage the pedestrian environment, buildings shall be as transparent as possible creating an active dialogue between interior and exterior. Forms and materials can be innovative and daring while maintaining a connection to the local and regional context.



2. Exterior Envelope Guidelines

A. FORM AND EXPRESSION

- Buildings shall relate to the scale, massing, and articulation of the original modern architecture and harmonize with the surrounding urban environment in materiality, color palette, and form.
- Building expression shall be modern, inviting, and transparent.
- Large volumes shall be articulated to reduce apparent scale.

B. FENESTRATION AND SURFACES

- Windows shall maximize views and daylight while minimizing glare.
- Curtain wall or storefront shall be used to express special transparent elements such as entries or interior public spaces.
- Glazing shall provide strong connections between indoor and outdoor spaces.
- Surface expression should relate to the nature of the materials.

C. ROOF TREATMENTS

- Roof planes visible from upper floors shall be treated as building elevations and appropriately
- designed for visual appeal through materiality, form, or vegetation.

D. MATERIAL OPTIONS

- Wood accents should be used as appropriate for both interior and exterior applications.
- Curtain wall or storefront glazing should be used at public spaces and adjacent to pedestrian throughfares.
- Durable, high quality materials such as precast concrete, brick, stone, or metal should be used as major cladding.

E. COLOR PALETTE

- Exterior colors shall reflect the colours of surrounding urban environment.
- Colors shall be a natural expression of the material.
- Paints or finishes shall be warm tones that relate to the natural landscape.

F. SCREENING

- Service areas, mechanical equipment, and other support areas should be appropriately screened through landscape or architectural devices.

04 Interior Design Guidelines

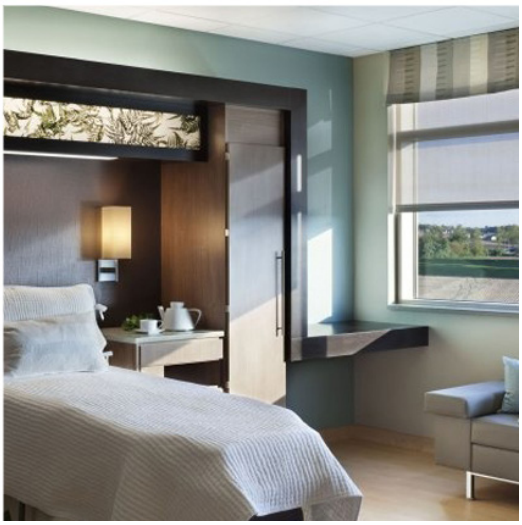
SECTION 04 - INTERIOR DESIGN GUIDELINES

1. Interior Architectural Character

As with the Architectural Character of the Campus, the Interior Architectural character aesthetic shall be in harmony with the natural environment of the Pacific Northwest. Where appropriate, regional materials evoking a Northwest "sense of place" shall be used to connect the interior environments with nature and shall blend with the colors, scale, articulation and forms of the exterior building envelope. Interior environments shall be warm and inviting and not feel institutional. Where appropriate natural materials evoking a Northwest sense of place shall be used to connect the natural world.

A. FORM AND EXPRESSION

- Non-institutional character with warm natural finishes
- Simple forms evoking natural environment
- Durable, high quality materials
- Hopsitality feel



APPENDIX 1M

SPACE DESIGN COMFORT AND PRESSURIZATION CRITERIA

Type of Room / Area Designation	Design Temp. [°C]	Permissible Temp. Setpoint Adjustment Range Min/Max [°C]	Temp. Control: Tolerance from Setpoint [°C]	Return Air Humidity Setpoint Winter-Summer [%RH]	Humidity Control: Tolerance from Setpoint [%RH]	Relative Pressurization	Supply Air Volume: Tolerance from Design Air Flow Quantity [%]	Return or Exhaust Air Volume: Tolerance from Design Air Flow Quantity [%]
Patient Bedroom	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Secure Room	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Secure Room - Anteroom	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Corridors	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Exam / Treatment	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Consultation / Therapy	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Exercise / Wellness	21	19-23	±1.0	30-60	±5.0	N	±10	±10
Allied Health	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Life Skills Assessment	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Comfort	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Lounges	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Laundry Facility	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Tub Room	24	22-26	±1.0	30-60	±5.0	N	±10	±10
Washrooms	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Medication Room	22	20-24	±1.0	30-60	±5.0	P	±10	±10
Clean Supply	22	20-24	±1.0	30-60	±5.0	P	±10	±10
Soiled Utility	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Multi-Purpose / Conference / Meeting	21	19-23	±1.0	30-60	±5.0	N	±10	±10
Offices and Administrative Areas	22	20-24	±1.0	30-60	±5.0	E	±10	±10
Staff Lockers	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Video Conference	21	19-23	±1.0	30-60	±5.0	N	±10	±10
Video Conference Operator	21	19-23	±1.0	30-60	±5.0	E	±10	±10
Projection Room	21	19-23	±1.0	30-60	±5.0	E	±10	±10
Lobby	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Dining / Café	22	20-24	±1.0	30-60	±5.0	N	±10	±10
Waiting / Reception / Registration	22	20-24	±1.0	30-60	±5.0	N	±10	±10

ECT Treatment	22	20-24	±1.0	30-60	±5.0	N	±10	±10
TMS	19	17-21	±1.0	30-60	±5.0	E	±10	±10
Recovery	22	20-24	±1.0	30-60	±5.0	E	±10	±10

Notes:

[1] Pressurization: P = Positive, N = Negative, E = Equal

[2] Design shall include separate monitoring and control for all Type of Room / Area Designation listed above, except where the room or space is provided with exhaust only, such as small Washrooms, Soiled Utility or Housekeeping.

[3] Requirements to maintain temperature, pressure and humidity control setpoints and tolerances are not applicable when an operable window in that room can be proven to be in an open position.

APPENDIX 1N DAYLIGHTING MATRIX

room	Artificial Light	Preferred Borrow Light	Borrrowed Light	Preferred Day Light	Daylight
Allied Health Room	✓				
Central Storage Room	✓				
Clean Supply Room	✓				
Clinical Observation Room; Obeservation Room	✓				
Clinician Workstation			✓		
Comfort Room					✓
Conference Room/Team Room		✓			
Consult - high risk				✓	
Consultation/Therapy Room; Large Consultation/Therapy Room					✓
Corridor			✓		
Crash Cart Closet	✓				
Dining Room/Lounge					✓
Ensuite	✓				
Exam/Treatment Room; Consult/Exam Room (ClinicalSkills); Exam/Procedure Room (Clinical Skills)	✓				
Exercise/Wellness Room				✓	
General Waiting Room, ECT/TMS				✓	
Housekeeping Closet	✓				
Kitchenette/Nourishment Station					✓
Large Group Therapy Room				✓	
Laundry Facility		✓			
Life skills Assessment Room			✓		
Linen Closet	✓				
Lounge (Quiet)					✓
Medication Room	✓				
Patient Bedroom					✓
Patient Bedroom Bariatric Contact Isolation Room					✓
Patient Change Room		✓			

Royal Columbian
Mental Health and Substance Use

room	Artificial Light	Preferred Borrow Light	Borrrowed Light	Preferred Day Light	Daylight
Patient Corridor			✓		
Patient /Public Washroom	✓				
Patient Washroom	✓				
Pre-treatment Gowned Waiting Area		✓			
Post Recovery Room					✓
Reception/Registration Desk (Outpatient area)		✓			
Recovery Room				✓	
Secure Room Ante Room		✓			
Secure Room					✓
Secure Outdoor Space					✓
Security Office			✓		
Soiled Utility; Soiled Holding Room	✓				
Staff Conference Room		✓			
Staff Lockers	✓				
Staff Lounge					✓
Staff Support Areas		✓			
Staff washroom	✓				
TMS Room				✓	
Treatment Room		✓			
Tub Room	✓				
Visitor Lounge					✓
Wheelchair Alcove	✓				
Wheelchair/stretcher alcove	✓				

APPENDIX 1P: EQUIPMENT LIST

1 INTENT

1.1 Intent

1.1.1 To provide further requirements and information between the Design- Builder and the Authority in terms of Clinical Equipment and Furniture in Appendix 1P [Equipment List] and IMIT equipment referred to primarily in Schedule 1 [Statement of Requirements], “Section 7.9 Communications” and in Appendix 1B(II) [Campus Communications Hub Technical Specifications] for the design, construction and commissioning of the Facility;

1.1.2 To provide a sample IMIT equipment list (refer to Appendix 1P [Equipment List] for Clinical Equipment and Furniture);

1.2 Overview

1.2.1 In this Appendix contains sample IMIT Equipment listed by:

1.2.1.1 End-use Equipment;

1.2.1.2 Communications Rooms;

1.2.1.3 Campus Communications Hub;

1.2.1.4 Multimedia Rooms;

1.2.2 IMIT Equipment items are classified into one of three categories of Design-Builder and Authority responsibilities:

1.2.2.1 Category 1 Authority Supplied, Authority Installed, Authority Paid;

1.2.2.2 Category 2 Authority Supplied, Design-Builder Installed, Authority Paid;

1.2.2.3 Category 3 Design-Builder Supplied, Design-Builder Installed, Design-Builder Paid;

1.2.3 Appendix 1P [Equipment List] contains Clinical Equipment and Furniture items classified into one of five categories of Design-Builder and Authority responsibilities:

1.2.3.1 Category OSOI Owner Supplied Owner Installed;

1.2.3.2 Category OSCI Owner Supplied Contractor Installed;

1.2.3.3 Category OSVI Owner Supplied Vendor Installed;

1.2.3.4 Category CSCI Contractor Supplied Contractor Installed

1.2.3.5 Category VSVI Vendor Supplied Vendor Installed

1.2.4 This Appendix describes general and category equipment specific responsibilities.

2 DEFINITIONS

2.1 In this Appendix

2.1.1 “Category 1IMIT Equipment” means the equipment described and listed as “Category 1” in the IMIT Equipment List (or similar equipment) and “Category 1” have corresponding meaning;

2.1.2 “Category 2 IMIT Equipment” means the equipment described and listed as “Category 2” in the IMIT Equipment List (or similar equipment) and “Category 2” have corresponding meaning;

2.1.3 “Category 3 IMIT Equipment” means the equipment described and listed as “Category 3” in the IMIT Equipment List (or similar equipment) and “Category 3” have corresponding meaning;

2.1.4 “Category OSOI Owner Supplied Owner Installed” means the equipment described and listed as “OSOI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSOI” and “OSOI” have corresponding meaning;

2.1.5 “Category OSCI Owner Supplied Contractor Installed” means the equipment described and listed as “OSCI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSCI” and “OSCI” have corresponding meaning;

2.1.6 “Category OSVI Owner Supplied Vendor Installed” means the equipment described and listed as “OSVI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category OSVI” and “OSVI” have corresponding meaning

2.1.7 “Category CSCI Contractor Supplied Contractor Installed” means the equipment described and listed as “CSCI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category CSCI” and “CSCI” have corresponding meaning;

2.1.8 “Category VSVI Vendor Supplied Vender Installed” means the equipment described and listed as “VSVI” in the Appendix 1P [Equipment List] (or similar equipment) and “Category VSVI” and “VSVI” have corresponding meaning;

2.1.9 “Commission” means to test and commission the equipment or system in accordance with any commissioning requirements set out in this Agreement, and applicable standards and Good Industry Practice, including to ensure that the Equipment is operating in accordance with the manufacturer’s requirements and specification, and “Commissioned” and “Commissioning” have a corresponding meaning;

2.1.10 “Contractor” in relation to Category CSCI means Design-Builder;

2.1.11 “Deliver” means to deliver Equipment to the Facility, and “Delivered” and “Delivery” have corresponding meanings;

2.1.12 “Equipment” means:

2.1.12.1 the Category 1 IMIT Equipment, Category 2 IMIT Equipment and Category 3 IMIT Equipment as described in this Appendix, and “IMIT Equipment” has corresponding meaning;

2.1.12.2 the Category OSOI Owner Supplied Owner Installed, Category OSCI Owner Supplied Contractor Installed, Category OSVI Owner Supplied Vendor Installed, Category CSCI Contractor Supplied Contractor Installed and Category VSVI Vendor Supplied Vendor Installed as described in Appendix 1P [Equipment List], and “Clinical Equipment and Furniture” has corresponding meaning;

2.1.13 “Joint Equipment Coordination Committee” means the committee established pursuant to Section 3.3 of this Schedule and “Equipment Coordination Committee” has corresponding meaning;

2.1.14 “Equipment List” means the list of Equipment set out in the four attachments of this Appendix and Appendix 1P [Equipment List], and “IMIT Equipment List” has corresponding meaning;

2.1.15 “Install” means to install in the Facility, including making connections to necessary building services (including plumbing, heating, cooling, ventilation and electricity) and

connections to necessary communication or network interfaces or devices, and "Installed" and "Installation" have corresponding meanings;

2.1.16 "Receive" means the provision of equipment and staff to accept Delivery and provide an appropriate and secure staging and storage area to be used prior to Setup, and "Received" and "Receiving" have corresponding meanings;

2.1.17 "Setup" includes:

2.1.17.1 transportation and movement within the Facility from the Delivery or storage location to the final installation location;

2.1.17.2 placement in the final location within the Facility; and

2.1.17.3 any necessary unwrapping, unpacking, disposing and/or recycling all wrapping and packaging materials, assembly.

2.1.18 "Supply" means the management and completion of procurement processes, up to and including Delivery, for Equipment, including the payment to vendors, and "Supplied" has a corresponding meaning.

2.1.19 "Vendor" in relation to Category OSVI and Category VSVI means Authority when Authority assigns to supply and installation to a third party.

3 GENERAL

3.1 Physical Integration of Equipment with Design of Facility

3.1.1 Notwithstanding integration requirements elsewhere in the Statement of Requirements, the Design-Builder will ensure that all Equipment is physically integrated with the overall Design of the Facility and will include such Equipment as part of the development of Design under this Agreement. To the extent practicable, any required changes to the Design of the Facility as a result of changes to Equipment requirements will be resolved as part of the design development process.

3.2 Changes affecting Design or Construction

3.2.1 If the Authority increases or decreases the quantities of Equipment, procures other items in substitution for those identified on the Equipment List or otherwise changes the items to be procured and there is an effect on the Design or Construction, such increase, decrease, procurement or change, and the effect thereof, will constitute a Change. The parties will endeavour to agree to an expedited Change process to deal with Equipment changes.

