# BURNABY HOSPITAL
# REDEVELOPMENT PROJECT – PHASE ONE

## Schedule 3 - Design and Construction Specifications
## Final Project Agreement

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## Appendices

## PART 1. INTERPRETATION

1.1 Definitions and Interpretation

1.1.1 In this Agreement:

1.1.1.1 “Acoustic and Vibration Consultant” means a professional engineer with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance of buildings;

1.1.1.2 “Airborne Isolation Room” means a space designed, constructed and ventilated to limit the spread of microorganisms from an infected occupant, having negative pressure ventilation conforming to CSA Z8000 Canadian Healthcare Facilities and CSA Z317.2 Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Healthcare Facilities with an adjoining AIR Anteroom at the entrance that is separated by doors from both the outside and the main space in the AIR;

1.1.1.3 “AIR Anteroom” means a space at the entrance to an Airborne Isolation Room that provides for storage and removal of PPE, hand washing and hand hygiene features and provides an airlock between the adjacent space and the Patient;

1.1.1.4 "Anti-Barricade" has the meaning set out in Section 5.13.3.4 Mental Health Requirements;

1.1.1.5 “Architectural Concrete” means all concrete exposed to view, excluding the Facility parking levels;

1.1.1.6 “Architectural Openings Consultant” means an individual who has attained AHC, CDC and EHC professional certifications and mastered all facets of the commercial door and hardware industry;

1.1.1.7 “Authority's End-use Equipment” means Category 1 Equipment and Category 2 Equipment;

1.1.1.8 “Authority’s Quantity Surveyor” means a quantity surveyor hired by the Authority;

1.1.1.9 “Back of House” means the rooms, spaces and circulation systems, including corridors, elevators and stairs, that are not designed for use by the general public and/or Patients;

1.1.1.10 “BC Building Code” or “BCBC” means the most recent version of the BC Building Code;

1.1.1.11 “Borrowed Light” has the meaning set out in Section 5.7.1.5(2) of this Schedule;

1.1.1.12 “BH” means all the existing buildings which comprise the Burnaby Hospital and the lands upon which the Burnaby Hospital is located;

1.1.1.13 “BH Energy Centre” is a post disaster facility that houses the BC Hydro utility entrance, high voltage distribution, H.V transformers, primary and secondary 600V distribution, and metering and includes the generator supplied emergency power and essential power systems, vital, delayed vital and conditional power sources for the BH and Facility site wide services. The BH Energy Centre will be constructed as part of the BH Phase 1 Redevelopment Project and will be located on the existing BH site housed in a post disaster outbuilding or be co-located in the BH Phase 1A or Phase 1B building. The BH Energy Centre will be sized to accommodate Phase 1A and Phase 1B and the Existing Hospital excluding the West-Wing and Cascade buildings which will be demolished at the end of Phase 1. The BH Energy Centre will provide expandability for Phase 2 and will provide a high-level of post-disaster distribution infrastructure;

1.1.1.14 “Building Envelope Consultant” means an individual whose credentials as a building envelope professional are recognized by the AIBC or the EGBC to review and certify building envelope Design and Construction;

1.1.1.15 “Building Gross Area" or "Building Gross Square Metres” (BGSM) means the sum of all floor areas within a building measured to the outside face of exterior walls for all stories or areas having floor surfaces;

1.1.1.16 “Builders Lien Act” means Builders Lien Act S.B.C 1997;

1.1.1.17 “Building Systems” means the architectural, mechanical, electrical and other systems in or servicing the Facility;

1.1.1.18 “Burnaby Building Bylaw” means the most recent version of the City of Burnaby Building Bylaw;

1.1.1.19 “Category 6A” means the standard for Category 6A (augmented Category 6) is ANSI/TIA-568-C.1, defined by the Telecommunications Industry Association (TIA) for enhanced performance standards for twisted pair cable systems.

1.1.1.20 “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;

1.1.1.21 “Clinical Spaces” means spaces that support, or are used in, the direct care of Patients, excluding storage rooms, housekeeping closets, and non clinical corridors. These include spaces such as waiting rooms, medication rooms, nourishment rooms, clean supply rooms, soiled Utility rooms and Care Stations;

1.1.1.22 “Clinical Specifications and Functional Space Requirements” means Appendix 3A [Clinical Specifications and Functional Space Requirements], and provides a description of each space, the purpose of the Facility and how the programs will be delivered at BH;

1.1.1.23 "Clinical Systems Furniture" has the meaning set out in Section 6.12.2.4(1) of this Schedule;

1.1.1.24 “Close Access” means access between rooms, spaces, areas or Components that are located at a minimal distance from each other and linked by horizontal circulation or, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] on a case-by-case basis, linked by vertical circulation, such that the location of these items is optimized for efficiency of flow and the path between them minimizes corners, jogs or obstructions such as columns that create interference;

1.1.1.25 “Commissioning” means a quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that all of the facility’s systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the 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;;

1.1.1.26 “Commissioning Authority” means an independent entity who leads, plans, schedules, and coordinates the Commissioning Team to implement the Commissioning Process. The Commissioning Authority reports to both the Authority and the Project Co;

1.1.1.27 “Communications Pathway System” has the meaning set out in Section 7.10.7 of this Schedule;

1.1.1.28 “Communications Room” means an enclosed environmentally controlled centralized architectural space that houses telecommunication and data processing equipment, connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection apparatus. This room may also provide any or all the functions of a Telecommunications Room and house equipment and horizontal terminations for a portion of the Facility;

1.1.1.29 “Compliance Team” means the team of design professionals engaged by the Authority to represent its interests;

1.1.1.30 “Component” or “Functional Component” means a cohesive grouping of activities or spaces related by service or physical arrangement. A planning component may or may not be a department or platform since the term “Department” or “Platform” means an administrative organization rather than a functional organization of space and activities;

1.1.1.31 “Convenient Access” means access between rooms, spaces, areas or Components that are linked at a minimal distance from each other either horizontally or vertically or as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] on a case-by-case basis, such that the location of these items is optimized for efficiency of

flow and the path between them minimizes corners, jogs or obstructions such as columns that create interference;

1.1.1.32 "Core Network Equipment" means equipment classified as a backbone device that is central to the network's successful operation. Core Network Equipment is used to connect to servers, internet service providers and to aggregate all switches that are used to connect End-use Equipment and other devices. This equipment is typically located in the main equipment room;

1.1.1.33 "CPPS" means Campus Perimeter Pathway System. CPPS is a pathway distribution system enabling the Authority to deploy a physical fibre optic ring typology around the perimeter of the BH campus that will connect to new and existing buildings

1.1.1.34 "CPTED" means Crime Prevention Through Environmental Design. CPTED is a multi-disciplinary approach to deterring undesirable and criminal activity and behaviour through environmental Design;

1.1.1.35 "CSA" means Canadian Standards Association or CSA Group, a standards development organization accredited by the Standards Council of Canada, that develops standards in multiple areas including climate change, business management and safety and performance, including those for electrical and electronic equipment, industrial equipment, boilers and pressure vessels, compressed gas handling appliances, environmental protection, and construction materials;

1.1.1.36 "Data Drop" means the complete 1 (one) Category 6A structured cabling connections or permanent link between the RJ45 connector in a telecommunication outlet and the horizontal cross connect in a Communications Room;

1.1.1.37 "dBA" means 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;

1.1.1.38 "Design Life" means the period of time during which an item is expected by its designers to work within its specified parameters; in other words, the anticipated life expectancy of the item;

1.1.1.39 "Design Objectives" has the meaning set out in Section 3.1.5 of this Schedule;

1.1.1.40 "Direct Access" means access between rooms, spaces, areas or Components that are horizontally contiguous such that the path between them involves no movement through other circulation systems or spaces or, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] on a case-by-case basis, are vertically contiguous by means of a dedicated elevator or internal stairs;

1.1.1.41 “Direct Natural Light” has the meaning set out in Section 5.7.1.5 of this Schedule;

1.1.1.42 "Effective Date" means the date of the Project Agreement.

1.1.1.43 “Emergency Power System” – means a power system that is supplied from an emergency supply connected to feed the essential systems.

1.1.1.44 “End-use Equipment” means any device used directly by an end-user;

1.1.1.45 “Entrance Facility Room” or "EF Room" means an enclosed environmentally controlled architectural space, consisting of the pathways, cables, connecting hardware, protection devices and other passive and active equipment that support the Telecommunication Service Provider;

1.1.1.46 “EPDS” means Electrical Power Duct System. EPDS is a pathway distribution system providing an electrical power under-ground duct system around the perimeter of the BH campus that will connect to new, existing buildings and future buildings.

1.1.1.47 “Equipment Ready” means a room or infrastructure that is sufficiently completed to enable the Authority to begin its equipment installation. Refer to Section 7.10.8 and 7.10.10;

1.1.1.48 “Essential Electrical System” means an electrical system that has the capability of restoring and sustaining a supply of electrical energy to specified loads in the event of a loss of the Normal Power Supply.