3.3 Joint Equipment Coordination Committee

3.3.1 The parties will establish an Equipment Coordination Committee composed of at least two (or any other number agreed between the parties) representatives of each party. The Joint Equipment Coordination Committee will meet regularly (not less than once per month) to review the status of, and to provide advice to the parties with respect to the Equipment Supply, Delivery, Receiving, Setup, Installation and Commissioning.

3.3.2 The parties will ensure at least one representative from each party from the Joint Equipment Coordination Committee are members of the IMIT Coordination Committee (refer to Schedule 1 [Statement of Requirements], Section 7.9.1 Design and Implementation Principles and Guidelines);

3.4 **Equipment Logistics Schedule**

3.4.1 The Design-Builder will propose a draft schedule (the "Equipment Logistics Schedule") within 6 months after the Effective Date and the parties will seek to finalize the Equipment Logistics Schedule, each party acting reasonably, within 11 months after the Effective Date, in accordance with the following principles:

3.4.1.1 in order to take advantage of the most recent technological advances, final decisions on the selection of Equipment sensitive to or anticipated to be revised with newer technology prior to the Target Substantial Completion Date, together with any training or service requirements, will not be made by the Authority until as late as possible in the period for Construction;

3.4.1.2 the Design-Builder will provide adequate time to issue competitive bidding documents, receive proposals, clarify aspects of proposals, and Receive, Install and Commission the Equipment;

3.4.1.3 the Authority will require the ability to take advantage of bulk or other purchase opportunities advantageous to it;

3.4.1.4 the Design-Builder will undertake the precautions set out by Equipment vendors to protect any Equipment that is required to be Delivered or Installed while construction is still underway; however, as an additional precaution some sensitive Equipment (such as equipment with electronic components) may require Delivery, Receiving, Installation and Commissioning dates that are late in the period for Construction. Refer to Schedule 1 [Statement of Requirements], Sections 7.9.6 Wireless Network Infrastructure (WIFI) and 7.9.7 Data Communications for specific conditions required by the Authority before installation of equipment; and,

3.4.1.5 the parties may modify the Equipment Logistics Schedule by mutual agreement, each acting reasonably.

3.5 **Staging and Storage**

3.5.1 The Design-Builder will:

3.5.1.1 provide a secure, dry, clean space to accommodate staging, storage and commissioning of Equipment;

3.5.1.2 allow Authority representatives to access and work within the space;

3.5.1.3 will ensure the space is able to maintain a reasonable temperature to store and work in; and

3.5.1.4 provide power to the space and will notify the Authority, in advance (no less than 24 hours), of any power interruptions;

3.5.1.5 provide for office furniture and network connections for Authority computers, phones and printers to facilitate activities related to the use of the space; and

3.5.1.6 ensure the space is well serviced by nearby elevator to enable Setup.

3.6 **Storage Costs**

3.6.1 Any storage costs incurred by the Design-Builder due to Equipment being delivered before or by the delivery date as set out in the Equipment Logistics Schedule delivery date, but not ready for Setup, will be borne by the Design-Builder.

3.7 **Title**

3.7.1 The Design-Builder will cause the procurement arrangements for Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed to provide for a direct transfer of title to such Equipment from the vendors to the Authority. Title to Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed may be reserved by third party unpaid vendors until the earlier of the date of payment and the Target Substantial Completion Date. The Design-Builder will pay all such unpaid vendors prior to the Target Substantial Completion Date for amounts owing on outstanding invoices.

3.8 **Damage and Loss**

3.8.1 Any damage or loss occurring prior to the Target Substantial Completion Date to:

3.8.1.1 Equipment after it has been Received and prior to the Target Substantial Completion Date, is the responsibility of the Design-Builder.

3.9 **Equipment Commissioning**

3.9.1 The Design-Builder will incorporate its Commissioning responsibilities under this Schedule into its commissioning activities for the Facility as set out in this Agreement.

3.9.2 All Category 3, Category CSCI, and Category OSCI Equipment must be Commissioned, and the Acceptance Protocol completed where applicable, prior to Substantial Completion of the Facility.

3.10 **Addition of Additional Equipment or Replacement of Existing Equipment**

3.10.1 If the Authority identifies Equipment that is in addition to, or in replacement of certain items of, the Equipment, the Authority may in its discretion:

3.10.1.1 elect to have the Design-Builder Supply, Deliver, Receive, Setup, Install and/or Commission such additional Equipment, in accordance with and subject to the procedures for Changes; or

3.10.1.2 itself perform any of such activities.

3.11 **Category 3 IMIT Equipment and Category CSCI Contractor Supplied Contractor Installed Approvals**

3.11.1 All equipment identified as Category 3 and CSCI is required to be approved by the Authority prior to purchasing and supplying.

3.11.2 Timelines for Authority approvals are to be identified on the Equipment Logistics Schedule, and will include sufficient time for the Authority to consider the Design-Builder's proposed procurement process (including for conformity, where required, with procurement practices consistent with those that would be carried out by the Authority itself) and for the Authority to consider the proposed Category 3 and CSCI Equipment prior to purchase.

3.11.3 Authority may request Design-Builder to facilitate mock ups on-site installation reviews for Category 3 and CSCI Equipment. Authority to identify which equipment items mock-up will be required for prior to the finalization of the Equipment Logistics Schedule.

3.11.4 Sample manufacturers and sample models are given in the Equipment List and do not override statements of "approved equal" in the Statement of Requirements.

3.11.5 Equipment Lists are for reference only and do not preclude the Authority or Design-Builder from selecting equipment not identified in the Equipment List.

3.12 Acceptance Protocol

3.12.1 A document will be provided by the Design-Builder to the Authority for each Category 2, Category 3, Category OSCI and Category CSCI item that certifies all testing of the relevant Equipment has been completed to demonstrate that it has been Installed and Commissioned in accordance with the manufacturer's requirements and is functioning in accordance with the specifications included in the relevant equipment purchase contract or purchase order (the "Acceptance Protocol").

3.12.2 Without limiting the Design-Builder's obligation to Commission the relevant Equipment, the Design-Builder will, to the Authority's reasonable satisfaction, complete all aspects of the Acceptance Protocol for each item of Category 2, Category 3, Category OSCI, and Category CSCI Equipment if:

3.12.2.1 prior to the Target Substantial Completion Date, the Design-Builder fails to complete any aspect of an Acceptance Protocol for any item of Category 2, Category 3, Category OSCI and Category CSCI Equipment; and

3.12.2.2 the Authority waives the requirement for the Design-Builder to complete the relevant Acceptance Protocol prior to the Target Substantial Completion Date, then subject to meeting the other requirements for Substantial Completion of the Facility each such failure will be a deficiency and the Authority may make the withholding described in Section 43 of the Design-Build Agreement.

4 CATEGORY 1 IMIT EQUIPMENT, CATEGORY OSOI, CATEGORY OSVI, CATEGORY VSVI (AUTHORITY SUPPLIED, AUTHORITY INSTALLED, AUTHORITY PAID)

4.1 Responsibilities for Category 1, OSOI, OSVI, VSVI Equipment

4.1.1 The Authority intends to, but is not obligated to, Supply, Deliver, Setup, Install and Commission the Equipment.

4.1.2 The Design-Builder will Receive the Equipment and provide space for Authority, and its agents, receiving staff to also Receive into their systems.

4.1.3 The Authority may, at its option, engage with third parties to, Supply, Deliver, Setup, Install and Commission the Equipment.

4.2 Responsibilities for Timing of Delivery and Installation of Category 1, OSOI, OSVI, VSVI Equipment

4.2.1 The Design-Builder will:

4.2.1.1 As early as practicable:

4.2.1.1.1 for each item of Equipment, provide on the Equipment Logistics Schedule the earliest date when the Facility will be available to the Authority to Install such item, which date must, for all Equipment and any required Setup or Installation equipment that will not fit through the constructed doorways and other physical constraints on access, be a reasonable period in advance of the construction of such doorways and other physical constraints on access; and

4.2.1.1.2 identify to the Authority the date by which each item of Equipment must be Delivered, Installed and Commissioned so as not to delay the Design, the

Construction, and Substantial Completion of the Facility or the Authority's use and occupation of the Facility; and

4.2.1.2 as required from time to time until Substantial Completion of the Facility, but no less than once per calendar month, update and make available the information in Section 3.4 so that at all times it is an accurate, reasonable and realistic representation of the Design-Builder's plans for the completion of the Design and Construction of the Facility.

4.2.2 The Authority will:

4.2.2.1 cause the relevant item of Equipment the Authority wishes to install in the Facility to be delivered by the date specified by the Design-Builder under Section 3.4 above.

4.3 Indicative Precedence of Delivery and Installation of Category 1 IMIT Equipment

4.3.1 An indicative precedence of activities for Category 1 IMIT Equipment is included below in Section 4.3.2. The Authority's IMIT group requires a reasonable amount time to prepare, deploy, test and operationalize IMIT related equipment in the Facility.

4.3.2 Indicative precedence of Authority activities for installation of Category 1 IMIT Equipment:

4.3.2.1 Network switches racked and stacked and all Category 6A, multimode and single mode patch cords as well as any copper cross connect wire jumpers and harness cables of the correct length are installed to make each device and system in the Facility fully operational;

4.3.2.2 Wireless access points installation starts after ceiling is in place;

4.3.2.3 Receiving/Staging/Commissioning space ready before IMIT Equipment deployment starts. Includes space located in close proximity to elevators, elevators are operational, space is clean and secured with key or proximity card reader restricted and audited access, desks installed, network cabling to desks for computer/phone, network cabling to printer(s), ideally near an existing communications room;

4.3.2.4 Elevators accessible for use by Authority for IMIT Equipment deployments;

4.3.2.5 Wall mounts and all wiring in place in advance of related IMIT Equipment deployments;

4.3.2.6 IMIT Equipment deployments start typically around two months prior to Target Substantial Completion Date with space that is clean – dust free, walls are painted, flooring and ceilings are finished, furnishings complete, desktop grommets complete;

4.3.2.7 Multimedia IMIT Equipment deployment starts earlier with completion earlier because of the degree of functionality programming and testing required.

4.3.3 The Authority's IMIT group requires a period starting several months in advance 4.3.2 to prepare, deploy, test and operationalize IMIT related equipment in the Campus Communications Hub required for building occupancy and owner operations testing. Refer to Schedule 1 [Statement of Requirements], Section 2.11.12 for further details concerning CCH Early Access. An indicative precedence of activities for Category 1 IMIT Equipment is included below in Section 4.3.4.

4.3.4 Indicative precedence of Authority activities for installation of Category 1 IMIT Equipment in the Campus Communications Hub:

4.3.4.1 Enterprise Network Gateway (ENG) switch and dependent services ready. Includes ENG Firewall, 3rd Party (Telus, HSSBC) CIUs, MRVs, Modems and Management Tools;

4.3.4.2 Network core switch installed and ready;

4.3.4.3 CCH specific switches installed and ready;

4.3.4.4 Network critical services (DHCP, DNS, NTP appliances) installed and ready;

4.3.4.5 Perimeter security firewalls, installed and ready;

4.3.4.6 Storage Area Network (SAN) directors installed and ready;

4.3.4.7 SAN storage to provide storage disk for virtual server farm and standard network backups, installed and ready;

4.3.4.8 Chassis and blade servers installed and ready;

4.3.4.9 Network load balancers installed and ready;

4.3.4.10 Phone switchboard (IP-PBX) including all dependent hardware, software and services, installed and ready. Includes virtual servers, voice gateways, session border controller, media gateways, integration with current campus.

5 CATEGORY 2 IMIT EQUIPMENT AND CATEGORY OSCI (AUTHORITY SUPPLIED, DESIGN-BUILDER INSTALLED, AUTHORITY PAID)

5.1 Responsibilities for Category 2 and OSCI Equipment

5.1.1 The Authority will Supply, Deliver and Commission the Category 2 IMIT Equipment.

5.1.2 The Authority will Supply and Deliver Category OSCI Equipment.

5.1.3 The Design-Builder will Receive, Setup, Install the Category 2 Equipment and Category OSCI Equipment and additionally Commission Category OSCI Equipment.

5.1.4 The Design-Builder will provide space for Authority, and its agents, receiving staff to also Receive into their systems.

5.1.5 The Authority may, at its option, engage with third parties to Commission Equipment identified as to be commissioned by the Authority.

5.2 Responsibilities for Timing of Delivery and Installation of Category 2 and OSCI Equipment

5.2.1 The Design-Builder will:

5.2.1.1 As early as practicable:

5.2.1.1.1 for each item of Equipment, provide on the Equipment Logistics Schedule the earliest date when the Facility will be available to the Design-Builder to Install such item, which date must, for all Equipment and any required Setup or Installation equipment that will not fit through the constructed doorways and other physical constraints on access, be a reasonable period in advance of the construction of such doorways and other physical constraints on access; and

5.2.1.1.2 identify to the Authority the date by which each item of Equipment must be Delivered, Installed and Commissioned so as not to delay the Design, the Construction, Substantial Completion of the Facility or the Authority's use and occupation of the Facility; and

5.2.1.2 as required from time to time until Substantial Completion of the Facility, but no less than once per calendar month, update and make available the information in Section 3.4 so that at all times it is an accurate, reasonable and realistic representation of the

Design-Builder's plans for the completion of the Design and Construction of the Facility.

5.2.2 The Authority will:

5.2.2.1 cause the relevant item of Equipment the Authority wishes to install in the Facility to be delivered by the date specified by the Design-Builder under Section3.4 above.

5.3 Indicative Precedence of Delivery and Installation of Category 2 IMIT Equipment

5.3.1 An indicative precedence of activities for Category 2 IMIT Equipment is included below in Section 5.3.2. The Authority's IMIT group requires a reasonable amount time to prepare, deploy, test and operationalize IMIT related equipment in the Building and Energy Center required for building occupancy and owner operations testing.

5.3.2 Refer to 4.3.2 for indicative precedence of Authority activities for installation of Category 2 IMIT Equipment.

5.3.3 The Authority's IMIT group requires a period starting several months in advance of 5.3.2 to prepare, deploy, test and operationalize IMIT related equipment in the Campus Communication Hub required for building occupancy and owner operations testing. Refer to Schedule 1 [Statement of Requirements], Section 2.11.12 for further details concerning CCH Early Access. An indicative precedence of activities for Category 2 IMIT Equipment is included below in Section 5.3.4

5.3.4 Refer to 4.3.4 for indicative precedence of Authority activities for installation of Category 2 IMIT Equipment in the Campus Communications Hub

6 CATEGORY 3 IMIT EQUIPMENT and category csci (DESIGN-BUILDER SUPPLIED, DESIGN-BUILDER INSTALLED, DESIGN-BUILDER PAID)

6.1 Responsibilities for Category 3 and CSCI Equipment

6.1.1 The Design-Builder will Supply (and pay for), Deliver, Receive, Setup, Install and Commission Equipment included in this category.

6.2 Standards for Equipment

6.2.1 The Design-Builder will cause all Equipment to be:

6.2.1.1 new;

6.2.1.2 of good quality and in a safe, serviceable and clean condition in accordance with the Equipment List;

6.2.1.3 of the type specified in the Statement of Requirements, if applicable;

6.2.1.4 in compliance with all Laws; and

6.2.1.5 in compliance with all certifications or standards or Authority standards & guidelines.

6.2.2 The Design-Builder will, as soon as practicable after receiving a request from the Authority, supply to the Authority evidence demonstrating its compliance with this Section 6.2.

6.3 Warranties

6.3.1 The Design-Builder will ensure that all manufacturers' and vendors' warranties for all Equipment:

6.3.1.1 commence no earlier than the date of first clinical use of the relevant item of Equipment; and

6.3.1.2 are in the Authority's name.

6.4 **Training**

6.4.1 The Design-Builder will include the Authority staff and other representatives to be notified and included in all stages of the Receiving, Setup, Installation and Commissioning to ensure there is a comprehensive overview of the Equipment, including its features, calibration and interfaces.

6.4.2 The Design-Builder will be knowledgeable on the proper use and maintenance of all Equipment and will provide sufficient training and education of the Authority and persons designated by the Authority to enable proper use and maintenance of the Equipment. The Design-Builder will not be responsible for providing the Authority with training and education in respect of Category 1, Category 2, OSOI, OSCI, OSVI and VSVI Equipment.

6.4.3 On or before the Target Substantial Completion Date, the Design-Builder will transfer and deliver to the Authority all guidance and materials and manuals relating to Equipment items as produced and provided by the manufacturer or the vendor of such items.

7 EQUIPMENT LIST

											This info is provided for planning purposes only and is not to be relied upon. Final installation specifications are dependent upon selected supplier's shop drawing											
Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Coffee Maker single		1	OSCI	GK-112	Yes	-	-	Yes	-	Maybe	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Digital Menu Board Monitor	47"x2, 42" x1	3	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Dishwasher, Commercial		1	OSCI	GK-111	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Hood Maybe	May require
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Fridge, 72" Commercial grade, Glass Display		1	OSCI	22-029.4	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Fridge, Undercounter, Commercial grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Kitchenware, Microwave		1	OSCI	GK-100	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Mount, Digital Display		3	OSCI	15-861	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Blender, Triple		1	OSOI	GK-117	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Cash Register Machine		1	OSOI	GK-136	Yes	-	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Coffee Grinder		1	OSOI	GK-132	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Coffee Satellite Server Base		3	OSOI	GK-134	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Coffee Scale with adaptor		1	OSOI	GK-133	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Digital Menu Board, Server & Licence		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Espresso Machine		1	OSOI	GK-130	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Grinder, Espresso, Decaf		1	OSOI	GK-131	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Knock Box, Espresso		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Panini Maker		1	OSOI	GK-135	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Small wares, Bravo		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Soup warmer		1	OSOI	GK-137	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Café, Timer, Mini		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.1	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Patient-run	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.2	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Café, Storage	Cart, Wire		2	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.3	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Security Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.4	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Lobby	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.1.4	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Lobby	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.4	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Lobby	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.4	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Lobby	Furniture, Soft Seating, Two seats		4	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.1.4	Mental Health Outpatient Area	MAIN ENTRANCE LOBBY	0	Lobby	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.2.1	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Large Multipurpose Room, 120 seat	Chair, Auditorium	Refer to Schedule 1 [Statement of Requirements], Section 7.9.9 AV and Video Conference Multimedia Rooms, for further details.	120	CSCI	0	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.1	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Large Multipurpose Room, 120 seat	Table, Auditorium	Refer to Schedule 1 [Statement of Requirements], Section 7.9.9 AV and Video Conference Multimedia Rooms, for further details.	120	CSCI	0	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.1	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Large Multipurpose Room, 120 seat	Defibrillator, AED		1	OSCI	17-116	-	-	-	-	-	-	-	-	-	-	-	Yes (controlled wall recessed model)
1st fl.	G1.0.2.1	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Large Multipurpose Room, 120 seat	Can, Garbage, 39		5	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.2	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Projection Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.2	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Projection Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.2	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Projection Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.2.3	Mental Health Outpatient Area	LARGE MULTIPURPOSE ROOM	0	Staging/ Preparation Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.1	Mental Health Outpatient Area	RECEPTION	0	Reception/Registration Desk	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.3	Mental Health Outpatient Area	RECEPTION	0	Clerical Workstation	System Furniture		3	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.3	Mental Health Outpatient Area	RECEPTION	0	Clerical Workstation	Can, Garbage, 26.6		3	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.3	Mental Health Outpatient Area	RECEPTION	0	Clerical Workstation	Can, Recycle		3	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.3	Mental Health Outpatient Area	RECEPTION	0	Clerical Workstation	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.3.3	Mental Health Outpatient Area	RECEPTION	0	Clerical Workstation	Furniture, Chair, Task		3	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.4	Mental Health Outpatient Area	RECEPTION	0	Office, Intake Nurse	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.5	Mental Health Outpatient Area	RECEPTION	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.5	Mental Health Outpatient Area	RECEPTION	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.5	Mental Health Outpatient Area	RECEPTION	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Furniture, Table, Side		6	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Furniture, Chair, Waiting		25	OSVI	FS-114	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.6	Mental Health Outpatient Area	RECEPTION	0	Waiting Area (for 25 people)	Furniture, Children size	Table and chairs for children	1	OSVI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.8.01	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.8.01	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.8.01	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.3.8.02	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.8.02	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.3.8.02	Mental Health Outpatient Area	RECEPTION	0	Patient/Public Washroom (Unisex)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.01	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.02	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.03	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.04	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-

											This info is provided for planning purposes only and is not to be relied upon. Final installation specifications are dependent upon selected supplier's shop drawing											
Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.05	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.06	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.07	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.08	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.09	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.10	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.11	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.12	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.13	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.14	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.15	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.16	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.17	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.18	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.19	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.20	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.21	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.22	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.23	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.24	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.25	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.1.26	Mental Health Outpatient Area	Outpatient treatment	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Furniture, Chair, Boardroom		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.2	Mental Health Outpatient Area	Outpatient treatment	0	Large Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.01	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.3.02	Mental Health Outpatient Area	Outpatient treatment	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, ACS		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Beery		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, BNT		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Categories		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, CPT-II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, DKEFS		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, DRS –II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Finger Tapping		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Grooved Pegboard		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Kaplan Baycrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, MTOA (geri)		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, RBANS updated		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Tactile Performance Test		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, TOMM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, TOPF		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WAISIV		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WASI II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WCST		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WMS IV		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Chair, Boardroom		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.01	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, ACS		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Beery		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, BNT		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Categories		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, CPT-II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, DKEFS		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, DRS –II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Finger Tapping		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Grooved Pegboard		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Kaplan Baycrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, MTOA (geri)		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, RBANS updated		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, Tactile Performance Test		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, TOMM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, TOPF		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WAISIV		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WASI II		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WCST		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Tests, Psychologist, WMS IV		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Chair, Boardroom		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.4.02	Mental Health Outpatient Area	Outpatient treatment	0	Neuropsychologist Consultation / Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.5.01	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.5.01	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.5.01	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.5.02	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.4.5.02	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.5.02	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.5.03	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.5.03	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.5.03	Mental Health Outpatient Area	Outpatient treatment	0	Patient Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.01	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.01	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.01	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.02	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.02	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.6.02	Mental Health Outpatient Area	Outpatient treatment	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.7	Mental Health Outpatient Area	Outpatient treatment	0	Observation Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.7	Mental Health Outpatient Area	Outpatient treatment	0	Observation Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.7	Mental Health Outpatient Area	Outpatient treatment	0	Observation Room	Furniture, Chair, with Arm		6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.8	Mental Health Outpatient Area	Outpatient treatment	0	Conference Room/Team Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.4.8	Mental Health Outpatient Area	Outpatient treatment	0	Conference Room/Team Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.8	Mental Health Outpatient Area	Outpatient treatment	0	Conference Room/Team Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.8	Mental Health Outpatient Area	Outpatient treatment	0	Conference Room/Team Room	Furniture, Table, Rectangular, foldable		5	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.8	Mental Health Outpatient Area	Outpatient treatment	0	Conference Room/Team Room	Furniture, Chair, Boardroom		18	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.4.9	Mental Health Outpatient Area	Outpatient treatment	0	Print/Copy Alcove	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.1	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Clinician Workstation	Can, Garbage, 26.6		5	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.1	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Clinician Workstation	Can, Recycle		5	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.1	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Clinician Workstation	Furniture, File Cabinet		3	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.1	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Clinician Workstation	Furniture, Chair, Task		5	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.2	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Office, Coordinator	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.3	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Consultation / Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.3	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Consultation / Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.3	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Consultation / Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.3	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Consultation / Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.3	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Consultation / Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Fridge, Freezer, 20 cuft, residential grade		1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Furniture, Table, Side		3	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
1st fl.	G1.0.5.4	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Patient Observation Lounge (PTOP)	Furniture, Chair, Recliner		6	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Cabinet, Medication	Herman Miler	1	CSCI	10-535	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.5.5	Mental Health Outpatient Area	PTOP CLINIC SPACE	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.1	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Central Equipment Room	Cart, Wire		2	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.1	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Central Equipment Room	Patient lift, Portable		1	OSOI	12-330	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.1	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Central Equipment Room	pump, IV		8	OSOI	13-215	-	Yes	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.1	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Central Equipment Room	Sling, Lift	variety of sizes	15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.1	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Central Equipment Room	Mattress	Spare	5	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.2	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Housekeeping Closet	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Can, Large, Garbage		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Can, Large, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Cart, Soiled Laundry		2	OSOI	15-889.2	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.6.3	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Utility	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.6.4	Mental Health Outpatient Area	Supplies/equipment /environmental	0	Soiled Holding	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.1	Mental Health Outpatient Area	Staff support area	0	Physician Lead Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.10 .01	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.10 .01	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.10 .01	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.10 .02	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.10 .02	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.10 .02	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Dispenser, Cold / hot water		1	OSCI	GK-104	Yes	-	-	Yes	-	Maybe	-	-	-	-	-	Yes
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Furniture, Table, Dining, For 4		2	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Kitchenware, Microwave		2	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Kitchenware, Miscellaneous		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Furniture, Chair, Recliner		3	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.2	Mental Health Outpatient Area	Staff support area	0	Staff Lounge	Furniture, Chair, with arm		8	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.3	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.3	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.7.3	Mental Health Outpatient Area	Staff support area	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.01	Mental Health Outpatient Area	Staff support area	0	Manager Office (INPATIENT)	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.5.02	Mental Health Outpatient Area	Staff support area	0	Manager Office (OUTPATIENT)	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-