1.1.1.49 “Evidence-Based Design” or “EBD” has the meaning set out in Section 3.2.1 of this Schedule;

1.1.1.50 “Existing Hospital” means all the existing buildings, including all Utilities (to the nearest connection point, off site where applicable), vehicle and pedestrian access points, forming part of BH;

1.1.1.51 “Facility” means, collectively, the BH Energy Centre, the SFB Expansion and the New Tower, and includes the CPPS, all utility connections, landscaping and other improvements that form part of the Design and the Construction under this Agreement, and “Facility” means any one of the BH Energy Centre, the SFB Expansion or the New Tower, as the context requires;

1.1.1.52 “FMO” means Facilities Maintenance and Operations department at BH and the Facility;

1.1.1.53 “Front of House” means the rooms, spaces and circulation systems, including corridors, elevators and stairs, that are designed for use by the general public;

1.1.1.54 “Functional Space Requirements” means the list of required spaces to be included in the Design of the Facility. The Functional Space Requirements document is located in the Appendix 3A [Clinical Specifications and Functional Space Requirements];

1.1.1.55 “Functional Testing” means a full range of tests under actual load, conducted to verify that specific systems, subsystems, components, and interfaces between systems conform to a given criteria. Functional Testing is witnessed and documented by the Commissioning Authority.

1.1.1.56 "Furniture" has the meaning set out in Section 6.12.2.3(1) of this Schedule;

1.1.1.57 “Future Expansion” means space that will not be built now but which Project Co will include in the planning and Design of the Facility;

1.1.1.58 “General Circulation” means movement between rooms, spaces, areas or Components by means of horizontal and/or vertical circulation corridors, stairs or elevators that are for use by the general public, visitors and Staff;

1.1.1.59 “Geotechnical Consultant” means an individual whose credentials as a building envelope professional are recognized by the AIBC or the EGBC to review and certify building envelope Design and Construction;

1.1.1.60 “Health Authority” means the government body responsible for planning and delivering health-care services within a specific geographic area;

1.1.1.61 “Indigenous Consultation Advisor” means a Person qualified, by education and experience, to facilitate Indigenous consultation processes and sessions as a neutral, informative resource and to provide advice to any of the parties involved;

1.1.1.62 “IEEE-SA” means Institute of Electrical and Electronics Engineers Standards Association, the organization for the development of industrial standards in a broad range of disciplines, including electric power and energy, biomedical technology and health care, Information Technology, information assurance, telecommunications, consumer electronics, transportation, aerospace, and nanotechnology;

1.1.1.63 “IM/IT” means Information Management and Information Technology;

1.1.1.64 “IM/IT Infrastructure” means everything required to support an IM/IT system except for the required Software, network equipment and Server(s);

1.1.1.65 “Information Technology” means the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data;

1.1.1.66 “Infection Control Practitioner” means an individual qualified in infection prevention and control as referred to in CSA Z8000 and CSA Z317.13;

1.1.1.67 “Internal Circulation” means movement between rooms, spaces, areas or Components internally by means of horizontal connections such as doors or openings without passage through other circulation systems;

1.1.1.68 “Lean Health Care” has the meaning set out in Section 3.3.1 of this Schedule;

1.1.1.69 “Life Safety System” means any equipment or infrastructure that either provides, monitors or supports life safety or is designed to protect and evacuate BH in emergencies, including Patient vital signs, fire alarm, medical gases and nurse call systems;

1.1.1.70 "Ligature Resistant" means elimination of all points where a cord, rope, bed sheet, string or similar cordlike material can be looped or tied to an item in order to create a point of ligature;

1.1.1.71 “Line of Sight” has the meaning set out in Section 5.7.9.1 of this Schedule;

1.1.1.72 “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;

1.1.1.73 “Mental Health Area” has the meaning set out in Section 5.13.2.1 of this Schedule;

1.1.1.74 “Make Good” means preparing adjoining surfaces to be identical, with construction and finishing completed in such a manner that there are no visible traces, at a minimum distance of 600 mm, between the work and the existing condition. Making Good therefore includes the construction and re-finishing of existing areas and surface as necessary to junction points or inside or outside corners of roofs, exterior walls, partitions, ceilings and landscaping or paving;

1.1.1.75 “Medical Device Reprocessing Department" or "MDRD” means the department that processes and provides supplies of sterile instruments, linen packs, dressings and other sterile items used in Patient care;

1.1.1.76 “Millwork” means fixed, i.e. non-movable, site-built architectural woodwork for casework, counters, walls, ceiling, doors, paneling, trim and partitions;

1.1.1.77 "Modular Casework" has the meaning set out in Section 6.6.3.7(1) Modular Casework Requirements;

1.1.1.78 “Move In” has the meaning set out in Section 2.9 of this Schedule;

1.1.1.79 “Multimedia Room” has the meaning set out in Section 7.10.15 of this schedule;

1.1.1.80 “Net Area" or "Net Square Metres" or "NSM” means the horizontal area of space assignable to a specific function. The Net Area of rooms is measured to the inside face of wall surfaces;

1.1.1.81 “Normal Power Supply” means the main electrical supply into a building or a building complex; it may consist of one or more consumer services capable of supplying all loads in the building or building complex.

1.1.1.82 “Opening Day Layout” means the layout of all rooms and areas that will be equipped and put into service as of the Substantial Completion. Refer to Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and

Appendix 2L [Food Services Equipment] for the quantity of rooms that will be equipped on the Substantial Completion;

1.1.1.83 "Outbreak Control Zone" means a collection of rooms and spaces that, in the event of an infectious disease outbreak, can be isolated as a self-contained zone and negatively pressurized by the HVAC system relative to the surrounding areas to mitigate the spread of airborne infections, and as referred to in CSA Z317.2 and CSA Z317.13;

1.1.1.84 “PACU” means Post Anesthetic Care Unit;

1.1.1.85 “PAR” means Periodic Automatic Replenishment. This is one method of inventory replenishment used by logistic operations within a hospital;

1.1.1.86 “Patient” means any Patient, client or resident who is waiting for or undergoing medical investigation care or treatment at the hospital;

1.1.1.87 “Person- and Family-Centred Care” means 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;

1.1.1.88 “Persons with Disabilities” has the meaning set out in the BCBC;

1.1.1.89 “Phase 1A” means the Tower, linked to the Support Facilities Building to be constructed on the BH;

1.1.1.90 “Phase 1B” means the extension to the Support Facilities Building to be constructed on the BH;

1.1.1.91 “Phase 2’ means Phase 2 of the Burnaby Hospital Redevelopment Project. It is currently anticipated that this will comprise the construction of a new eight (8) level Inpatient Tower and integrated Cancer Centre of approximately 37,736 square metres, with two (2) levels of underground parking (with approximately 248 new parking stalls), two and a half (2.5) levels of support services (including a new Medical Imaging Department of approximately 1,530 CGSM) and two and a half (2.5) levels of Inpatient beds, adding 160 new beds to the BH campus, and the renovation of the existing Medical Imaging space on Level 3 of the Support Facilities Building (of approximately 913 m2) to accommodate an expanded Emergency Department (ED) bringing the service capacity of the ED up to 68 treatment bays by 2035.

1.1.1.92 “Preliminary Plan Approval” means an approval granted by the City of Burnaby Director Planning and Building indicating that a proposed development meets all the applicable requirements of the Burnaby Zoning Bylaw;

1.1.1.93 "Quality Daylight" means that the daylight in a space within 4.5 m of the exterior perimeter wall will have at least 55% coverage with natural light levels between 300 and 3000 lux as set out under the Daylight credit for LEED BD+C: Healthcare

v4.1, Option 2 or Option 3. Follow regularly occupied space definition in LEED, excluding locker rooms and bathrooms in patient rooms and staff lounge and any non-perimeter spaces;

1.1.1.94 “Rain Screen” has the meaning set out in Section 5.7.2.2 of this Schedule;

1.1.1.95 “Recurrent Room” means spaces or rooms that are of the same type, have the same required NSM and are repeated or listed as multiple units in the Appendix 3A [Clinical Specifications and Functional Space Requirements];

1.1.1.96 “Restricted Circulation” means movement between rooms, spaces, areas or Components by means of horizontal and/or vertical circulation corridors, stairs or elevators that are for use by Staff, registered Patients and services and not for use by the general public;

1.1.1.97 “Review Procedure” means the review procedure as described in Appendix 2C [User Consultation and Review Procedure];

1.1.1.98 “RTLS” has the meaning set out in Section 1.2 of Schedule 3 [Design and Construction Specifications];

1.1.1.99 “Serviceable” means the items referenced will be installed so they can be serviced without the worker needing to reach or stretch to the side, around, or over any obstruction. Items will not require the use of a fall restraint or a fall protection system to service and will be fully visible from the access point including ceiling tile or access door openings. No special tools will be required and items in ceilings will be reached from an 8’ ladder;

1.1.1.100 “Service Entrance Facilities” or “Service Entrance Facilities” means an entrance to a building for both public and private network service cables including the entrance point at the building wall or floor, and continuing to a Communications Room;

1.1.1.101 "Shelled Space" means space that is constructed to meet the Authority’s future needs and is enclosed within the building envelope of the Facility. Shelled Space includes all electrical, communications, plumbing, heating, ventilation and air conditioning services capacity and pathways that support the future needs. Shelled space includes emergency lighting, insulation and GWB that is taped but otherwise unfinished, unless required to meet the fire rating;

1.1.1.102 “STC” has the meaning set out in Appendix 3C [Acoustic and Noise Control Measures];

1.1.1.103 “Staff” means a Person or group of Persons carrying out work within BH, including volunteers, learners, couriers, vendors, patient transfer, police even if not directly employed by the Authority;

1.1.1.104 “Statement of Requirements” means the provisions of Schedule 3 [Design and Construction Specifications];

1.1.1.105 “Structural Engineer-of-Record” means a professional engineer registered in British Columbia who is a designated structural engineer having “Struct Eng” standing with EGBC;

1.1.1.106 “Substantial Completion” means SFB Expansion Substantial Completion or New Tower Substantial Completion or both, as the case may be.