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1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.6	Mental Health Outpatient Area	Staff support area	0	Administrative Assistant for Director, Managers, Physicians	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.8	Mental Health Outpatient Area	Staff support area	0	Clinician Workstation	System Furniture		12	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.8	Mental Health Outpatient Area	Staff support area	0	Clinician Workstation	Can, Garbage, 26.6		12	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.8	Mental Health Outpatient Area	Staff support area	0	Clinician Workstation	Can, Recycle		12	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.8	Mental Health Outpatient Area	Staff support area	0	Clinician Workstation	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.8	Mental Health Outpatient Area	Staff support area	0	Clinician Workstation	Furniture, Chair, Task		12	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.9	Mental Health Outpatient Area	Staff support area	0	Psychology Workspace	System Furniture		6	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.9	Mental Health Outpatient Area	Staff support area	0	Psychology Workspace	Can, Garbage, 26.6		6	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.9	Mental Health Outpatient Area	Staff support area	0	Psychology Workspace	Can, Recycle		6	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.7.9	Mental Health Outpatient Area	Staff support area	0	Psychology Workspace	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.7.9	Mental Health Outpatient Area	Staff support area	0	Psychology Workspace	Furniture, Chair, Task		6	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.1	Mental Health Outpatient Area	Neurostimulation Clinic	0	Reception/Registration Desk	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Chair, TMS		1	OSCI	18-406	Yes	-	-	-	-	-	-	-	-	-	-	May Require Floor mounting
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	TMS Machine		1	OSOI	22-839	-	Yes	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.10	Mental Health Outpatient Area	Neurostimulation Clinic	0	TMS Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Mount For Sharps Container		6	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Mount For Suction Canister		6	OSCI	10-211	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Can, Garbage, 39		11	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Cart, Medical		2	OSOI	10-635.1	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Container, Sharps		6	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Flowmeter, Air		6	OSOI	11-748.2	-	-	-	-	-	-	Yes	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Flowmeter, O2		6	OSOI	11-748.1	-	-	-	-	-	-	-	Yes	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Hamper, Linen		3	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Headwall Accessories		6	OSOI	FH-115	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Stretcher		6	OSOI	19-021.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Suction Regulator		6	OSOI	13-325	-	-	-	-	-	-	-	-	-	Yes	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Automated Medication Dispensing System, Workstation		1	OSVI	18-167.1	Yes	-	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Furniture, Chair, with Arm		6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Monitor, Physiological		6	OSVI	12-647	-	Yes	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.11	Mental Health Outpatient Area	Neurostimulation Clinic	0	Recovery Room	Mount for Physiological Monitor		6	OSVI	16-117.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.12	Mental Health Outpatient Area	Neurostimulation Clinic	0	Blanket Warmer Alcove	Warmer, Blanket, Full size		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Furniture, Chair, Recliner		4	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.13	Mental Health Outpatient Area	Neurostimulation Clinic	0	Post-Recovery Room	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.14	Mental Health Outpatient Area	Neurostimulation Clinic	0	Clean Supply	Bins, dividers for ROK shelving		1	OSOI	FO-127	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.14	Mental Health Outpatient Area	Neurostimulation Clinic	0	Clean Supply	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.14	Mental Health Outpatient Area	Neurostimulation Clinic	0	Clean Supply	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.14	Mental Health Outpatient Area	Neurostimulation Clinic	0	Clean Supply	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Can, Large, Garbage		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Can, Large, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Cart, Soiled Laundry		2	OSOI	15-889.2	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.15	Mental Health Outpatient Area	Neurostimulation Clinic	0	Soiled Utility	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.16	Mental Health Outpatient Area	Neurostimulation Clinic	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.16	Mental Health Outpatient Area	Neurostimulation Clinic	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.16	Mental Health Outpatient Area	Neurostimulation Clinic	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.2	Mental Health Outpatient Area	Neurostimulation Clinic	0	Wheelchair Alcove	Wheelchair, Stackable		4	OSCI	17-620	-	-	-	-	-	-	-	-	-	-	-	Floor Mounting Station
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Furniture, Chair, Waiting		10	OSVI	FS-114	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.3	Mental Health Outpatient Area	Neurostimulation Clinic	0	General Waiting Room, ECT/TMS	Furniture, Children size	Table and chairs for children	1	OSVI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.4	Mental Health Outpatient Area	Neurostimulation Clinic	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.4	Mental Health Outpatient Area	Neurostimulation Clinic	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.4	Mental Health Outpatient Area	Neurostimulation Clinic	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.5	Mental Health Outpatient Area	Neurostimulation Clinic	0	In-patient Stretcher Waiting Area	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.5	Mental Health Outpatient Area	Neurostimulation Clinic	0	In-patient Stretcher Waiting Area	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.5	Mental Health Outpatient Area	Neurostimulation Clinic	0	In-patient Stretcher Waiting Area	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.5	Mental Health Outpatient Area	Neurostimulation Clinic	0	In-patient Stretcher Waiting Area	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.5	Mental Health Outpatient Area	Neurostimulation Clinic	0	In-patient Stretcher Waiting Area	Stretcher, Transport		1	OSOI	19-021.1	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.8.6	Mental Health Outpatient Area	Neurostimulation Clinic	0	Patient Change Room	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.7	Mental Health Outpatient Area	Neurostimulation Clinic	0	Pre-Treatment Gowned Waiting Area	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.7	Mental Health Outpatient Area	Neurostimulation Clinic	0	Pre-Treatment Gowned Waiting Area	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.7	Mental Health Outpatient Area	Neurostimulation Clinic	0	Pre-Treatment Gowned Waiting Area	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.7	Mental Health Outpatient Area	Neurostimulation Clinic	0	Pre-Treatment Gowned Waiting Area	Furniture, Chair, Lounge		3	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Dispenser, Glove		1	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.8	Mental Health Outpatient Area	Neurostimulation Clinic	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Mount For Sharps Container		2	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Anesthesia		1	OSOI	10-635.1	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Difficult Airway		1	OSOI	10-635.8	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Malignant Hypothermia		1	OSOI	16-988	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Medical		1	OSOI	10-635.1	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Nurse		2	OSOI	10-635.1	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Container, Sharps		2	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Decapper , Dual-Action 13MM, 20MM		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	ECT Machine		2	OSOI	11-484	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Flowmeter, O2		2	OSOI	11-748.1	-	-	-	-	-	-	-	Yes	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Glidescope		1	OSOI	12-294	Yes	-	possible AV output	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	IV Poles		2	OSOI	12-177	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Laryngoscope	1 is Part of ACLS cart 2 is for Anesthesia Cart (total of 4 heads for Anesthesia cart)	6	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	LMA, Mask laryngeal, Various Sizes		10	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Mask, Face, Various Sizes		12	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Monitor, CO2 End tidal	Can be a module on the Physiological monitor	1	OSOI	16-938	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Nerve Stimulator	Part of Anesthesia Cart	1	OSOI	16-252	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Scissors		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Stool, Doctors		2	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Stool, Step		2	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Street Survival Skills Questionnaire		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Suction Regulator		2	OSOI	13-325	-	-	-	-	-	-	-	-	-	Yes	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Suction, Portable	for ACLS Cart	1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Table, procedure, Height Adjustable		1	OSOI	19-024	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Video Laryngoscope		1	OSOI	12-294	-	Yes	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Anesthesia Machine		1	OSVI	10-134	-	Yes	Yes	-	-	-	Yes	Yes	Yes	Yes	Yes	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Automated Medication Dispensing System, Workstation		1	OSVI	18-167.1	Yes	-	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Monitor, Physiological		2	OSVI	12-647	-	Yes	Yes	-	-	-	-	-	-	-	-	-
1st fl.	G1.0.8.9	Mental Health Outpatient Area	Neurostimulation Clinic	0	ECT Treatment Room	Mount for Physiological Monitor		1	OSVI	16-117.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.1.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Video conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.1.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Video conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Video conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Video conference Room	Furniture, Table, Rectangular, foldable		8	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Video conference Room	Furniture, Chair, Boardroom		30	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Multi-Purpose Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.1.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Multi-Purpose Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Multi-Purpose Room	Furniture, Table, Rectangular, foldable		10	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Multi-Purpose Room	Furniture, Chair, Boardroom		30	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Seminar/ Small Group Therapy	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Seminar/ Small Group Therapy	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Seminar/ Small Group Therapy	Furniture, Chair, with Arm		12	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.1.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.1.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.1.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Meeting spaces	Mental Health Education	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Chair, with Arm		4	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Department Head Office	Furniture, Desk	Cupboard, Overhead, for storage to match	1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Associate	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Can, recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Business Manager	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Can, recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Admin)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Can, recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Executive Assistant (Education)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Office support (copier, supplies)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Office support (copier, supplies)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Office support (copier, supplies)	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Television & Mount	70" - 80"	1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	2	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Kitchenware, Miscellaneous		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Chair, Lounge		2	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Chair, with Arm	with arms (as per Mark email 29 Nov 2016)	6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.2.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Departmental offices	Mental Health Education	Learner's Lounge	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Pedestal, Lockable		1	OSOI	FO-135	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Chair, with Arm		3	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.1.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Psychiatrist	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-

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1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	System Furniture		2	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	System Furniture		2	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	System Furniture		2	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.2.03	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Clinical Research Team Room (2 people)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	System Furniture		9	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	Can, Garbage, 26.6		9	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	Can, Recycle		9	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	Furniture, File Cabinet		3	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.3.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Researchers	Mental Health Education	Learner Workstations	Furniture, Chair, Task		9	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Admin Assistant	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Admin Assistant	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Admin Assistant	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Admin Assistant	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Admin Assistant	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.4.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.4.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.2.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Data Manager	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.4.3.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.4.3.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
1st fl.	G1.1.4.3.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.3.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Research Coordinators	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	File Storage	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.4	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	File Storage	Furniture, File Cabinet		4	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Clinical trials prep/staging area	System Furniture		1	CSCI	FO-115	wired in	-	wired in	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Clinical trials prep/staging area	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.4.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Clinical trials prep/staging area	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.4.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Clinical trials area	Mental Health Education	Clinical trials prep/staging area	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Clinical Exam/Observation Room	Furniture, Chair, Visitor		2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Consult / Exam Room (Clinical Skills)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.3	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Exam / Procedure Room (Clinical Skills)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	O2 Tank Holder		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Scale, Weigh, Eye Level Model		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Chair, Visitor		2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.01	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	O2 Tank Holder		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Scale, Weigh, Eye Level Model		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Chair, Visitor		2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.4.02	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Testing Rooms (Clinical Skills)	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Phlebotomy Station	Freezer, Scientific	minus 20 C	1	OSCI	15-144	Yes	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Phlebotomy Station	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Phlebotomy Station	Centrifuge, Low speed		1	OSOI	10-778	-	Yes	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.5	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Phlebotomy Station	Stool, Doctors		1	OSOI	10-037	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Waiting Area	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Waiting Area	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Waiting Area	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Waiting Area	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.6	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Waiting Area	Furniture, Chair, Waiting		5	OSVI	FS-114	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.5.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.5.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.5.7	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Research testing area	Mental Health Education	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.6.1	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Server Telecommunication	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
1st fl.	G1.1.6.2	MENTAL HEALTH and SUBSTANCE USE CLINICAL AND APPLIED RESEARCH PROGRAM	Other	Mental Health Education	Housekeeping Closet	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.1.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.1.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.1.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Family support areas	0	Visitor Lounge	Furniture, Chair, Visitor		5	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Reception	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.2.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Reception	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Reception	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Reception	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.1	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Reception	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Label Maker		1	OSOI	IT-106	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Laminator		1	OSOI	GE-117	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Safe, Small		1	OSOI	GM-107	-	-	-	-	-	-	-	-	-	-	-	Maybe
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.2	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Care Team Base	Furniture, Chair, Task		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.3	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Pneumatic Tube Station	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.4	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.4	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.4	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.5	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.2.5	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.2.5	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.6	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Staff Conference Room	Furniture, Chair, Boardroom		16	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.7	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Nursing Leader Office	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.2.8	Inpatient Mental Health Services: Unit 1 (15 Bed IPUs)	Staff support areas	0	Social Work Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Warmer, Blanket, Small		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	BP Cuff, Reusable	variety of sizes	3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Nebulizer		2	OSOI	12-712	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Oxygen Concentrators		10	OSOI	12-873	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Stethoscope		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Tape, measure, Metabolic Monitoring		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Thermometer		2	OSOI	14-035	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Totes, Storage		10	OSOI	GM-135	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Board, Cardiac Arrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Laryngoscope	Part of BCLS cart	2	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Miscellaneous crash cart items		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Automated Medication Dispensing System, One-cell		1	OSVI	18-167	Yes	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.3.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Clinic support areas	0	Wheelchair/Stretcher Alcove	Stretcher, Transport		1	OSOI	19-021.1	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Lift, Ceiling, Motor		1	OSCI	19-015	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.1.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Cart, Isolation		1	OSOI	10-642	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.4.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.04	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.05	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.06	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.07	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.4.4.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.08	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.09	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.10	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.11	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.12	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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2nd fl.	G2.0.4.4.13	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.14	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.4.4.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.4.4.15	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Monitor, Interactive		1	OSCI	GA-105	-	Yes	-	-	-	-	-	-	-	-	-	Recessed
2nd fl.	G2.0.5.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Miscellaneous comfort room supplies	small rug, cushions….	1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Sensory Modulation of the environment elements of Occupation		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Soft Seating, Two seats	Added to the list Nov 2016	1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	4	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, Visitor	Added to the list Nov 2016	2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	16	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.5.3.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.3.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.3.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Washer / Dryer, Side by Side	front loader All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GE-114	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Yes	-
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Iron Auto Shut Off		1	OSOI	GE-110	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.4	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Ironing Board & Cover		1	OSOI	GM-121	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.5	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Linen Closet	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Bean Bag		1	OSOI	FS-121	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.6	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Chair, Visitor		6	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.7	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Food Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.7	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Food Cart Closet	Cart, Food delivery		1	OSOI	15-887.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.8	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.8	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.9	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.9	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.5.9	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.5.9	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.1	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Assessment kit, DVD sets on foot walking and rolling workouts		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Ball, Misc., Therapeutic and Exercise		10	OSOI	GM-112	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Band, Exercise	exercise bands (varying strengths)	15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Bike Exercise		2	OSOI	GM-120	Yes	-	Maybe - simulators	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Cart, Lakeside		1	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Dynatronics Model Knee Wedge		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Miscellaneous, GYM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Pump, Ball		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Rack, Ball		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Scale, Weigh, Bathroom		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Skipping ropes		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.2	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Treadmill		2	OSOI	14-141.2	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.3	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.0.6.4.01	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.02	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.0.6.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.4.03	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.5	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.5	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.0.6.5	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Ping-Pong table		1	OSOI	GM-131	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.0.6.5	Inpatient Mental Health Services: Unit 1 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.1.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.1.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.1.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Family support areas	0	Visitor Lounge	Furniture, Chair, Visitor		5	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Reception	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Reception	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.2.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Reception	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Reception	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Reception	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Label Maker		1	OSOI	IT-106	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Laminator		1	OSOI	GE-117	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Safe, Small		1	OSOI	GM-107	-	-	-	-	-	-	-	-	-	-	-	Maybe

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Care Team Base	Furniture, Chair, Task		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Pneumatic Tube Station	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Staff Conference Room	Furniture, Chair, Boardroom		16	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Nursing Leader Office	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.2.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Staff support areas	0	Social Work Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Warmer, Blanket, Small		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	BP Cuff, Reusable	variety of sizes	3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Nebulizer		2	OSOI	12-712	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Oxygen Concentrators		10	OSOI	12-873	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Patient lift, portable		1	OSOI	12-330	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Pump, IV		1	OSOI	13-215	-	Yes	Yes	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Stethoscope		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Tape, measure, Metabolic Monitoring		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Thermometer		2	OSOI	14-035	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Central Storage Room	Totes, Storage		10	OSOI	GM-135	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Board, Cardiac Arrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Laryngoscope	Part of BCLS cart	2	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Miscellaneous crash cart items		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Crash Cart Closet	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monse	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Automated Medication Dispensing System, One-cell		1	OSVI	18-167	Yes	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.3.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.3.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Clinic support areas	0	Wheelchair/Stretcher Alcove	Wheelchair, Patient		2	OSOI	18-407	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.1.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Lift, Ceiling, Motor		1	OSCI	19-015	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.1.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Patient Bedroom Contact Isolation Ante Room	Cart, Isolation		1	OSOI	10-642	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.04	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.05	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.4.4.06	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.07	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.08	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.09	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.10	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.11	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.12	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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2nd fl.	G2.1.4.4.13	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.14	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.4.4.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.4.4.15	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient bedrooms	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Monitor, Interactive		1	OSCI	GA-105	-	Yes	-	-	-	-	-	-	-	-	-	Recessed
2nd fl.	G2.1.5.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Miscellaneous comfort room supplies	small rug, cushions….	1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Comfort Room	Sensory Modulation of the environment elements of Occupation		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Soft Seating, Two seats	Added to the list Nov 2016	1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	4	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, Visitor	Added to the list Nov 2016	2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	16	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.5.3.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.3.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.3.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Washer / Dryer, Side by Side	front loader All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GE-114	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Yes	-
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Iron Auto Shut Off		1	OSOI	GE-110	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.4	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Laundry Facility	Ironing Board & Cover		1	OSOI	GM-121	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Linen Closet	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Bean Bag		1	OSOI	FS-121	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.6	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Lounge (Quiet)	Furniture, Chair, Visitor		6	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Food Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.7	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Food Cart Closet	Cart, Food delivery		1	OSOI	15-887.1	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.8	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.9	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.9	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.5.9	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.5.9	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Patient support zone	0	Secure Room Ante Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.1	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Assessment kit, DVD sets on foot walking and rolling workouts		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Ball, Misc., Therapeutic and Exercise		10	OSOI	GM-112	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Band, Exercise	exercise bands (varying strengths)	15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Bike Exercise		2	OSOI	GM-120	Yes	-	Maybe - simulators	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Cart, Lakeside		1	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Dynatronics Model Knee Wedge		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Miscellaneous, GYM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Pump, Ball		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Rack, Ball		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Scale, Weigh, Bathroom		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Skipping ropes		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.2	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Exercise/Wellness Room	Treadmill		2	OSOI	14-141.2	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.3	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Individual Consult Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.6.4.01	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.02	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.1.6.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.4.03	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.1.6.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Ping-Pong table		1	OSOI	GM-131	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.1.6.5	Inpatient Mental Health Services: Unit 2 - 15 Bed IPUs	Therapy zone	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Parallel bars		1	OSCI	12-957	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Patient Transfer Board		1	OSCI	19-014	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Belt, Transfer		6	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Blueware, Bedpans, etc		10	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Chair, Shower		1	OSOI	10-802	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Free Weights		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Gel cushion, wheelchair		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Reacher, Long handled		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Recreation Supplies		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Restrain Kit		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Stairs, Climbing		1	OSOI	11-620	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Tests, Cognitive Competency		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Tests, Cognitive Performance		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Tests, OSOT Perceptual		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Walker		2	OSOI	17-627	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.1	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Allied Health Room	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.2	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Clean Supply Room	Bins, dividers for ROK shelving		1	OSOI	FO-127	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.2	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Clean Supply Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.2	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Clean Supply Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.2	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Clean Supply Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.3	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Housekeeping Closet	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Hood, Quiet	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-108	Yes	-	-	-	-	-	-	-	-	-	Yes	-

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2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Stove	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-103	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Cutting board polycarbonate		5	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Chair, without Arm		6	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 3 metal mixing bowls with rubber base		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 7 piece nylon tools set		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 8" square cake pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 9" Round Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Blender		1	OSOI	GK-117	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Bread maker		1	OSOI	GK-118	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Broom and dust pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Bus pan		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Can opener, Electrical		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Colander		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Cookie cutter		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Cooking set, for 10 people		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Fork		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Hand mixer		1	OSOI	GK-114	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Knife		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Knife, Chef		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Large Cookies Sheet		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Loaf Pan		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Measuring Cup, 8 oz		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Micro splatter cover		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Muffin tin		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Mug China, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Nappies Dessert		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Ove glove for ovens		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Oven, Thermometer		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Pitcher		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Plates Dinner, 8"		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Popcorn maker		1	OSOI	GK-119	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Pot, Coffee/Tea		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rack Open		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rack, Spice		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rice Cooker, For 12 people		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rolling Pin		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Sandwich maker, Grilled		1	OSOI	GK-135	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Scoop, Ice-cream		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of measuring cups		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of Measuring Spoons		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of Oblong Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, set of Pop top storage container, Plastic		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Sieves		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Silicone dot pot mitt		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Soup Bowl		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 2 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 4 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 6 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Spoon, Soup		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Teaspoon		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Tongs, 16"		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tray, Plastic		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 5 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.4	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Washer, Bedpan		1	OSCI	14-310	Yes	-	Yes	Yes	Yes	Yes	-	-	-	-	Dedicated riser for steam	-
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Can, Large, Garbage		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Can, Large, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Cart, Soiled Laundry		2	OSOI	15-889.2	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.5	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Utility Room	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.6	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Soiled Holding Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Dispenser, Cold / hot water		1	OSCI	GK-104	Yes	-	-	Yes	-	Maybe	-	-	-	-	-	Yes
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Furniture, Table, Dining, For 4		2	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Kitchenware, Microwave		2	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Kitchenware, Miscellaneous		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Furniture, Chair, Recliner		4	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.8	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Lounge	Furniture, Chair, with arm		8	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.9.01	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.9.01	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.9.01	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
2nd fl.	G2.2.1.9.02	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.9.02	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
2nd fl.	G2.2.1.9.02	Inpatient Mental Health Services: Unit 1 &2	Shared areas per floor	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.1.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.1.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.1.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-

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3rd fl.	G3.0.1.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Family support areas	0	Visitor Lounge	Furniture, Chair, Visitor		5	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Reception	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Reception	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Reception	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Reception	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Reception	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Label Maker		1	OSOI	IT-106	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Laminator		1	OSOI	GE-117	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Safe, Small		1	OSOI	GM-107	-	-	-	-	-	-	-	-	-	-	-	Maybe
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-

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3rd fl.	G3.0.2.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Care Team Base	Furniture, Chair, Task		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Pneumatic Tube Station	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Washroom	Dispenser, Soap		2	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Staff Conference Room	Furniture, Chair, Boardroom		16	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Nursing Leader Office	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.2.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Staff support areas	0	Social Work Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Warmer, Blanket, Small		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	BP Cuff, Reusable	variety of sizes	3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Nebulizer		2	OSOI	12-712	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Oxygen Concentrators		10	OSOI	12-873	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Patient lift, portable		1	OSOI	12-330	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Pump, IV		1	OSOI	13-215	-	Yes	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Stethoscope		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Tape, measure, Metabolic Monitoring		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Thermometer		2	OSOI	14-035	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Central Storage Room	Totes, Storage		10	OSOI	GM-135	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Board, Cardiac Arrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Laryngoscope	Part of BCLS cart	2	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Miscellaneous crash cart items		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Crash Cart Closet	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Automated Medication Dispensing System, One-cell		1	OSVI	18-167	Yes	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.3.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Clinic support areas	0	Wheelchair/Stretcher Alcove	Wheelchair, Patient		1	OSOI	18-407	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.1.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.1.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.2.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.04	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.05	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.06	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.07	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.08	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.09	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.2.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.10	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.11	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.12	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.13	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.2.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.2.14	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Lift, Ceiling, Motor		1	OSCI	19-015	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Room	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.4.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.4.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient bedrooms (1x 15 beds ipu)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Cart, Isolation		1	OSOI	10-642	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Comfort Room	Monitor, Interactive		1	OSCI	GA-105	-	Yes	-	-	-	-	-	-	-	-	-	Recessed
3rd fl.	G3.0.5.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Comfort Room	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Comfort Room	Miscellaneous comfort room supplies	small rug, cushions….	1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Comfort Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Comfort Room	Sensory Modulation of the environment elements of Occupation		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Soft Seating, Two seats	Added to the list Nov 2016	1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	4	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, Visitor	Added to the list Nov 2016	2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	16	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.3.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.3.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.3.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Washer / Dryer, Side by Side	front loader All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GE-114	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Yes	-
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Iron Auto Shut Off		1	OSOI	GE-110	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Laundry Facility	Ironing Board & Cover		1	OSOI	GM-121	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.5	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Linen Closet	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Furniture, Bean Bag		1	OSOI	FS-121	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Lounge (Quiet)	Furniture, Chair, Visitor		6	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Food Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.5.7	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Food Cart Closet	Cart, Food delivery		1	OSOI	15-887.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.8	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.9	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.9	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room Ante Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.5.9	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.5.9	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Patient support zone	0	Secure Room Ante Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Parallel bars		1	OSCI	12-957	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Patient Transfer Board		1	OSCI	19-014	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Assessment Kit, Cognitive Assessment of Minnesota		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Assessment Kit, Middlesex Elderly Assessment of Mental state		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Belt, Transfer		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Blueware, Bedpans, etc		5	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Chair, Shower		1	OSOI	10-802	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Free Weights		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Gel cushion, wheelchair		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Recreation Supplies		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Restrain Kit		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Stairs, Climbing		1	OSOI	11-620	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Tests, Cognitive Competency		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Tests, Cognitive Performance		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Tests, OSOT Perceptual		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Walker		1	OSOI	17-627	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.1	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Allied Health Room	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.2	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Assessment kit, DVD sets on foot walking and rolling workouts		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Ball, Misc., Therapeutic and Exercise		10	OSOI	GM-112	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Band, Exercise	exercise bands (varying strengths)	15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Bike Exercise		2	OSOI	GM-120	Yes	-	Maybe - simulators	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Cart, Lakeside		1	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Dynatronics Model Knee Wedge		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Miscellaneous, GYM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Pump, Ball		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Rack, Ball		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Scale, Weigh, Bathroom		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Skipping ropes		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.3	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Exercise/Wellness Room	Treadmill		2	OSOI	14-141.2	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.4	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.5.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.01	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.5.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.0.6.5.02	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.0.6.5.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.5.03	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Group Therapy Room	Ping-Pong table		1	OSOI	GM-131	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.0.6.6	Inpatient Mental Health Services: Unit 3 - 15 Bed IPU	Therapy zone	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.1.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.1.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.1.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Family support areas	0	Visitor Lounge	Furniture, Chair, Visitor		5	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Reception	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Reception	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Reception	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Reception	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Reception	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Label Maker		1	OSOI	IT-106	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Laminator		1	OSOI	GE-117	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Safe, Small		1	OSOI	GM-107	-	-	-	-	-	-	-	-	-	-	-	Maybe
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Care Team Base	Furniture, Chair, Task		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Pneumatic Tube Station	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.2.5	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.5	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.5	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Staff Conference Room	Furniture, Chair, Boardroom		16	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	Nursing Leader Office	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.2.8	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Staff support areas	0	CNE Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Warmer, Blanket, Small		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	BP Cuff, Reusable	variety of sizes	3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Nebulizer		2	OSOI	12-712	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Oxygen Concentrators		10	OSOI	12-873	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Stethoscope		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Tape, measure, Metabolic Monitoring		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Thermometer		2	OSOI	14-035	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Central Storage Room	Totes, Storage		10	OSOI	GM-135	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Board, Cardiac Arrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Laryngoscope	Part of BCLS cart	2	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Miscellaneous crash cart items		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Crash Cart Closet	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Automated Medication Dispensing System, One-cell		1	OSVI	18-167	Yes	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Wheelchair/Stretcher Alcove	Stretcher, Transport		1	OSOI	19-021.1	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.3.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Clinic support areas	0	Wheelchair/Stretcher Alcove	Wheelchair, Patient		1	OSOI	18-407	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.1.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom Contact Isolation Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom Contact Isolation Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Patient Bedroom Contact Isolation Ante Room	Cart, Isolation		1	OSOI	10-642	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.4.3.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.04	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.05	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.06	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.07	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.08	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.4.3.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.09	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.4.3.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.4.3.10	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient bedrooms (1x 10 beds phau)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Comfort Room	Monitor, Interactive		1	OSCI	GA-105	-	Yes	-	-	-	-	-	-	-	-	-	Recessed
3rd fl.	G3.1.5.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Comfort Room	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Comfort Room	Miscellaneous comfort room supplies	small rug, cushions….	1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Comfort Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Comfort Room	Sensory Modulation of the environment elements of Occupation		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Soft Seating, Two seats	Added to the list Nov 2016	1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	3	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, Visitor	Added to the list Nov 2016	2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	12	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.3.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.3.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Washer / Dryer, Side by Side	front loader All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GE-114	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Yes	-
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Iron Auto Shut Off		1	OSOI	GE-110	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Laundry Facility	Ironing Board & Cover		1	OSOI	GM-121	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.5	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Linen Closet	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Furniture, Bean Bag		1	OSOI	FS-121	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Lounge (Quiet)	Furniture, Chair, Visitor		6	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Food Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.7	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Food Cart Closet	Cart, Food delivery		1	OSOI	15-887.1	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.8.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.8.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.8.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.8.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.9	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.9	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room Ante Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.5.9	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.5.9	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Patient support zone	0	Secure Room Ante Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Parallel bars		1	OSCI	12-957	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Patient Transfer Board		1	OSCI	19-014	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Assessment Kit, Cognitive Assessment of Minnesota		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Assessment Kit, Middlesex Elderly Assessment of Mental state		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Belt, Transfer		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Blueware, Bedpans, etc		5	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Free Weights		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Gel cushion, wheelchair		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Reacher, Long handled		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Recreation Supplies		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Restrain Kit		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Stairs, Climbing		1	OSOI	11-620	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Tests, Cognitive Competency		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Tests, Cognitive Performance		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Tests, OSOT Perceptual		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Walker		1	OSOI	17-627	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.1	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Allied Health Room	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.2	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Assessment kit, DVD sets on foot walking and rolling workouts		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Ball, Misc., Therapeutic and Exercise		10	OSOI	GM-112	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Band, Exercise	exercise bands (varying strengths)	10	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Bike Exercise		2	OSOI	GM-120	Yes	-	Maybe - simulators	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Cart, Lakeside		1	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Dynatronics Model Knee Wedge		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Miscellaneous, GYM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Pump, Ball		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Rack, Ball		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Scale, Weigh, Bathroom		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Skipping ropes		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.3	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Exercise/Wellness Room	Treadmill		2	OSOI	14-141.2	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.4	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Individual Consult Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.5.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.01	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.5.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.02	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.1.6.5.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.1.6.5.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.5.03	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Group Therapy Room	Ping-Pong table		1	OSOI	GM-131	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.1.6.6	Inpatient Mental Health Services: Unit 4 - 10 Bed PHAU	Therapy zone	0	Large Group Therapy Room	Furniture, Chair, with Arm		15	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.1	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Clean Supply Room	Bins, dividers for ROK shelving		1	OSOI	FO-127	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.1	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Clean Supply Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.1	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Clean Supply Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.1	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Clean Supply Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.2.1.2	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Housekeeping Closet	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Hood, Quiet	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-108	Yes	-	-	-	-	-	-	-	-	-	Yes	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Stove	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-103	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Cutting board polycarbonate		5	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Chair, without Arm		6	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 3 metal mixing bowls with rubber base		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 7 piece nylon tools set		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 8" square cake pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, 9" Round Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Blender		1	OSOI	GK-117	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Bread maker		1	OSOI	GK-118	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Broom and dust pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Bus pan		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Can opener, Electrical		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Colander		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Cookie cutter		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Cooking set, for 10 people		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Fork		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Hand mixer		1	OSOI	GK-114	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Knife		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Knife, Chef		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Large Cookies Sheet		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Loaf Pan		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Measuring Cup, 8 oz		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Micro splatter cover		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Muffin tin		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Mug China, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Nappies Dessert		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Ove glove for ovens		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Oven, Thermometer		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Pitcher		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Plates Dinner, 8"		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Popcorn maker		1	OSOI	GK-119	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Pot, Coffee/Tea		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rack Open		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rack, Spice		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rice Cooker, For 12 people		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Rolling Pin		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Sandwich maker, Grilled		1	OSOI	GK-135	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Scoop, Ice-cream		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of measuring cups		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of Measuring Spoons		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Set of Oblong Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, set of Pop top storage container, Plastic		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Sieves		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Silicone dot pot mitt		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Soup Bowl		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 2 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 4 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Spoodles 6 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Spoon, Soup		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Teaspoon		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Kitchenware, Tongs, 16"		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tray, Plastic		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 5 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
3rd fl.	G3.2.1.3	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Life Skills Assessment Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Washer, Bedpan		1	OSCI	14-310	Yes	-	Yes	Yes	Yes	Yes	-	-	-	-	Dedicated riser for steam	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Can, Large, Garbage		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Can, Large, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Cart, Soiled Laundry		2	OSOI	15-889.2	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.4	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Utility Room	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.5	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Soiled Holding Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Dispenser, Cold / hot water		1	OSCI	GK-104	Yes	-	-	Yes	-	Maybe	-	-	-	-	-	Yes
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-