1.1.1.107 “Systems Furniture” has the meaning set out in Section 6.12 of this Schedule;

1.1.1.108 “Tamper Resistant” means a non-electrical component resistant to being operated, accessed, compromised or removed without the use of proper, specialized tools, or an electrical receptacle designed, constructed, and marked as tamper-resistant in accordance with CSA C22.2 No. 42;

1.1.1.109 “Task Lighting” means lighting by means of a luminaire that is not hard-wired to a building outlet box and is complete with integral controls and a 5-15P type corded plug that can be connected to any standard 120V, 5-15R power outlet;

1.1.1.110 “Telecommunications Room” or "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 Facility;

1.1.1.111 “Teleconference” means a meeting that uses a speakerphone, or standard business communications software such as Skype or Microsoft Teams or equivalent, as used by the Authority for collaborative meetings;

1.1.1.112 “Telecommunication Service Provider” means an organization that will provide a wide range of telecommunication services to individuals or other organizations;

1.1.1.113 “Telemetry” means the wireless component of the patient physiological monitoring system, which is comprised of wireless access points, horizontal structured cabling, and access point enclosures;

1.1.1.114 “TIA” means Telecommunications Industry Association, the organization that develops industry standards for a wide variety of Information and Communication Technology (ICT) products, that is comprised of communications equipment manufacturers, service providers, government agencies, academic institutions, and Authority;

1.1.1.115 “Universal Design” means the Design of products, environments, programs and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized Design, by following the principles of equitable, flexible, and simple and intuitive use, perceptible communication of information, tolerance for error, and low physical effort. “Universal Design” will not exclude assistive devices for particular groups of Persons with Disabilities where these devices are needed;

1.1.1.116 "Unusable Area" means horizontal area that does not contribute to the function of the room as described in Appendix 3A [Clinical Specifications and Functional Space Requirements];

1.1.1.117 "Utility" or "Utilities" means:

1.1.1.117(1) Utility Electrical Power;

1.1.1.117(2) Water Main;

1.1.1.117(3) Sanitary Sewer;

1.1.1.117(4) Storm Sewer;

1.1.1.117(5) Gas, Oil and Any Other Fossil-Based Fuel;

1.1.1.117(6) Oxygen; and

1.1.1.117(7) Telephone and Data.

1.1.1.118 "Vandal Resistant" means designed to withstand abuse and tampering without damage and includes features to resist prying, impact and shattering;

1.1.1.119 "Void Space" means space that is trapped between walls and/or structure and is not intended to be finished or used;

1.1.1.120 "Wayfinding" refers to the spatial problem-solving process people undertake as they travel through an environment seeking a destination. Signage, landmarks and other assets help individuals with the Wayfinding process;

1.1.1.121 "West Wing Steam Plant" means the area of the West Wing Building that contains the existing steam plant, and identified as such in Appendix 2H Site Plan, also known as the 'power plant'.

1.1.1.122 "Wi-Fi" means an organization made up of a consortium of leading wireless equipment and software providers for the purpose of certifying all IEEE 802.11-based products for interoperability. Formerly called the Wireless Ethernet Compatibility Association.

1.1.1.123 "Work Plan" has the meaning set out in the Agreement.

1.1.2 Statement of Requirements

1.1.2.1 This Schedule is written as an output specification and defines what Project Co will achieve in the design and construction. Except as expressly stated otherwise, Project Co will carry out the Design and the 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 Project Co or is stated in the imperative form.

1.1.2.2 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 owner 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.

1.1.2.3 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.

1.1.2.4 Project Co will provide a complete and fully functional Facility fit for its intended use and purpose as specified in this Agreement.