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3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Furniture, Table, Dining, For 4		2	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Kitchenware, Microwave		2	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Kitchenware, Miscellaneous		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Furniture, Chair, Recliner		4	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.7	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Lounge	Furniture, Chair, with arm		8	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.8.01	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.8.01	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.8.01	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
3rd fl.	G3.2.1.8.02	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.8.02	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
3rd fl.	G3.2.1.8.02	Inpatient Mental Health Services: Unit 3&4	Shared areas per floor	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Patient/Public Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.1.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Patient/Public Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.1.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Patient/Public Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Furniture, Table, Side		2	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.1.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Family support areas	0	Visitor Lounge	Furniture, Chair, Visitor		8	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Reception	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Reception	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Reception	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Reception	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Reception	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Dispenser, Cold / hot water		1	OSCI	GK-104	Yes	-	-	Yes	-	Maybe	-	-	-	-	-	Yes
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Freezer, 24" commercial grade, With Glass Door		1	OSCI	22-081.1	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Fridge, 48" commercial grade, With Glass Door		1	OSCI	22-029.2	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Furniture, Table, Dining, For 4		3	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Kitchenware, Microwave		2	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Kitchenware, Miscellaneous		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Furniture, Chair, Recliner		5	OSVI	FS-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Lounge	Furniture, Chair, with arm		12	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Multi-Purpose Room	Furniture, Chair, with arm		22	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Fridge, Undercounter, residential grade		1	OSCI	22-032	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Cart, Chart Storage		1	OSOI	FO-101	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Furniture, File Cabinet		2	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Label Maker		1	OSOI	IT-106	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Laminator		1	OSOI	GE-117	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Safe, Small		1	OSOI	GM-107	-	-	-	-	-	-	-	-	-	-	-	Maybe
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Care Team Base	Furniture, Chair, Task		8	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Pneumatic Tube Station	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Work Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Work Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Work Room	Can, Confidential		1	OSVI	FH-111	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Washroom	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Furniture, Table, Rectangular, foldable		4	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Staff Conference Room	Furniture, Chair, Boardroom		16	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Can, Garbage, 26.6		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.2.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Physician Lead Office	Furniture, Desk, Office		2	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, Chair, with Arm		2	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Nursing Leader Office (PCC, CNE)	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Furniture, File Cabinet		1	OSOI	FO-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Furniture, Chair, Task		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.2.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Staff support areas	0	Social Work Office	Furniture, Desk, Office		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Warmer, Blanket, Full size		1	OSCI	10-414	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	BP Cuff, Reusable	variety of sizes	6	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Decontamination System, UVC		1	OSOI	20-585	Yes	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Light, Exam, Portable		1	OSOI	12-276.4	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Nebulizer		4	OSOI	12-712	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Oxygen Concentrators		10	OSOI	12-873	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Pump, IV		1	OSOI	13-215	-	Yes	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Stethoscope		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Tape, measure, Metabolic Monitoring		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Thermometer		2	OSOI	14-035	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Central Storage Room	Totes, Storage		10	OSOI	GM-135	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Clean Supply Room	Bins, dividers for ROK shelving		1	OSOI	FO-127	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.3.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Clean Supply Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Clean Supply Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Clean Supply Room	Cart, Wire		3	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Board, Cardiac Arrest		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Cart, ACLS		1	OSOI	10-635	-	Yes	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Defibrillator		1	OSOI	18-499	-	Yes	Maybe - wireless, BT	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Laryngoscope	Part of BCLS cart	2	OSOI	12-293	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Miscellaneous crash cart items		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	O2 Tank Holder		2	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	O2 Tank Rack		1	OSOI	15-981	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.3.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Crash Cart Closet	Suction, Portable		1	OSOI	10-215	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Housekeeping Closet	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Fridge, Thermometer		1	OSCI	14-036	-	-	-	-	-	-	-	-	-	-	-	Yes

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4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Fridge, Undercounter, Scientific, Medication		1	OSCI	22-016	Yes	-	Maybe - Remote temp monitor	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Mount For Sharps Container		1	OSCI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Container, Sharps		1	OSOI	14-423	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Glucometer		1	OSOI	15-102	Yes	-	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Pill Crusher		1	OSOI	21-913	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Scissors		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Automated Medication Dispensing System, One-cell		1	OSVI	18-167	Yes	-	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Medication Room	Furniture, Chair, Task, High		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

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4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Eyewash station, Bottle		1	OSCI	11-655	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Washer, Bedpan		2	OSCI	14-310	Yes	-	Yes	Yes	Yes	Yes	-	-	-	-	Dedicated riser for steam	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Can, Large, Garbage		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Can, Large, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Cart, Soiled Laundry		2	OSOI	15-889.2	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Utility Room	Hamper, Linen		2	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Soiled Holding Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.3.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Wheelchair/Stretcher Alcove	Stretcher, Transport		1	OSOI	19-021.1	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.3.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Clinic support areas	0	Wheelchair/Stretcher Alcove	Wheelchair, Patient		4	OSOI	18-407	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.4.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	SERVICE DELIVERY SPACE	0	Clean Holding Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.4.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	SERVICE DELIVERY SPACE	0	Clean Holding Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.4.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	SERVICE DELIVERY SPACE	0	Clean Holding Room	Cart, Wire		4	OSOI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.4.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	SERVICE DELIVERY SPACE	0	Food Services Holding Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.4.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	SERVICE DELIVERY SPACE	0	Soiled Holding Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.1.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.2.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.05	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.2.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.06	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.07	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.08	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.09	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.12	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.2.13	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.14	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.15	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.16	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.2.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.17	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.18	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.2.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.2.19	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Lift, Ceiling, Motor		1	OSCI	19-015	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Hamper, Laundry		1	OSOI	15-837.1	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Bed		1	OSVI	10-347	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Chair, Lounge		1	OSVI	FS-107	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Chair, with Arm		1	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Furniture, Table, Bedside, Weighted		1	OSVI	10-531	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Room	Mattress		1	OSVI	12-475	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ensuite	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ensuite	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ensuite	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.5.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.5.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient bedrooms (1x20 beds psychogeriatric unit)	0	Patient Bedroom Bariatric Contact Isolation Ante Room	Cart, Isolation		1	OSOI	10-642	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Comfort Room	Monitor, Interactive		1	OSCI	GA-105	-	Yes	-	-	-	-	-	-	-	-	-	Recessed
4th fl.	G4.0.6.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Comfort Room	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Comfort Room	Miscellaneous comfort room supplies	small rug, cushions….	1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Comfort Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Comfort Room	Sensory Modulation of the environment elements of Occupation		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room Ante Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room Ante Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room Ante Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.10	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room Ante Room	Cart, Supply		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Lift, Ceiling, Motor		1	OSCI	19-015	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Patient Bathtub		1	OSCI	10-316.2	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Furniture, Chair, without Arm		1	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.11	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Tub Room	Scale, Weigh, Eye Level Model		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Dispenser, Hand Sanitizer		2	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Ice Machine		1	OSCI	15-912	Yes	-	-	Yes		Yes	-	-	-	-	-	Yes

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Can, Garbage, 39		2	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Can, Recycle		2	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	DVD Player		1	OSOI	GA-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, without Arm		2	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Soft Seating, Two seats	Added to the list Nov 2016	1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	6	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Piano, Electric with bench		1	OSOI	GE-118	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, Visitor	Added to the list Nov 2016	2	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Dining/Lounge Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	24	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.3.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.3.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.3.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.3.04	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Hamper Alcove	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Linen Closet	Cart, Linen		1	OSVI	15-888	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Furniture, Bean Bag		1	OSOI	FS-121	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Furniture, Soft Seating, Two seats		1	OSOI	FS-105	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Furniture, Table, Side		1	OSOI	FT-102	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.5	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Lounge (Quiet)	Furniture, Chair, Visitor		6	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Washer / Dryer, Side by Side	front loader All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GE-114	Yes	-	-	Yes	Yes	Yes	-	-	-	-	Yes	-
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Iron Auto Shut Off		1	OSOI	GE-110	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Laundry Facility	Ironing Board & Cover		1	OSOI	GM-121	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Dishwasher	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-102	Yes	-	-	Yes	Yes	Yes	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Hood, Quiet	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-108	Yes	-	-	-	-	-	-	-	-	-	Yes	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Stove	All appliances must be a commercial grade providing full warranty for commercial use with local service support including parts and emergency service.	1	CSCI	GK-103	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Fridge, Freezer, 20 cuft, residential grade	with temperature display	1	OSCI	22-028	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Can, 3 piece, Garbage, Recycle, Bottle		1	OSOI	FH-102	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Cutting board polycarbonate		5	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Furniture, Chair, without Arm		6	OSOI	FS-101	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Furniture, Table, Dining, For 4	square ones with rounded corners (as per Mark email 29 Nov 2016)	1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, 3 metal mixing bowls with rubber base		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, 7 piece nylon tools set		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, 8" square cake pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, 9" Round Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Blender		1	OSOI	GK-117	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Bread maker		1	OSOI	GK-118	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Broom and dust pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Bus pan		1	OSOI	10-635.2	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Can opener, Electrical		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Coffee Maker	with shut off key and not boiling water	1	OSOI	GK-101	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Colander		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Cookie cutter		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Cooking set, for 10 people		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Fork		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Hand mixer		1	OSOI	GK-114	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Kettle, Electrical		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Knife		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Knife, Chef		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Large Cookies Sheet		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Loaf Pan		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Measuring Cup, 8 oz		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Micro splatter cover		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Microwave		1	OSOI	GK-100	Yes	-	-	-	-	-	-	-	-	-	Maybe	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Muffin tin		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Mug China, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Nappies Dessert		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Ove glove for ovens		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Oven, Thermometer		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Pitcher		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Plates Dinner, 8"		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Popcorn maker		1	OSOI	GK-119	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Pot, Coffee/Tea		1	OSOI	GK-106	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Rack Open		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Rack, Spice		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Rice Cooker, For 12 people		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Rolling Pin		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Sandwich maker, Grilled		1	OSOI	GK-135	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Scoop, Ice-cream		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Set of measuring cups		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Set of Measuring Spoons		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Set of Oblong Cake Pan		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, set of Pop top storage container, Plastic		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Sieves		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Silicone dot pot mitt		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Soup Bowl		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Spoodles 2 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Spoodles 4 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Spoodles 6 Oz		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Spoon, Soup		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Teaspoon		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Toaster		1	OSOI	GK-107	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Kitchenware, Tongs, 16"		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Tray, Plastic		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 10 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	kitchenware, Tumbler, Plastic, 5 oz		15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Life Skills Assessment Room	Furniture, Chair, with arm	with arms (as per Mark email 29 Nov 2016)	6	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Food Cart Closet	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.8	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Food Cart Closet	Cart, Food delivery		1	OSOI	15-887.1	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room	Blanket Strong		2	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.6.9	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Patient support zone	0	Secure Room	Mattress, Seclusion		1	OSVI	17-553	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Pole, Floor to ceiling		1	CSCI	MM-115	-	-	-	-	-	-	-	-	-	-	-	fixed to floor and ceiling
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Furniture, Bookcase		1	OSCI	FO-104	-	-	-	-	-	-	-	-	-	-	-	May require wall mounting

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4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Parallel bars		1	OSCI	12-957	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Patient Transfer Board		1	OSCI	19-014	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Alarm, Bed		4	OSOI	12-585	Yes	-	Wander - to nurse call system or wireless	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Alarm, Chair		4	OSOI	17-531	Yes	-	Wander - to nurse call system or wireless	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Assessment Kit, Cognitive Assessment of Minnesota		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Assessment Kit, Middlesex Elderly Assessment of Mental state		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Belt, Transfer		6	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Blueware, Bedpans, etc		10	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Cane		6	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Cart, Lakeside		2	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Chair, Shower		3	OSOI	10-802	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Cushion, Backrest		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Cushion, Heels-up (for bed)		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Free Weights		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Gel cushion, wheelchair		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Patient lift, Portable		1	OSOI	12-330	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Reacher, Long handled		4	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Recreation Supplies		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Restrain Kit		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Security buckle cover	wheelchair accessory	2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Stairs, Climbing		1	OSOI	11-620	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Stool, Step		1	OSOI	16-017	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Tests, Cognitive Competency		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Tests, Cognitive Performance		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Tests, OSOT Perceptual		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Walker		4	OSOI	17-627	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.1	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Allied Health Room	Furniture, Chair, Task		2	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Diagnostic Set	include: oto ophthalmoscope and specula dispenser, bp, thermometer	1	OSCI	12-815.1	-	Yes	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Dispenser, Glove		3	OSCI	16-286	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Light, Exam, ceiling mounted		1	OSCI	12-276.1	Yes	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Monitor, Vital Signs (w stand)		1	OSOI	25-209	-	Yes	Maybe	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Scale, Weigh, Eye Level Model	with measuring height	1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Table, Exam, Height Adjustable		1	OSOI	18-374.1	-	Yes	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Furniture, Chair, Visitor		1	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.2	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exam / Treatment Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Television & Mount		1	OSCI	15-861	Yes	-	Yes	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Assessment kit, DVD sets on foot walking and rolling workouts		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-

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4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Ball, Misc., Therapeutic and Exercise		10	OSOI	GM-112	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Band, Exercise	exercise bands (varying strengths)	15	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Bike Exercise		2	OSOI	GM-120	Yes	-	Maybe - simulators	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Cart, Lakeside		1	OSOI	10-635.3	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Dynatronics Model Knee Wedge		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Hamper, Linen		1	OSOI	15-837	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Mat, Exercise		10	OSOI	GM-122	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Miscellaneous, GYM		1	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Pump, Ball		1	OSOI	N/A	Yes	-	-	-	-	-	-	-	-	-	-	-

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Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Rack, Ball		2	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Radio/CD Player		1	OSOI	GA-102	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Scale, Weigh, Bathroom		1	OSOI	13-455	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Skipping ropes		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.3	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Exercise/Wellness Room	Treadmill		2	OSOI	14-141.2	Yes	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Furniture, Table, Round, 36"		1	OSOI	FT-104	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Boardroom		1	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Furniture, Chair, Visitor		4	OSVI	FS-119	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.4	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Individual Consult Therapy Room	Furniture, Desk		1	OSVI	FT-100	-	-	-	-	-	-	-	-	-	-	-	-

											This info is provided for planning purposes only and is not to be relied upon. Final installation specifications are dependent upon selected supplier's shop drawing										
Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.7.5.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.5.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.01	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.5.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.02	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Dispenser, Hand Sanitizer		1	OSCI	11-285	-	-	-	-	-	-	-	-	-	-	-	Yes

											This info is provided for planning purposes only and is not to be relied upon. Final installation specifications are dependent upon selected supplier's shop drawing										
Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
4th fl.	G4.0.7.5.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Garbage, 39		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Can, Recycle		1	OSOI	FH-105	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Table, Coffee, large		1	OSOI	FT-104	-	-	Yes	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.5.03	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Consult Therapy Room	Furniture, Chair, Boardroom		10	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Group Therapy Room	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Group Therapy Room	Furniture, Table, Rectangular, Foldable		5	OSOI	FT-103	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Group Therapy Room	Ping-Pong table		1	OSOI	GM-131	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.6	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Large Group Therapy Room	Furniture, Chair, with Arm		20	OSVI	FS-113	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Patient Washroom	Dispenser, Soap		1	OSCI	15-827.2	-	-	-	-	-	-	-	-	-	-	-	Yes
4th fl.	G4.0.7.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Patient Washroom	Can, Garbage, 26.6		1	OSOI	FH-108	-	-	-	-	-	-	-	-	-	-	-	-
4th fl.	G4.0.7.7	Inpatient Mental Health Services: Unit 5 - 20 Bed Psychogeriatric Unit	Therapy zone	0	Patient Washroom	Seat, Shower		1	OSOI	10-805	-	-	-	-	-	-	-	-	-	-	-	-
5th fl.	G5.000.00	IT area	0	0	Tech room	Furniture, Chair, Task		4	OSVI	FS-100	-	-	-	-	-	-	-	-	-	-	-	-

											This info is provided for planning purposes only and is not to be relied upon. Final installation specifications are dependent upon selected supplier's shop drawing											
Floor	New Room #	Sub Area	Area	Area	Room Name	General item description	Further item description	Quantity	Responsibility	Data Sheet	Power	Emerg power	Data drop	Water - cold	Water - hot	Drain	Gas - Air	Gas - O2	Gas - N2O	Gas - Suction	Gas - Scavenging	Wall Backing
Existing campus	A003	0	0	Under ground	Food Service	Food Services, Heat-on -demand system	consist of Burloudge B-line, twin coffee maker, Aladdin HoD and associated dishes, steam cart	1	OSCI	GK-113	Yes	-	-	?	?	?	-	-	-	-	?	-
Parking	A000	0	0	Under ground	Parking Level 1	Miscellaneous (decor items)		10	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
Parking	A000	0	0	Under ground	Parking Level 1	Cart, Linen, Tow		6	OSVI	15-208.4	-	-	-	-	-	-	-	-	-	-	-	-
Parking	A001	0	0	Under ground	Sally-Port	Blanket Strong		3	OSOI	GM-126	-	-	-	-	-	-	-	-	-	-	-	-
Parking	A001	0	0	Under ground	Sally-Port	Restrain Kit		3	OSOI	N/A	-	-	-	-	-	-	-	-	-	-	-	-
Parking	A002	0	0	Under ground	Vestibule	Wheelchair, Stackable		6	OSCI	17-620	-	-	-	-	-	-	-	-	-	-	-	Floor Mounting Station
Parking	A002	0	0	Under ground	Vestibule	Tow Motor		2	OSOI	FH-108	Yes	-	-	-	-	-	-	-	-	-	-	-

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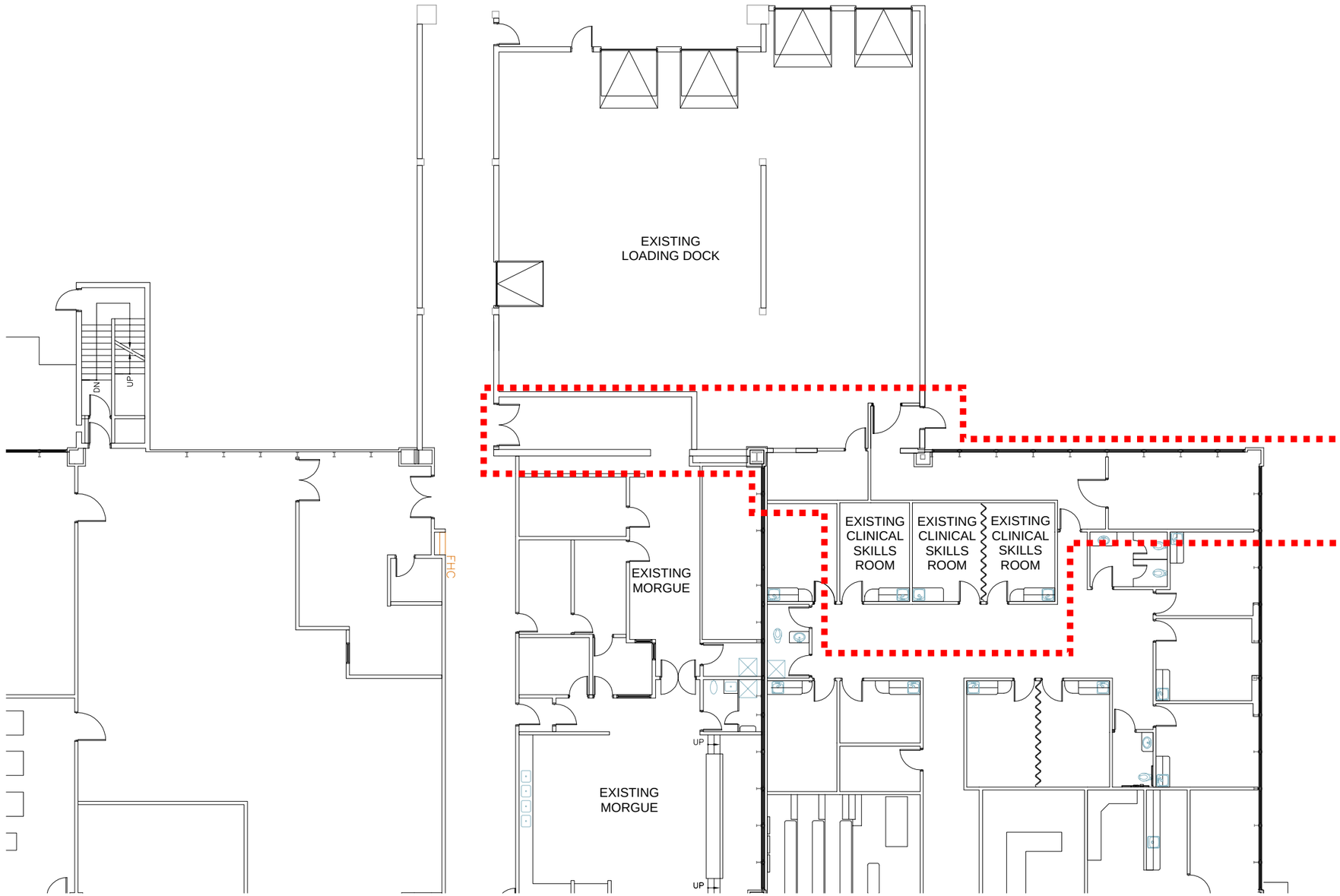
Appendix 1Q Site Plan (Royal Columbian Hospital Redevelopment)
Design-Build Agreement

CANNONDESIGN



PROJECT BOUNDARY LIMIT

SCALE: 1: 200

N

Attachment 1 to Appendix 1Q Site Plan (Royal Columbian Hospital Redevelopment) Design-Build Agreement

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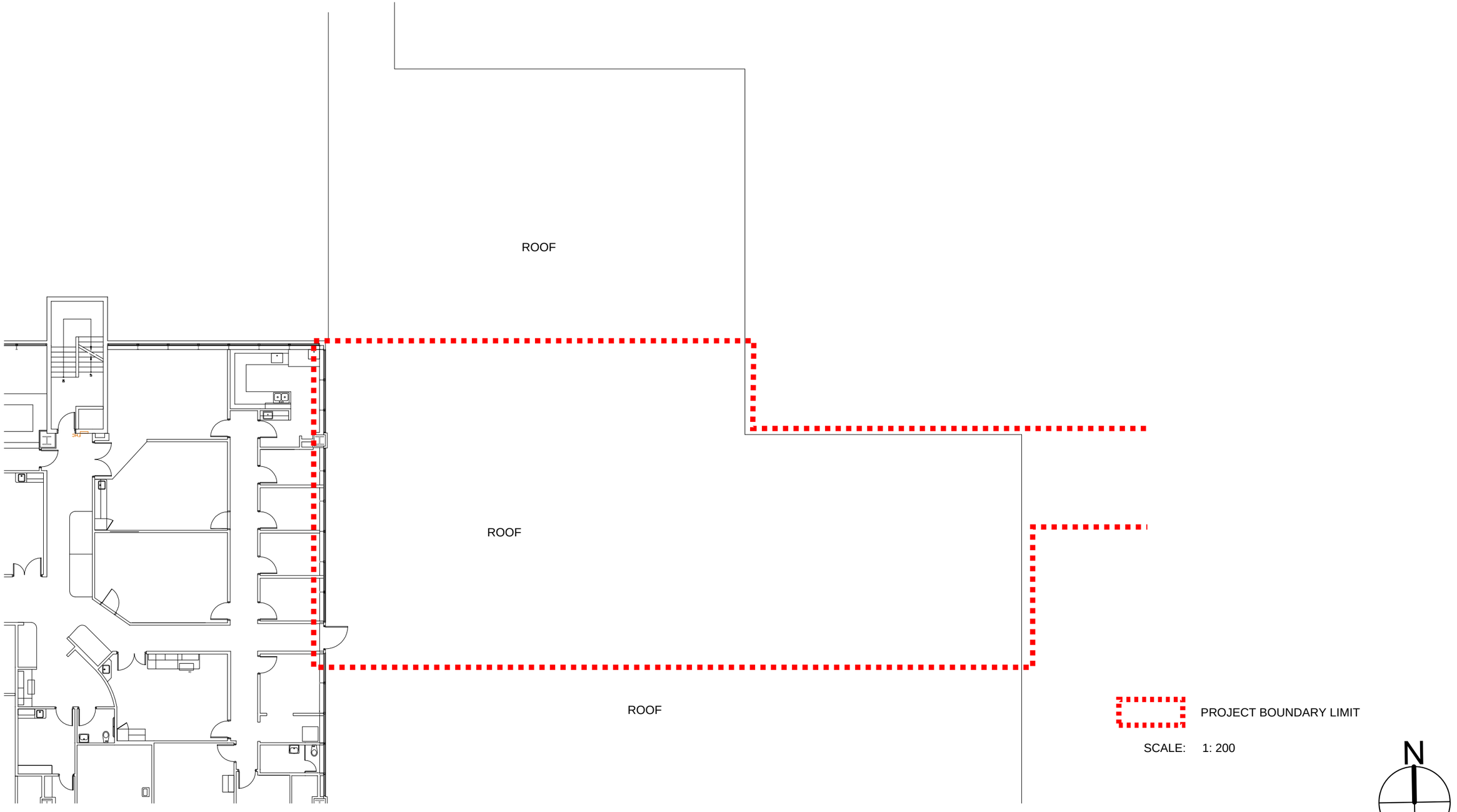
CANNONDESIGN



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Attachment 2 to Appendix 1Q Site Plan (Royal Columbian Hospital Redevelopment)
Design-Build Agreement

CANNONDESIGN

APPENDIX 1R
WAYFINDING AND SIGNAGE

WAYFINDING

A. Intent

The Design-Builder will consider the following when designing the wayfinding system:

- For persons visiting or entering a hospital or mental health environment it can be a disorienting and confusing experience.
- Clients and visitors alike are usually going through a worrisome experience involving themselves, a friend or family member, and can be easily lost or misdirected by poor or inadequate wayfinding signage.
- Anxiety can be greatly reduced when there is order and clarity while moving through the Facility and specific destinations can be easily found.
- Universal access is an integral part of universal design and includes more than addressing physical barriers. It is critical to look beyond physical barriers in the built environment to uncover the hidden barriers to universal access. One hidden barrier to universal access is inadequate and inappropriate wayfinding information.

B. Key Factors in Wayfinding Design

The Design-Builder will apply the following concepts to articulate wayfinding for all users of the built environment:

Cognitive Mapping

Cognitive mapping is an individual's internal spatial representation of points, lines, areas and surfaces that are learned, experienced and recorded in quantitative and qualitative forms serving to spatially orient the wayfinder. Cognitive maps assist the wayfinder in determining paths in new and never visited spaces because individuals can apply previously learned information from a particular environment to a new but similar environment. Buildings with design features that help build a good cognitive map for individuals can be highly important to wayfinding as it applies to remembering a space if the wayfinder revisits it. They can also assist in returning people to their point of origin. Building a robust cognitive map is also critical to building evacuation in emergencies. In emergencies people tend to remember distinct features in a built environment that can help them exit.

Spatial Organization

Spatial organization or building layout is considered the first major component in wayfinding design. It not only defines the wayfinding problems of users but also affects the ease or difficulty with which users will move around within the Facility.

Spatial organization includes:

- architectural features that define different areas, such as columns, varied ceiling heights and fenestration differentialization;
- destination zones, such as atria and corridor hubs;
- overall layout using simple and straightforward plans to eliminate confusion and disorientation; and
- landmarks that are distinct in shape and colour and are appropriately lit.

C. Overriding Principles

Design wayfinding signage to direct all Facility Users by way of clearly configured and easily understood lettering and/or graphic pictograms. Provide well labeled directories to help identify major traffic corridors, building and department entrances and clinical zones, and to indicate primary, secondary and interdepartmental paths of travel. These directories will include orientation clues such as "YOU ARE HERE" labels and colour coded zone indicators. Use major site components such as street names, parking lots and north arrows help to orient the user.