1.2 Acronym List

1.2.1 AAADM – American Association of Automatic Door Manufacturers

1.2.2 AAS – Aluminum Association Standards

1.2.3 AAMA – American Architectural Manufacturers Association

1.2.4 AAMI – Association for The Advancement of Medical Instrumentation

1.2.5 AASHTO – American Association of State Highway and Transportation Officials

1.2.6 ACI – American Concrete Institute

1.2.7 ACS - Access Control System

1.2.8 ACU - Anesthetic Care Unit

1.2.9 ADC – Automated Dispensing Cabinet

1.2.10 ADA - Americans with Disabilities Act

1.2.11 ADL – Activities of Daily Living

1.2.12 AECB – Atomic Energy Control Board

1.2.13 AFCI – Arc Fault Circuit Interrupter

1.2.14 AFF – Above Finished Floor Level

1.2.15 AFDDR – Automated Fault Detection, Diagnosis and reporting

1.2.16 AFUE – Annual Fuel Utilization Efficiency

1.2.17 AGSS - Anaesthetic Gas Scavenging System

1.2.18 AHER – Antenna Headend Equipment Room

1.2.19 AHC – Architectural Hardware Consultant

1.2.20 AHJ – Authority Having Jurisdiction

1.2.21 AHU – Air Handling Unit

1.2.22 AIBC – Architectural Institute of British Columbia

1.2.23 AIR – Airborne Isolation Room

1.2.24 ANSI – American National Standards Institute

1.2.25 ANSI/TIA-1179-A – Healthcare Facility Telecommunications Infrastructure Standards

1.2.26 API - Application Programming Interface

1.2.27 ARGWB – Abuse-Resistant Gypsum Wall Board

1.2.28 ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers

1.2.29 ASME – American Society of Mechanical Engineers

1.2.30 ASPE – American Society of Plumbing Engineers

1.2.31 ASTC – Apparent Sound Transmission Class

1.2.32 ASTM – ASTM International

1.2.33 ATPV – Arc Thermal Performance Value

1.2.34 ATS – Automatic Transfer Switch

1.2.35 AV / IT – Audio Visual / Information Technology

1.2.36 AWCC – Association of Wall and Ceiling Contractors

1.2.37 AWMA – Architectural Woodwork Manufacturers Association

1.2.38 AWMAC – Architectural Woodwork Manufacturers Association of Canada

1.2.39 AWWA – American Water Works Association

1.2.40 BBBL – City of Burnaby Building Bylaw

1.2.41 BCAS – British Columbia Ambulance Service

1.2.42 BCBC – British Columbia Building Code

1.2.43 BCERMS – British Columbia Emergency Response Management System

1.2.44 BCICA – British Columbia Insulation Contractors Association

1.2.45 BCLNA – British Columbia Landscape & Nursery Association

1.2.46 BCSLA – British Columbia Society of Landscape Architects

1.2.47 BICSI – Building Industry Consulting Service International

1.2.48 BIM – Building Information Management

1.2.49 BMP -- Best Management Practices

1.2.50 BMS – Building Management System

1.2.51 BOMA – Building Owner and Managers Association

1.2.52 BH – Burnaby Hospital

1.2.53 CACF – Central Alarm and Control Facility

1.2.54 CAD – Computer-aided Design

1.2.55 CAFM – Computer-aided Facility Management

1.2.56 CATV – Cable Television

1.2.57 CB – Catch Basin

1.2.58 CCD – Charge Couple Device

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

1.2.60 CCTV – Closed Circuit Television

1.2.61 CDC – Certified Door Consultant

1.2.62 CDP – Centralized Distribution Panelboard

1.2.63 CEC – Canadian Electrical Code

1.2.64 CFC – Chlorofluorocarbon

1.2.65 CFD – Computational Fluid Dynamics

1.2.66 CFL – Compact Fluorescent Lamp

1.2.67 CFR – United States Code of Federal Regulations

1.2.68 CGA – Compressed Gas Association

1.2.69 CGBCI – Canada Green Business Certification Institute

1.2.70 CGSB - Canadian General Standards Board

1.2.71 CGSM – Component Gross Square Metres

1.2.72 CI – Cochlear Implant

1.2.73 CIC – Certified Irrigation Contractor – Commercial

1.2.74 CIF – Common Intermediate Format

1.2.75 CISCA – Ceiling Interior Systems Construction Association

1.2.76 CAGBC – Canada Green Building Council

1.2.77 CL – Containment Level

1.2.78 CLIA – Certified Irrigation Designer and Certified Landscape Irrigation Auditor

1.2.79 CLS – Canadian Landscape Standard

1.2.80 CMCA – Canadian Masonry Contractors Association

1.2.81 CMMS – Computerised Maintenance Management System

1.2.82 CNSC – Canadian Nuclear Safety Commission

1.2.83 CODEC – Coder/Decoder

1.2.84 CPPS – Campus Perimeter Pathway System

1.2.85 CPTED – Crime Prevention Through Environmental Design

1.2.86 CPU – Central Processing Unit

1.2.87 CRAC – Computer Room Air Conditioning

1.2.88 CRCA – Canadian Roofing Contractors Association

1.2.89 CRI – Colour Rendering Index

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

1.2.91 CRN - Canadian Registration Number

1.2.92 CRT – Cathode Ray Tube

1.2.93 CRTC – Canadian Radio-Television and Telecommunications Commission

1.2.94 CSA – Canadian Standards Association

1.2.95 CSDFMA – Canadian Steel Door and Frame Manufacturers Association

1.2.96 CSLA – Canadian Society of Landscape Architects

1.2.97 CSSBI – Canadian Sheet Steel Building Institute

1.2.98 DALI – Digital Addressable Lighting Interface

1.2.99 DAS – Distributed Antenna System

1.2.100 DCOF – Dynamic Coefficient Of Friction

1.2.101 DDC – Direct Digital Controls

1.2.102 DFO – Department of Fisheries and Oceans

1.2.103 DHI – Door and Hardware Institute

1.2.104 DI – Ductile Iron

1.2.105 DID – Direct Inward Dialling

1.2.106 DiiA – Digital Illumination Interface Alliance

1.2.107 DISS – Diameter Index Safety System

1.2.108 DoE – United States Department of Energy

1.2.109 DSSS – Direct Sequence Spread Spectrum

1.2.110 DVMS – Digital Video Management System

1.2.111 EBD – Evidence-Based Design

1.2.112 ECG – Electrocardiography

1.2.113 ECOMM – Emergency Communication

1.2.114 ED – Emergency Department

1.2.115 EEG – Electroencephalogram

1.2.116 EF – Entrance Facility

1.2.117 EGBC - Engineers and Geoscientists British Columbia

1.2.118 EHC – Electrified Hardware Consultant

1.2.119 EMG - Electromyography

1.2.120 EMR – Electronic Medical Record

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

1.2.122 EMI – Electromagnetic Interference

1.2.123 EMS – Elevator Management System

1.2.124 EMT – Electrical Metallic Tubing

1.2.125 EOC - Emergency Operations Centre

1.2.126 EPA – United States Environmental Protection Agency

1.2.127 “EPDS – Electrical Power Duct System

1.2.128 EPMS – Energy and Power Management System

1.2.129 ESA – Environmental Site Assessment

1.2.130 ESC – Erosion and Sediment Control

1.2.131 ESS – Electronic Security Systems

1.2.132 EPDU – Electronic Power Distribution Unit

1.2.133 ERC – Environmental Review Committee

1.2.134 EV – Electric Vehicle

1.2.135 EVAC – Emergency Voice/Alarm Communications

1.2.136 EVCS – Electrical Vehicle Charging Station

1.2.137 EVSE – Electric Vehicle Supply Equipment

1.2.138 FACP – Fire Alarm Control Panel

1.2.139 FCC – Federal Communications Commission

1.2.140 FDC – Fire Department Connection

1.2.141 FEMA – Federal Emergency Management Agency

1.2.142 FF&E – Furniture, Fixtures and Equipment

1.2.143 FHA – Fraser Health Authority

1.2.144 FM – Facilities Management

1.2.145 FMO – Facilities Maintenance and Operations

1.2.146 FoM – Faculty of Medicine

1.2.147 FOV - Field Of View

1.2.148 FPS - Frames Per Second

1.2.149 FUS – Fire Underwriters Survey

1.2.150 GAI – Gamut Area Index

1.2.151 GCABC – Glazing Contractors Association of British Columbia

1.2.152 GFCI – Ground Fault Circuit Interrupter

1.2.153 GPS – Global Positioning System

1.2.154 GUI - Graphical User Interface

1.2.155 GV – Gate Valve

1.2.156 GVW – Gross Vehicle Weight

1.2.157 GWB – Gypsum Wall Board

1.2.158 HAZMAT - Hazardous Materials

1.2.159 HCFC – Hydrochlorofluorocarbons

1.2.160 HD – High Definition

1.2.161 HDPE – High Density Polyethylene

1.2.162 HEPA – High Efficiency Particulate Air

1.2.163 HLD – High Level Disinfectant

1.2.164 HOA – Hand/Off/Auto

1.2.165 HP – Horsepower

1.2.166 HRC – High Rupture Capacity (Fuse Type)

1.2.167 HVAC – Heating, Ventilation and Air Conditioning

1.2.168 HVATS – High Voltage Automatic Transfer Switch

1.2.169 IBMP - Integrated Building Management Platform

1.2.170 IC – Infection Control

1.2.171 ICP – Infection Control Practitioner

1.2.172 ICRA – Infection Control Risk Assessment

1.2.173 IDA - International Dark-Sky Association

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

1.2.175 IESMA – Illumination Engineering Society of North America

1.2.176 IEEE – Institute of Electrical and Electronic Engineers

1.2.177 IHC - ImmunoHistoChemistry

1.2.178 IIABC – Irrigation Industry Association of British Columbia

1.2.179 IGMAC – International Glazing Manufacturers Association of Canada

1.2.180 I/O – Input/Output

1.2.181 IP – Internet Protocol

1.2.182 IPC – Infection Prevention and Control

1.2.183 IPS – Integrated Protection Services

1.2.184 IPTV – Internet Protocol Television

1.2.185 IPU – Inpatient Unit

1.2.186 IRGWB – Impact-Resistant Gypsum Wall Board

1.2.187 IM/IT – Information Management / Information Technology

1.2.188 IRMP - Integrated Rainwater Management Plan

1.2.189 ISO – International Organization for Standardization

1.2.190 IT – Information Technology

1.2.191 ITA – Independent Testing Agency

1.2.192 ITIL – Information Technology / Telecommunication and Infrastructure Library

1.2.193 IV – Intravenous

1.2.194 JOHSC – Joint Occupational Health and Safety Committee

1.2.195 KPI – Key Performance Indicator

1.2.196 kw – Kilowatt

1.2.197 kWH – Kilowatt Hours

1.2.198 kV – Kilovolt

1.2.199 kVA – Kilovolt Ampere

1.2.200 LAN – Local Area Network

1.2.201 LCD – Liquid Crystal Display

1.2.202 LED – Light Emitting Diode

1.2.203 LEED – LEED® Leadership in Energy and Environmental Design

1.2.204 LEED V4 BD+C: Healthcare – LEED Version 4 Building Design + Construction: Healthcare

1.2.205 LEED V4.1 BD+C: – LEED Version 4.1 Building Design + Construction

1.2.206 LMFM - Lower Mainland Facilities Management

1.2.207 LRV - Light Reflectance Values

1.2.208 M&V – Measurement & Verification

1.2.209 MB – Megabyte

1.2.210 MCC – Motor Control Centre

1.2.211 MCP – Motor Circuit Protector

1.2.212 MDF - Medium-density Fibreboard

1.2.213 MDRD – Medical Device Reprocessing Department

1.2.214 MEO – Medical Emergency Operation

1.2.215 MER – Main Equipment Room

1.2.216 MH – Manhole

1.2.217 MIBC – Masonry Institute of British Columbia

1.2.218 MMCD – Master Municipal Construction Documents

1.2.219 MMRGWB – Moisture and Mould-Resistant Gypsum Wall Board

1.2.220 MOC – Model of Care

1.2.221 MPI – Master Painters Institute

1.2.222 MPR – Multi-Purpose Room

1.2.223 MSE – Mobility Service Engines

1.2.224 MUTCDC – Manual of Uniform Traffic Control Devices of Canada

1.2.225 NAPRA – National Association of Pharmacy Regulatory Authorities

1.2.226 NC – Noise Criteria

1.2.227 NCRP – National Council on Radiation Protection and Measurement

1.2.228 NEMA – National Electrical Manufacturers Association

1.2.229 NFCA – National Floor Covering Association

1.2.230 NFPA – National Fire Protection Association

1.2.231 NIC – Noise Insulation Class

1.2.232 NICU – Neonatal Intensive Care Unit

1.2.233 NRC – Noise Reduction Coefficient (acoustic parameter)

1.2.234 NSM – Net Square Metres

1.2.235 NWNA – National Woodwork Manufacturers Association

1.2.236 OA – Outdoor Air

1.2.237 OFDM – Orthogonal Frequency Division Multiplexing

1.2.238 OHSAH – Occupational Health and Safety Agency for Healthcare

1.2.239 OLT – Optical Line Terminal

1.2.240 ONT – Optical Network Terminal

1.2.241 OR – Operating Room

1.2.242 OSDP – Open Supervised Device Protocol

1.2.243 OSHA – Occupational Safety and Health Administration

1.2.244 OS&Y – Open Stem and Yoke

1.2.245 PACS – Picture Archiving and Communication System

1.2.246 PAR - Periodic Automatic Replenishment

1.2.247 PBX – Private Branch Exchange

1.2.248 PC – Personal Computer

1.2.249 PCB – Polychlorinated Biphenyls

1.2.250 PCR – Polymerase Chain Reaction

1.2.251 PDA – Personal Digital Assistant

1.2.252 PDU – Power Distribution Unit

1.2.253 PHSA – Provincial Health Services Authority

1.2.254 PMS – Power Management System

1.2.255 POC – Point Of Care

1.2.256 POCT – Point Of Care Testing

1.2.257 PoE – Power over Ethernet

1.2.258 POS - Point Of Sale

1.2.259 PPA - Preliminary Plan Approval

1.2.260 PPE – Personal Protective Equipment

1.2.261 PTS - Pneumatic Tube System

1.2.262 PSTN – Public Switched Telephone Network

1.2.263 PTZ – Pan Tilt Zoom

1.2.264 PV – Photovoltaic

1.2.265 PVC – Polyvinyl Chloride

1.2.266 RC – Reinforced Concrete

1.2.267 RF – Radio Frequency

1.2.268 RFID – Radio Frequency Identification

1.2.269 RCABC – Roofing Contractors Association of British Columbia

1.2.270 RCDD – Registered Communications Distribution Designer

1.2.271 RGS – Rigid Galvanized Steel Conduit

1.2.272 RO – Reverse Osmosis

1.2.273 RoHS – Restriction of Hazardous Substances

1.2.274 REST – Representational State Transfer

1.2.275 RPA – Radiation Protection Adviser

1.2.276 RPBD – Reduced Pressure Backflow Device

1.2.277 RPVC – Rigid Polyvinyl Chloride Conduit

1.2.278 RSSI - Received Signal Strength Indication

1.2.279 RT – Respiratory Therapy/Therapist

1.2.280 $RT_{60}$ – Reverberation Time

1.2.281 RTLS – Real Time Location System

1.2.282 RU – Rack Unit

1.2.283 SACT – Suspended Acoustic Ceiling Tile

1.2.284 SAGA – System of Approach Azimuthal Guidance

1.2.285 SBS - Styrene Butadiene Styrene

1.2.286 SES – Safety Engineering Society

1.2.287 SDK – Software Developer Kit

1.2.288 SFB – Support Facilities Building

1.2.289 SFRS – Seismic Force Resisting System

1.2.290 SIP – Session Initiated Protocol

1.2.291 SPD – Surge Protective Device

1.2.292 SMACNA – Sheet Metal and Air Conditioning National Contractors Association

1.2.293 SMDR – Station Message Detail Recording

1.2.294 SNR – Signal to Noise Ratio

1.2.295 SPEA – Streamside Protection and Enhancement Areas

1.2.296 SQLI – Structured Query Language

1.2.297 SRI - Solar Reflectance Index

1.2.298 SSACT – Suspended Security Acoustic Ceiling Tile

1.2.299 STAT – Statim (“Immediately”)

1.2.300 STC – Sound Transmission Class

1.2.301 $STC_C$ – Composite Sound Transmission Class

1.2.302 STI – Sound Transmission Index

1.2.303 TAB – Testing, Adjusting and Balancing

1.2.304 TAC – Transportation Association of Canada

1.2.305 TCO – Total Cost of Ownership

1.2.306 TCP – Transmission Control Protocol

1.2.307 TDM – Time Division Multiplexing

1.2.308 THD – Total Harmonic Distortion

1.2.309 TIA – Telecommunications Industry Association

1.2.310 TLOF – Touchdown and Lift-Off Area

1.2.311 TO - Telecommunications Outlet

1.2.312 TR – Telecommunications Room

1.2.313 TTMAC – Terrazzo and Tile Manufacturers Association of Canada

1.2.314 TVOC – Total Volatile Organic Compounds

1.2.315 UBC – University of British Columbia

1.2.316 UHF – Ultra High Frequency

1.2.317 UL – Underwriters' Laboratories

1.2.318 ULC – Underwriters' Laboratories of Canada

1.2.319 UNDRIP – United Nations Declaration on the Rights of Indigenous Peoples

1.2.320 UPS – Uninterruptible Power Supply

1.2.321 USGBC – U.S. Green Building Council

1.2.322 USB - Universal Serial Bus

1.2.323 USP - United States Pharmacopeia

1.2.324 UV – Ultra Violet

1.2.325 V – Volt

1.2.326 VAV - Variable Air Volume

1.2.327 VAR – Volt Ampere Reactive Power

1.2.328 VC – Videoconference

1.2.329 VESA – Video Electronics Standards Association

1.2.330 VFD – Variable Frequency Drive

1.2.331 VLAN – Virtual Local Area Network

1.2.332 VOC – Volatile Organic Compounds

1.2.333 VoIP – Voice Over Internet Protocol

1.2.334 VSM – Vital Signs Monitor

1.2.335 WAN – Wide Area Network

1.2.336 WAP – Wireless Access Point

1.2.337 WAP2 – Wireless Application Protocol 2

1.2.338 WLC – Wireless LAN Controllers

1.2.339 WMM – Wi-Fi Multimedia

1.2.340 WSBC – WorkSafe BC

## PART 2. GENERAL

2.1 Clinical Specifications and Schedules of Accommodation

2.1.1 Project Co will design and construct the Facility:

2.1.1.1 So that it accommodates all of the spaces, activities, functions, design features and adjacencies described in the Appendix 3A [Clinical Specifications and Functional Space Requirements] and the BH Energy Centre;

2.1.1.2 In accordance with the requirements of Appendix 3A [Clinical Specifications and Functional Space Requirements], subject to any adjustments or refinements made in consultation with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

2.1.1.3 The NSM area for each room will not be more than 2% smaller or larger than the required area listed in Appendix 3A [Clinical Specifications and Functional Space Requirements]. Project Co will provide a rationale for each variation and demonstrate to the Authority's satisfaction that affected rooms retain their functionality. If, in the Authority's opinion, the room does not meet the required functionality, the full NSM will be provided as stated in Appendix 3A [Clinical Specifications and Functional Space Requirements].

2.1.2 Unusable Area includes:

2.1.2.1 Corridor circulation space required for access;

2.1.2.2 Non-functional areas created by acute or obtuse wall angles;

2.1.2.3 Non-functional L-shaped rooms; and

2.1.2.4 All other space where the functionality is encumbered by structure, columns, shafts or projections.

2.1.3 The NSM area for all rooms required per Appendix 3A [Clinical Specifications and Functional Space Requirements] will exclude Unusable Area.

2.2 Additional Rooms and Spaces

2.2.1 Notwithstanding anything in Appendix 3A [Clinical Specifications and Functional Space Requirements], the Design and Construction of the Facility will include all rooms and spaces as required to comply with the terms of the Agreement.

2.2.2 The following appendices are intended to represent the minimum requirements for the Facility and include additional civil, architectural, mechanical, electrical and communications criteria:

2.2.2.1 Appendix 3A [Clinical Specifications and Functional Space Requirements];

2.2.2.2 Appendix 3B [Minimum Room Requirements];

2.2.2.3 Appendix 3C [Acoustic and Noise Control Measures];

2.2.2.4 Appendix 3D [Not used]

2.2.2.5 Appendix 3E [Work Area Diagrams];

2.2.2.6 Appendix 3F [Equipment List IM/IT];

2.2.2.7 Appendix 3G [Not Used];

2.2.2.8 Appendix 3H [Commissioning];

2.2.2.9 Appendix 3I [Wayfinding Standards for Burnaby Hospital];

2.2.2.10 Appendix 3J [Wood First Appropriate Use];

2.2.2.11 Appendix 3K [Systems Responsibility Matrix];

2.2.2.12 Appendix 3L [Approved Sink and Faucet Combinations];

2.2.2.13 Appendix 3M [Indicative BMS Points List];

2.2.2.14 Appendix 3N [Not Used];

2.2.2.15 Appendix 3O [IT Design including the PHSA Communications Infrastructure Standards & Specifications];

2.2.2.16 Appendix 3P [Multimedia Room Matrix];

2.2.2.17 Appendix 3Q [Not Used];

2.2.2.18 Appendix 3R [Campus Perimeter Pathway System Technical Specifications];

2.2.2.19 Appendix 3S [UBC Requirements]; and

2.2.2.20 Appendix 3T [Lecture Room Requirements].

2.2.3 In addition to the requirements listed within the appendices above, Project Co will provide all appropriate services and connections to ensure full functionality of all equipment listed in Schedule 2, Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment]. Notwithstanding anything in appendices above, the design and construction of the Facility will include all requirements described in this Schedule.

2.3 Standards and Guidelines

2.3.1 Project Co will undertake the Design and Construction:

2.3.1.1 In accordance with the standards set out in this Schedule;

2.3.1.2 In accordance with the BCBC, BC Fire Code, BC Plumbing Code, National Fire Code and all applicable laws and City bylaws, including:

2.3.1.2(1) City of Burnaby Waterworks Regulation Bylaw No. 3325C;

2.3.1.2(2) Bylaw CD-1 (NSPH);

2.3.1.2(3) Zoning & Development Bylaw 3575;

2.3.1.2(4) Zoning and Development Fee Bylaw 5585;

2.3.1.2(5) City's Rainwater Management Plan;

2.3.1.2(6) Energy Utility System Bylaw 9552;

2.3.1.2(7) Erosion and Sediment Control System Permit;

2.3.1.2(8) Green Buildings Policy for Rezonings – Process and Requirements;

2.3.1.2(9) Rainwater Management Bulletin;

2.3.1.2(10) Rezoning Policy for Sustainable Large Developments;

2.3.1.2(11) City of Burnaby Design Criteria Manual;

2.3.1.2(12) City of Burnaby Supplemental Specifications and Detail Drawings;

2.3.1.2(13) Burnaby Building Bylaw No. 13658 (BBBL);

2.3.1.2(14) City of Burnaby Plumbing Bylaw No. 11148;

2.3.1.2(15) City of Burnaby Sewer Connection Bylaw No. 42476;

2.3.1.2(16) City of Burnaby Solid Waste and Recycling Bylaw No. 12875;

2.3.1.2(17) City of Burnaby Soil Removal Bylaw No. 4251C;

2.3.1.2(18) City of Burnaby Watercourse Bylaw No. 9044C;

2.3.1.2(19) City of Burnaby Noise or Sound Abatement Bylaw No. 7332;

2.3.1.2(20) Greater Vancouver Sewerage and Drainage District Bylaw No.268 Food Sector Grease Interceptor Bylaw;

2.3.1.2(21) Greater Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1161, 2012

2.3.1.2(22) Greater Vancouver Sewerage and Drainage District Bylaw No. 319 Hospital Pollution Prevention Bylaw; and

2.3.1.2(23) City of Burnaby Tree Bylaw.