Design wayfinding signage in accordance with the basic requirements of Section 3.6 of Schedule 3 [Design and Construction Specifications], as well as meet all the regulations and requirements of the BCBC with respect to accessibilities for persons with physical disabilities, including indication of potential hazards in and adjacent to the travel paths.

Design wayfinding signage that is flexible and economically changeable as departments may evolve and change throughout the life of the Facility.

Design public entrance areas to accommodate the potential addition of a "Donor Wall' in a prominent location and that can be dynamic through the life of the Facility.

SIGNAGE

D. Exterior Signage

Exterior signage will meet or exceed the following requirements:

- Provide formal identification of the Facility as well as identify the different building entrances.
- Be located appropriately for readability and address aesthetic considerations for the architectural design of the Facility.
- Use high contrast lettering on plain backgrounds. Lettering will have a stroke width to height ratio from 1:6 to 1:10 and a character width to height ration of 3:5 to 1:1. Lettering will be in Arabic numerals and sans-serif letters.
- Be lighted at night, by integral light source or floodlighting.
- Provide continuous path references from arrival points to building access points.
- Accessibility signage will include the International Symbol of Accessibility for Persons with disabilities, and include additional wording and symbols necessary to convey full understanding.
- Be located and constructed to minimize vandalism and vehicular damage, while maintaining maintenance and cleaning access.
- Meet all requirements of applicable Governmental Authorities for location, clarity and accessibility.

D. Interior Signage

Interior signage will meet or exceed the following requirements:

- Provide formal identification of the Facility as well as identify the different building entrances.
- Include a building directory with subdirectories indicating the locations of all departments that can be reached from the "YOU ARE HERE" point and meeting the requirements set out in Section C of this Appendix.
- Be appropriately located for readability and take in aesthetic considerations for the architectural design of the Facility.
- Use high contrast lettering on plain backgrounds. Lettering will have a stroke width to height ratio from 1:6 to 1:10 and a character width to height ration of 3:5 to 1:1. Lettering will be in Arabic numerals and sans-serif letters.

- Accessibility signage will include the International Symbol of Accessibility for Persons with disabilities, and include additional wording and symbols necessary to convey full understanding.
- Use consistent language and terminology that uses everyday terminology instead of technical medical terminology.
- Be installed at all points where a directional decision must be made.
- Provide continuous path references from arrival points to final destinations and inner circulation routes.
- Be located and constructed to minimize damage caused by normal operations of the Facility, such as impact from rolling equipment and maintenance equipment.
- Be designed and constructed of suitable materials to stand up to repeated and routine cleaning and maintenance cycles.
- Meet all requirements of applicable Governmental Authorities for location, clarity and accessibility, and exit signage requirements.
- Door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility. Door signage will:
    - indicate restrictions on entry and warn of hazards, including “Radiology in use” signage; and
    - not be obscured by the emergency systems and code blue system call.
- Each room and space will require a unique number for service reasons that will be determined early in design and maintained following occupancy. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc).
- Where applicable, and in addition to the requirements by code, signage will also have the corresponding braille signage.
- All signage in Patient accessible areas will be anti-ligature, tamper-proof, with no sharp edges and, to the extent possible, unbreakable.

E. Door Signage

Door signage will meet or exceed the following requirements:

- Identify every room with a number and name or graphic.
- Be installed at consistent location and height.
- Be integrated with existing building signage design and colour philosophies.
- Use internationally recognized pictograms where appropriate.
- Identify fire-separations, smoke separations and other hazardous conditions.
- Identify all exits.
- Meet all requirements of applicable Governmental Authorities for location, clarity and accessibility, and exit signage requirements.

F. Signage General

Exterior sign types may include the following:

- Building mounted.
- Free-standing.
- Individual letters or pictograms.

Interior sign types may include the following:

- Engraved plastic laminate
- Sandblasted acrylic or glass
- Silk-screened plastic or acrylic
- Injection moulded letters or characters
- Cast aluminum letters or characters

- Raised letter signs on metal or plastic material.

G. Room Numbering

Background

The ARCHIBUS Facility Management System has been in place for several years at FHA, PHC and VCHA. The database system which is comprised of AutoCAD drawings and ARCHIBUS database assets has been designed to be utilized by numerous departments that require a source of truth for Facility Information.

The consolidation of the 3 Health Organizations databases, and the addition of a fourth Health Organization in PHSA, requires that each room in each building has an assigned unique identifier and that they are numbered in a consistent and uniform manner.

Purpose

The intent of these guidelines is to give direction on the methodology of the FSS room numbering policy for assigning room numbers to all space in both existing and new facilities. Legacy environments where there is currently alpha-numeric combinations will be replaced as renovations are completed and as funds allow.

This methodology has been designed to allow for blocking of large floor plates into more manageable areas, and to assign space (room) numbering that can be used for multiple purposes, e.g. unique identifier, nurse call number, database asset, wayfinding, signage & telecomm. etc.

Room numbering will be standardized across all sites, both owned and lease wherever possible. Sequentially, consistent room numbering aids both staff and visitors in navigating the sites more easily and less stressfully.

Dependent Information

The ARCHIBUS database is set up in a very specific hierarchy i.e. Site, Building, Floor Level and Room Number, the key identifier being the Room number or code which must be unique to the floor level and correspond to the room number shown on the AutoCAD drawing.

Many existing technology based systems rely on a room number or location code, therefore having a numbering sequence that is logical in its progression, and intuitive in its design, can help increase response time in locating a specific room.

Responsibilities

Using these guidelines, together with direction from FSS, The Design-Builder is responsible the room numbering of the Building. FSS must review the room numbering prior to working drawings to ensure the layouts adhere to the room numbering guidelines and room numbers are not duplicated within ARCHIBUS. They will inform the Design-Builder that construction door schedule tags be defined as – multiple doors into the same room will use the same room number with the addition of an alpha suffix e.g. 2304A and 2304B – two doors into room 2304.

Methodology

Room Number assignment begins at the Building level with each Floor and Room having a unique identifier. Floors are numbered or named following the FSS ARCHIBUS Standards.

All rooms must have a unique numeric identifier and consist of a composite of floor number and Unit or area number. They may have up to 6 digits depending on their location. Numeric only room identifiers are

preferred to accommodate the nurse call systems. An Alpha suffix is sometimes used for individual rooms or separate areas within a room.

To accommodate the difficulty of sequentially numbering large floor plates, including floors containing multiple open workstations, floors can be divided into zones or sections.

Individual rooms with multiple doors and consequently multiple door signs, will have the same number assigned to them which allows staff and visitors to correctly & consistently identify the room regardless of which door is accessed.

If FSS is included in the construction design process, they will state that construction door schedule tags be defined as – multiple doors into the same room will use the same room number with the addition of an alpha suffix e.g. 2304A and 2304B – two doors into room 2304

Individual workstations in open areas must have their own unique number in sequence with the previous closed room number.

Continuous work counters in a closed room must be numbered clockwise when entering the room using the room number with an alpha suffix e.g. 3601A, 3601B. If however the counter is converted to individual workstations then each workstation would have its own sequential number i.e. 3601, 3602 etc.

Workstations in closed rooms must have their own unique number in sequence with the room number or as extension of the room number with an alpha suffix.

Room Numbers are periodically skipped creating redundant numbers to allow for future renovations or room changes. Example: If the last room number in a sequence is more than 5 and less than 9 then skip to the next number with a trailing 0. Room 3646 start next number sequence 3650.

Standards

Rooms can have up to 12 digits depending on their location.

Three (3) digit number:

Used for buildings with less than or equal to 9 floors and/or have less than or equal to 99 rooms per floor

a. First floor will be numbered with series “100”, second floor will be “200”, third floor will be “300”, etc.

Four (4) digit number

Used for buildings exceeding 9 floors or have less than or equal to than 99 rooms per floor

Five (5) or more digit number

When buildings exceed 9 floors and have more than 99 rooms per floor. When existing conditions dictate for consistency

Some core room types have specific numbering conventions:

CORR-01 = Corridor (Note: If there are existing numbers on site, add the prefix “CORR-“to that number. If no number exists, select an adjacent room number within the corridor and add the prefix ‘CORR” to that number.
ATR-01 = Atrium STR-01 = Stairwells SFT-01 = Shaft ELV-01 = Elevator
DMW-01 = Dumbwaiter

Note: In all cases the same room number would apply to the same stairwell, shaft or atrium on all floors and would be named the same from floor to floor i.e. STR-01

Workstations in open floor plans can be difficult to manage using one sequential numbering system. Breaking up the areas into logical zones or sections allows for smaller areas to be numbered sequentially within their zone.

Workstations within offices can be numbered either using the main room number with an alpha suffix (up to 26 workstations) or numbered sequentially after the main room number leaving room for additional workstations to be installed by providing redundant (surplus) numbers.

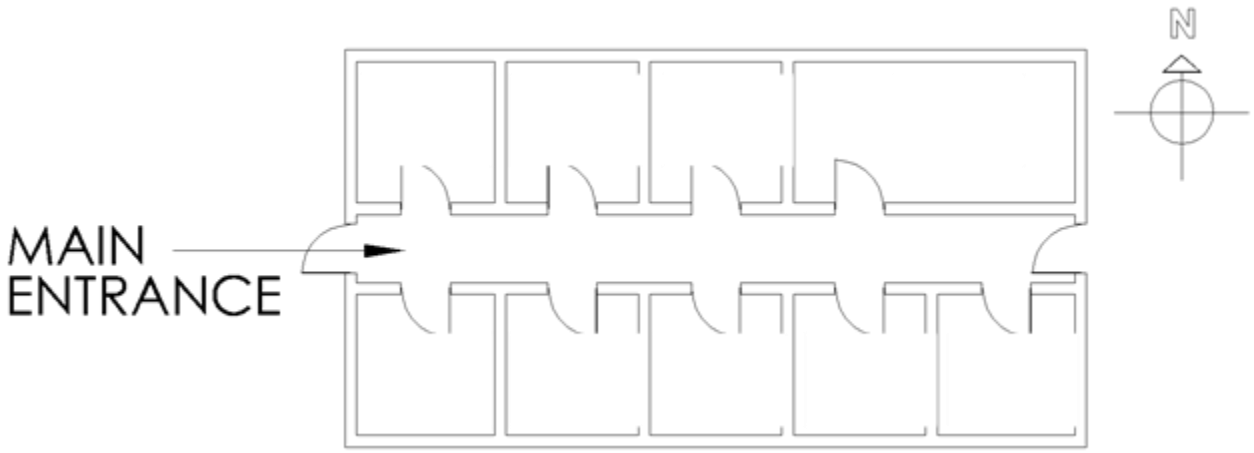
Parking Levels below a building– Use 'PK' as a prefix for all parking levels. If there are multiple parking levels, PK01 is the first level below the first occupied floor. PK02, PK03 etc. being assigned to descending levels within the parking structure

Inpatient Unit Room Numbering - Each department or unit is numbered in a clockwise direction starting at the first Patient room generally the first room on the left when entering the unit. All rooms with nurse call i.e. Patient rooms, Tub rooms etc. must have a numeric designate only to accommodate the Nurse Call system e.g. Unit 36 – 3601 –designates first Patient room 1.

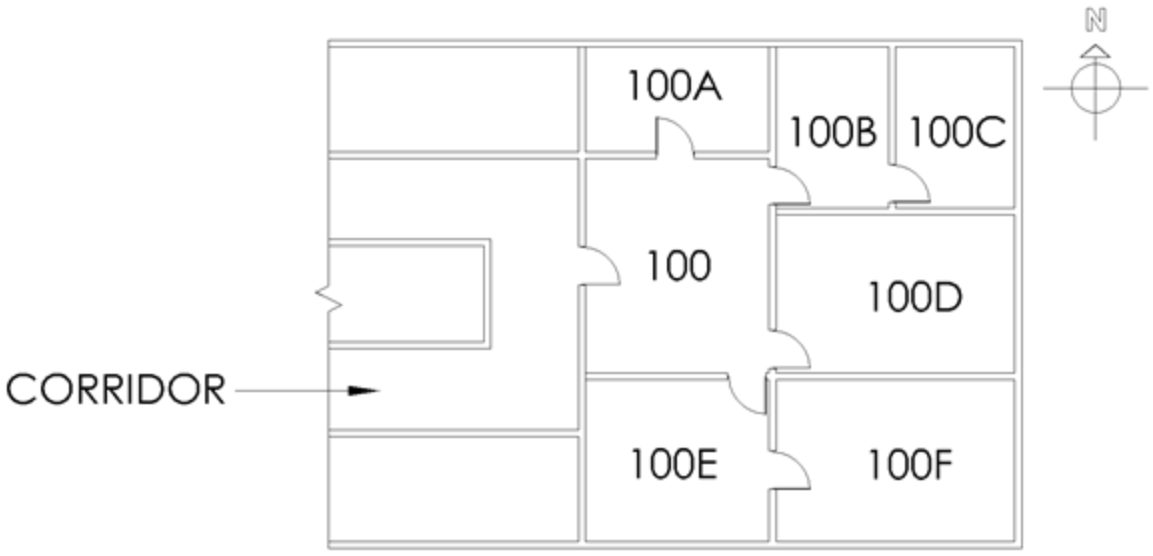
Inpatient Bed Numbering – Bed Numbers are numbered clockwise with Bed 1 at the left when entering the room. When a room consists of only two beds on one side of the room, the bed closest to the door is Bed 1. To reduce bed number confusion, new Patient rooms will have a sign above the bed which consists of a bed symbol (pictogram) and a bed number. However, washrooms inside a Patient room can be assigned the same room number with an alpha suffix as the nurse call is assigned to the Patient room number.

Inpatient Unit Support Rooms are numbered sequentially after the Patient rooms. Numbers are periodically skipped to allow for future renovations or room changes. Example: If the last room number in a sequence is more than 5 and less than 9 then skip to the next number with a trailing 0. Room 3646 start next number sequence 3650.

Double loaded corridor:



Rooms or Suite entered via another room. Use the primary number with an alpha suffix:



Elevators will follow the sequence: Elevator 1, Elevator 2 and Elevator 3.

Any space such as a Patient cubicle, alcove or recess of significant size must be numbered as a room. This identifies spaces for labelling of fire alarm, electrical and data outlets and for ongoing maintenance purposes.

It is important that room numbers be determined early in design and maintained following occupancy. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).