2.3.1.3 Having regard for the concerns, needs and interests of:

2.3.1.3(1) all Persons who will be Facility Users;

2.3.1.3(2) all Authorities Having Jurisdiction;

2.3.1.3(3) the community; and

2.3.1.3(4) the City.

2.3.1.4 In accordance with Good Industry Practice such that every product is installed in accordance with the manufacturer's installation instructions; and

2.3.1.5 To the same standard that an experienced, prudent and knowledgeable long-term owner of a high-quality health care facility in North America operated publicly would employ.

2.3.2 If more than one standard is applicable, the highest such standard will apply unless otherwise directed by the Authority.

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

2.3.4 The most recent version of any standard or guideline listed in Schedule 3 [Design and Construction Specifications], excluding any Codes and bylaws, which is in effect at the time of Effective Date will govern.

2.3.5 CSA Z8000: Canadian Healthcare Facilities

2.3.5.1 CSA Z8000 complements the standards and codes specified in Schedule 3 [Design and Construction Specifications] by providing overarching design principles and referencing specific standards and codes that are appropriate for health care facility design.

2.3.5.2 Project Co will:

2.3.5.2(1) Refer to CSA Z8000 for Design Guidance to resolve issues not otherwise addressed in this Schedule; and

2.3.5.2(2) Use CSA Z8000 as a guideline, together with:

2.3.5.2(2)(a) Any minimum standards and codes referenced in CSA Z8000 (except for any minimum space requirements that may be required by those standards and codes);

2.3.5.2(2)(b) All infection control provisions set out in CSA Z8000; and

2.3.5.2(2)(c) Accommodation of Bariatric Persons section of CSA Z8000.

2.3.6 Without limiting Section 2.2.1 of this Schedule, Project Co will undertake the Design and Construction in compliance with all applicable standards and guidelines, including:

2.3.6.1 The standards set out in this Schedule;

2.3.6.2 The following Health Authority standards and guidelines:

2.3.6.2(1) Fraser Health Chemical Storage Design Requirements;

2.3.6.2(2) Fraser Health Ergonomic Standard for Workstations;

2.3.6.2(3) Fraser Health Standard: Emergency Department – Patient Check-in Station;

2.3.6.2(4) Fraser Health Ergonomic Standard for Design of Shelving and Racks;

2.3.6.2(5) Fraser Health Fall Protection Requirements for Facility Design;

2.3.6.2(6) Fraser Health Fume Hoods/LEV Enclosures Design Requirements;

2.3.6.2(7) Fraser Health Laser Room Safety Design Considerations;

2.3.6.2(8) Fraser Health Standard: Patient Handling Equipment for Facility Design and Procurement;

2.3.6.2(9) Fraser Health Ergonomics Standard for Bariatric Design;

2.3.6.2(10) Fraser Health Guidelines for Location of Sharps Disposal Containers;

2.3.6.2(11) Fraser Health Emergency Department Quality Process Improvements and Model of Care;

2.3.6.2(12) Fraser Health Contractor Safety Program;

2.3.6.2(13) Fraser Health Contractor Safety Checklist;

2.3.6.2(14) Fraser Health Emergency Department Decontamination and Isolation Suite Design Standard;

2.3.6.2(15) Fraser Health Emergency Washing Facilities Requirements for Renovations and New Construction;

2.3.6.2(16) Fraser Health Design Requirements for Consult Rooms;

2.3.6.2(17) Fraser Health & Safety Position Statement: Decontamination Tanks;

2.3.6.2(18) Fraser Health Design Requirements when Nitrous Oxide Used as Anesthetic Gas;

2.3.6.2(19) Fraser Health Plume Scavenging System Design Requirements;

2.3.6.2(20) Fraser Health Transportation Demand Management & Commuter Services Design Guidelines – Bicycle Parking Facilities;

2.3.6.2(21) LMFM Technical Guidelines;

2.3.6.2(22) LMFM Fall Protection;

2.3.6.2(23) LMFM Waste Management Space Design Guidelines;

2.3.6.2(24) BC Ministry of Health Best Practices for Hand Hygiene in All Heath Care Settings and Programs

2.3.6.2(25) Behavioural Health Design Guide;

2.3.6.2(26) New York State Office of Mental Health Patient Safety Standards, Materials and Systems Guidelines;

2.3.6.2(27) Moving Towards Climate Resilient Health Facilities for Fraser Health – Technical Brief;

2.3.6.2(28) Investing in Climate Resilient Health Facilities & Operational Services for Fraser Health; and

2.3.6.2(29) Energy and Environmental Sustainability Design Guidelines – New Construction and Major Renovations.

2.3.6.3 Americans with Disabilities Act (ADA);

2.3.6.4 AIA Guidelines for Design and Construction of Healthcare Facilities;

2.3.6.5 AAMI TIR 34; Water for Reprocessing of Medical Devices;

2.3.6.6 American Conference of Governmental Hygienists, Industrial Ventilation: A Manual of Recommended Practice;

2.3.6.7 ANSI Z358 1- 2009 American National Standard for Emergency Eyewash and Shower Equipment

2.3.6.8 AODA – Accessibility for Ontarians with Disabilities Act;

2.3.6.9 BC Guidelines for Decontamination of Patients in Health Facilities;

2.3.6.10 British Columbia Insulation Contractors Association (BCICA) Quality Standards Manual for Mechanical Insulation;

2.3.6.11 Canadian Biosafety Standards and Guidelines, Government of Canada;

2.3.6.12 Canadian Landscape Standard Current Edition;

2.3.6.13 Canadian Society of Hospital Pharmacists Guidelines for the preparation of sterile products in Pharmacies;

2.3.6.14 CSA B651-18 Accessible design for the built environment;

2.3.6.15 Fire Underwriter Survey – Water Supply for Public Fire Protection, 1999;

2.3.6.16 Laboratory Biosafety Guidelines, Health Canada, Government of Canada;

2.3.6.17 Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the B.C. Mental Health Act, Ministry of Health, Province of British Columbia;

2.3.6.18 Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) Manuals;

2.3.6.19 ANSI / ASHRAE standards and guidelines, including the following:

2.3.6.19(1) Standard 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

2.3.6.19(2) Standard 55: Thermal Environmental Conditions for Human Occupancy;

2.3.6.19(3) Standard 62.1: Ventilation for Acceptable Indoor Air Quality;

2.3.6.19(4) Standard 90.1: Energy Standard for Buildings Except Low Rise Residential Buildings;

2.3.6.19(5) Standard 110: Method of Testing Performance of Laboratory;

2.3.6.19(6) Standard 111: Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;

2.3.6.19(7) Standard 129: Measuring Air Change Effectiveness;

2.3.6.19(8) Standard 135: BACnet™A Data Communication Protocol for Building Automation & Control Networks; and

2.3.6.19(9) Standard 170: Ventilation of Healthcare Facilities.

2.3.6.20 ASHRAE standards and guidelines, including the following:

2.3.6.20(1) Advanced ENERGY Guide for Hospitals and Healthcare Facilities;

2.3.6.20(2) Handbooks: Fundamentals, Refrigeration, HVAC Applications, Design of Smoke Control Systems;

2.3.6.20(3) Guideline 0-2019: The Commissioning Process;

2.3.6.20(4) Guideline 1.1: HVAC & R Technical Requirements for the Commissioning process;

2.3.6.20(5) Guideline 12-2000: Minimizing the Risk of Legionellosis Associated with Building Water Systems;

2.3.6.20(6) Handbooks: Fundamentals, Refrigeration, HVAC Applications, HVAC Systems and Equipment;

2.3.6.20(7) Standard 90.1: Energy Standard for Buildings;

2.3.6.20(8) Standard 180: Methods of Testing for Rating Ducted Air Terminal Units; and

2.3.6.20(9) System Design Manual for Hospitals and Clinics.

2.3.6.21 ANSI / AHRI standards and guidelines, including the following:

2.3.6.21(1) Standard 530: Method of measuring sound and vibration of refrigeration compressors;

2.3.6.21(2) Standard 550/590: Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle;

2.3.6.21(3) Standard 575: Method of Measuring Machinery Sound within an Equipment Space;

2.3.6.21(4) Standard 880: Standard for Air Terminals; and

2.3.6.21(5) Standard 885: Standard for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

2.3.6.22 ANSI / AIHI standards and guidelines, including the following:

2.3.6.22(1) Z9.5-2012 Laboratory Ventilation;

2.3.6.23 ANSI-ASC A14.3-2008 Standards for Ladders – Fixed – Safety Requirements;

2.3.6.24 ANSI/ASME Standards and Guidelines, including the following:

2.3.6.24(1) A13.1 – Visibility Standard (Pipe Labeling);

2.3.6.24(2) B16 – Piping Component Standards;

2.3.6.24(3) B16.1 – Cast Iron Pipe Flanges and Flanged Fittings;

2.3.6.24(4) B31.1 – Power Piping;

2.3.6.24(5) B31.9 – Building Services Piping;

2.3.6.24(6) B36 – Piping Standards;

2.3.6.24(7) BC Technical Safety – Safety Standard Act – Chapter 39; and

2.3.6.24(8) Boiler and Pressure Vessel Code:

2.3.6.24(8)(a) Section VIII: Pressure Vessels;

2.3.6.24(8)(b) Section IX: Welding Qualifications; and

2.3.6.24(8)(c) Unfired pressure vessels.

2.3.6.25 ANSI/AWWA standards and guidelines, including the following:

2.3.6.25(1) C104 – Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings;

2.3.6.25(2) C110 – Ductile-Iron and Gray-Iron Fittings;

2.3.6.25(3) C151 – Ductile-Iron Pipe, Centrifugally Cast;

2.3.6.25(4) C153 – Ductile Iron Compact Fittings for Water Service;

2.3.6.25(5) C-606 – Standard for Grooved and Shouldered Joints; and

2.3.6.25(6) C651 – Disinfecting Water Mains.

2.3.6.26 ANSI/BIFMA X6.1 - 2018 Educational Seating;

2.3.6.27 ANSI/ESNA American National Standard Practice for Lighting;

2.3.6.28 ANSI/NEMA LD 3-05: High-Pressure Decorative Laminates;

2.3.6.29 ANSI/NEMA LD 3.1-95: Application, Fabrication, and Decorative Laminates;

2.3.6.30 ANSI Standards and Guidelines, including the following:

2.3.6.30(1) A21.11 – Rubber Gasket joints for Ductile-Iron Pressure Pipe and Fittings;

2.3.6.30(2) A137.1 – American National Standard Specifications for Ceramic Tile;

2.3.6.30(3) A326.3 – American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials;

2.3.6.30(4) A1264.2 – Provision of Slip Resistance on Walking/Working Surfaces;

2.3.6.30(5) Z97.1-1984 – Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test ANSI C37.121, Unit Substations Requirements;

2.3.6.30(6) Z358.1 – Emergency Eyewash and Shower Equipment; and

2.3.6.30(7) Z535.4 – American National Standard for Product Safety Signs and Labels.

2.3.6.31 ASME standards and guidelines, including the following:

2.3.6.31(1) ASME A112.3.1 – Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above-ground and Below Ground;

2.3.6.31(2) ASME A112.6.3 – Floor and Trench Drains;

2.3.6.31(3) ASME A112.36.2M – Cleanouts;

2.3.6.31(4) ASME B1.20.1 – Pipe Threads, General Purpose (inch);

2.3.6.31(5) ASME B16.3 – Malleable Iron Threaded Fittings;

2.3.6.31(6) ASME B16.5 – Pipe Flanges and Flanged Fittings;

2.3.6.31(7) ASME B16.9 – Factory Made Wrought Steel Buttwelding Fittings;

2.3.6.31(8) ASME B16.10 – Face-to-Face and End-to-End Dimensions of Valves;

2.3.6.31(9) ASME B16.11 – Forged Fittings, Socket-Welding and Threaded;

2.3.6.31(10) ASME B16.15 – Cast Bronze Threaded Fittings, Classes 125 and 250;

2.3.6.31(11) ASME B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings;

2.3.6.31(12) ASME B16.20 – Metallic Gaskets for Pipe Flanges; Ring-Joint, Spiral-Wound, and Jacketed;

2.3.6.31(13) ASME B16.21 – Non-metallic Flat Gaskets for Pipe Flanges;

2.3.6.31(14) ASME B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings;

2.3.6.31(15) ASME B16.23 – Cast Copper Alloy Solder Joint Drainage Fittings: DWV;

2.3.6.31(16) ASME B16.24 – Cast Copper Alloy Pipe Flanges and Flanged Fittings; Class 150, 300, 400, 600, 900, 1500, & 2500;

2.3.6.31(17) ASME B16.29 – Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings-DWV;

2.3.6.31(18) ASME B16.34 – Valves Flanged, Threaded and Welding Ends;

2.3.6.31(19) ASME B16.47 – Large Diameter Steel Flanges: NPS 26 Through NPS 60;

2.3.6.31(20) ASME B16.50 – Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings;

2.3.6.31(21) ASME B16.39 – Malleable Iron Threaded Pipe Unions: Classes 150, 250 and 300;

2.3.6.31(22) ASME B18.2.1 – Square and Hex Bolts and Screws;

2.3.6.31(23) ASME B18.2.2 – Square and Hex Nuts;

2.3.6.31(24) ASME B31.3 – Process Piping;

2.3.6.31(25) ASME BPE – Bioprocessing Equipment; and

2.3.6.31(26) ASME PTC 19.3 TW – Thermowells.

2.3.6.32 AWS standards and guidelines, including the following:

2.3.6.32(1) A5.8 – Specification for Filler Metals for Brazing and Braze Welding; AWS A5.31 – Specification for Fluxes for Brazing and Braze Welding;

2.3.6.32(2) C3.4 – Specification for Torch Brazing;

2.3.6.32(3) D1.3-98 - Structural Welding Code - Sheet Steel; and

2.3.6.32(4) D18.2 – Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube;

2.3.6.33 ASPE Plumbing Engineering Design Handbook, Volumes 1-4;

2.3.6.34 ASTM standards and guidelines, including the following:

2.3.6.34(1) A36 A36M-12 – Standard Specification for Carbon Structural Steel;

2.3.6.34(2) A47 / A47M – Standard Specification for Ferritic Malleable Iron castings;

2.3.6.34(3) A53 – Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless;

2.3.6.34(4) A90/M – Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings;

2.3.6.34(5) A105 – Standard Specification for Carbon Steel Forgings for Piping Applications;

2.3.6.34(6) A106 – Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service;

2.3.6.34(7) A126 – Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings;

2.3.6.34(8) A167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip;

2.3.6.34(9) A182 – Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service;

2.3.6.34(10) A193 / A193M-14 – Standard Specification for Alloy –Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications;

2.3.6.34(11) A194 – Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both;

2.3.6.34(12) A240/M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications;

2.3.6.34(13) A269 – Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service;

2.3.6.34(14) A270 – Specification for seamless & welded austenitic stainless steel sanitary tubing;

2.3.6.34(15) A276 – Standard Specification for Stainless Steel Bars and Shapes;

2.3.6.34(16) A278 – Standard Specification for Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650°F (350°C);

2.3.6.34(17) A283/M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates;

2.3.6.34(18) A285 – Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate Tensile Strength;

2.3.6.34(19) A307-12 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength;

2.3.6.34(20) A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes;

2.3.6.34(21) A326M-13 – Standard Specification for Structural Bolts, Steel, Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric);

2.3.6.34(22) A351 – Standard Specification for Castings, Austenitic, for Pressure Containing Parts;

2.3.6.34(23) A403 – Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings;

2.3.6.34(24) A463/M – Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process;

2.3.6.34(25) A480/M – Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip;

2.3.6.34(26) A490-12 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Steel Strength;

2.3.6.34(27) A490M-12 – Standard Specification for High Strength Structural Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel joints (Metric);

2.3.6.34(28) A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes;

2.3.6.34(29) A516 – Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service;

2.3.6.34(30) A536 – Standard Specification for Ductile Iron Castings;

2.3.6.34(31) A563 – Standard Specification for Carbon and Alloy Steel Nuts;

2.3.6.34(32) A564 – Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes;

2.3.6.34(33) A653 / A653M-13 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process;

2.3.6.34(34) A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar;

2.3.6.34(35) A792 / A792M-10 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process;

2.3.6.34(36) A955 / A955M-17 – Standard Specification for Deformed & Plain Stainless-Steel Bars for Concrete Reinforcement;

2.3.6.34(37) A924/M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process;

2.3.6.34(38) 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;

2.3.6.34(39) B32 – Specification for Solder Metal;

2.3.6.34(40) B62 – Standard Specification for Composition Bronze or Ounce Metal Castings;

2.3.6.34(41) B88 – Standard Specification for Seamless Copper Water Tube;

2.3.6.34(42) B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

2.3.6.34(43) B306 – Standard Specification for Copper Drainage Tube (DWV);

2.3.6.34(44) B749 – Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate;

2.3.6.34(45) B819 – Standard Specification for Seamless Copper Tube for Medical Gas Systems;

2.3.6.34(46) B828 – Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings;

2.3.6.34(47) C260 / C260M-10a – Standard Specification for Air-Entraining Admixtures for Concrete;

2.3.6.34(48) C411 – Standard Test Method for Hot Surface Performance of High Temperature Thermal Insulation;

2.3.6.34(49) C494 / C494M – 13 – Standard Specification for Chemical Admixtures for Concrete;

2.3.6.34(50) C503-05 – Standard Specification for Marble Dimension Stone;

2.3.6.34(51) C518 – Standard Test Method for Steady State Thermal Transmission Properties by Means of Heat Flo Meter Apparatus;

2.3.6.34(52) C533 – Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation;

2.3.6.34(53) C534 – Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form;

2.3.6.34(54) C547 – Standard Specification for Mineral Fiber Pipe Insulation;

2.3.6.34(55) C552 – Standard Specification for Cellular Glass Thermal Insulation;

2.3.6.34(56) C553 – Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications;

2.3.6.34(57) C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings;

2.3.6.34(58) C568-03 – Standard Specification for Limestone Dimension Stone;

2.3.6.34(59) C612 – Standard Specification for Mineral Fiber Block and Board Thermal Insulation;

2.3.6.34(60) C615-03 – Standard Specification for Granite Dimension Stone;

2.3.6.34(61) C616-03 – Standard Specification for Quartz-Based Dimension Stone;

2.3.6.34(62) C635/C635M-17 – Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings;

2.3.6.34(63) C636 – Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels;

2.3.6.34(64) C645-18 – Standard Specification for Nonstructural Steel Framing Members;

2.3.6.34(65) C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products;

2.3.6.34(66) C795 – Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel;

2.3.6.34(67) C919 – Standard Practice for Use of Sealants in Acoustical Applications;

2.3.6.34(68) C1048-04 – Standard Specification for Heat-Treated Flat Glass;

2.3.6.34(69) C1036-06 – Standard Specification for Flat Glass;

2.3.6.34(70) C1053 – Borosilicate Glass Pipe and Fittings for Drain Waste and Vent (DWV) Applications;

2.3.6.34(71) C1126 (Gr.1) – Standard Specification for Faced and Unfaced Rigid Cellular Phenolic Thermal Insulation;

2.3.6.34(72) C1349-04 – Standard Specification for Architectural Flat Glass Clad Polycarbonate;

2.3.6.34(73) C1396 / C1396M – Standard Specification for Gypsum Board;

2.3.6.34(74) C1540 – Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings;

2.3.6.34(75) C1629 / C1629M – Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels;

2.3.6.34(76) D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes;

2.3.6.34(77) D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds;

2.3.6.34(78) D1785 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120;

2.3.6.34(79) D2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring;

2.3.6.34(80) D 2467 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80;

2.3.6.34(81) D2657 – Standard Practice for Heat Fusion Joining of Polyolefin Pipe & Fittings;

2.3.6.34(82) D3222 – Unmodified Poly (Vinylidene Fluoride) (PVDF) Moulding, Extrusion and Coating Materials;

2.3.6.34(83) D3450 – Test Method for Washability Properties of Interior Architectural Coatings;

2.3.6.34(84) D4101 – Specification for Polypropylene Injection and Extrusion Materials;

2.3.6.34(85) D4828 – Standard Test Methods for Practical Washability of Organic Coatings;

2.3.6.34(86) D543 / D543 – 14 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents;

2.3.6.34(87) D790-10 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials;

2.3.6.34(88) E84-12c – Standard Test Method for Surface Burning Characteristics of Building Materials;

2.3.6.34(89) ASTM E90-09: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements;

2.3.6.34(90) E1300-04e1 – Standard Practice for Determining Load Resistance of Glass in Buildings;

2.3.6.34(91) ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies;

2.3.6.34(92) F441 – Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedule 40 and 80;

2.3.6.34(93) F1120 – Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications;

2.3.6.34(94) F1412 – Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems;

2.3.6.34(95) F1673 – Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems;

2.3.6.34(96) G21-09 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; and

2.3.6.34(97) S325-10e1 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

2.3.6.35 CAN/ULC standards and guidelines, including:

2.3.6.35(1) C282 – Emergency Electrical Power Supply for Buildings;

2.3.6.35(2) C536 – Flexible Metallic Hose;

2.3.6.35(3) C842 – Guide for the investigation of valves for flammable and combustible liquids;

2.3.6.35(4) S102.2 – Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies;

2.3.6.35(5) S104 – Standard Method for Fire Tests of Door Assemblies;

2.3.6.35(6) S107 – Methods of Fire Tests of Roof Coverings;

2.3.6.35(7) S112 – Standard Method of Fire Test of Fire Damper Assemblies;

2.3.6.35(8) S115 – Fire Tests of Fire stop Systems;

2.3.6.35(9) S138 – Standard Method of Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration;

2.3.6.35(10) S524 – Standards for the Installation of Fire Alarm Systems;

2.3.6.35(11) S536 – Inspection and Testing of Fire Alarm Systems;

2.3.6.35(12) S537 – Standards for Verification of Fire Alarm Systems;

2.3.6.35(13) S560 – Standard for Category 3 Aqueous Film-Forming Foam (AFFF) Liquid Concentrates;

2.3.6.35(14) S561 – Installation and Services for Fire Signal Receiving Centres and Systems;

2.3.6.35(15) S576 – Standard for Mass Notification System Equipment and Accessories;

2.3.6.35(16) S631 – Isolation Bushings for Steel Underground Tanks Protected with External Corrosion Protection System;

2.3.6.35(17) S661 – Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage;

2.3.6.35(18) S663 – Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks;

2.3.6.35(19) S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering;

2.3.6.35(20) S702 – Standard for Mineral Fibre Thermal Insulation for Buildings;

2.3.6.35(21) S704 – Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced; and

2.3.6.35(22) S1001-11 – Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems.

2.3.6.36 CAN/CGSB standards and guidelines, including the following:

2.3.6.36(1) 12.20-M – Structural Design of Glass for Buildings;

2.3.6.36(2) 19.13-M87 – Sealing Compound, One Component, Elastomeric, Chemical Curing;

2.3.6.36(3) 19.24-M90 – Multi-Component, Chemical Curing Sealing Compound;

2.3.6.36(4) 37-GP-56M – Membrane Modified Bitinous, Prefabricated, and Reinforced for Roofing; and

2.3.6.36(5) 51.34-M86 – Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

2.3.6.37 CNSC regulatory and guidance documents, including the following:

2.3.6.37(1) GD-52 – Design Guide for Nuclear Substance Laboratories and Nuclear Medicine Rooms; and

2.3.6.37(2) REGDOC-2.12.3 – Security of Nuclear Substances: Sealed Sources.

2.3.6.38 CSA standards and guidelines, including the following:

2.3.6.38(1) A23.1 – Concrete Materials and Methods of Concrete Construction;

2.3.6.38(2) A23.1-09/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete;

2.3.6.38(3) A23.3 – Design of Concrete Structures;

2.3.6.38(4) A23.4 – Precast Concrete – Materials and Construction;

2.3.6.38(5) A82.27 – Gypsum Board;

2.3.6.38(6) CSA A123.21 – Standard Test Method for the dynamic wind uplift resistance of membrane roofing systems. Includes Update No. 1;

2.3.6.38(7) A231.1/A231.2 – Precast Concrete Paving Slabs/Precast Concrete Pavers;

2.3.6.38(8) A370-04 – Connectors for Masonry;

2.3.6.38(9) A371 – Masonry Construction for Buildings;

2.3.6.38(10) A660 – Certification of Manufacturers of Steel Building Systems;

2.3.6.38(11) B44 – Safety Code for Elevators and Escalators;

2.3.6.38(12) B44.2 – Maintenance Requirements and Intervals for Elevators, Dumbwaiters, Escalators, and Moving Walks;

2.3.6.38(13) B45 Series – 13: Plumbing Fixtures;

2.3.6.38(14) B51 – Boiler, Pressure vessel and Pressure Piping Code;

2.3.6.38(15) B52 – Mechanical Refrigeration Code;

2.3.6.38(16) B64 Series 17 – Backflow Preventers and Vacuum Breakers;

2.3.6.38(17) B64.10 Series – Backflow Preventers and Vacuum Breakers;

2.3.6.38(18) B70 – Cast Iron Soil Pipe, Fittings, and Means of Joining;

2.3.6.38(19) B72 – Installation Code for Lightning Protection Systems;

2.3.6.38(20) B79 – Commercial and Residential Drains and Cleanouts;

2.3.6.38(21) B125 – Plumbing Fittings;

2.3.6.38(22) B137.5 – Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications;

2.3.6.38(23) B137.6 – Chlorinated polyvinylchloride (CPVC) pipe, tubing, and fittings for hot- and cold-water distribution systems;

2.3.6.38(24) B139 – Installation Code for Oil-Burning Equipment;

2.3.6.38(25) B140.12 – Oil-Fired Service Water Heaters for Domestic Hot Water and Space Heating Use;

2.3.6.38(26) B149.1 – Natural Gas and Propane Installation Code;

2.3.6.38(27) B149.2-Propane Storage and Handling Code

2.3.6.38(28) B158.1 – Cast Brass Solder Joint Drainage, Waste, and Vent Fittings;

2.3.6.38(29) B181.2 – PVC Drain Waste and Vent Pipe and Fittings from CSA B 1800 Plastic Non-pressure Pipe Compendium;

2.3.6.38(30) B181.3 – Polyolefin Laboratory Drainage Systems;

2.3.6.38(31) B242 – Groove and Shoulder Type Mechanical Pipe Couplings;

2.3.6.38(32) B272 – Pre-Fabricated Self-Sealing Roof Vent Flashings;

2.3.6.38(33) B481 – Grease interceptors;

2.3.6.38(34) B602 – Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe;

2.3.6.38(35) B651 – Accessible Design For The Built Environment;

2.3.6.38(36) C2 – Single-Phase and Three-Phase Distribution Transformers, Types ONAN and LNAN;

2.3.6.38(37) C9 – Dry Type Transformers;

2.3.6.38(38) C22.1 & C22.2 – Canadian Electrical Code as adopted in British Columbia;

2.3.6.38(39) C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V;

2.3.6.38(40) C282 – Emergency Electrical Power Supply for Buildings;

2.3.6.38(41) C743 – Performance Standard for Rating Packaged Water Chillers;

2.3.6.38(42) G30.18 – Carbon steel bars for concrete reinforcement;

2.3.6.38(43) G40.20/G40.21 – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;

2.3.6.38(44) G164 – Hot Dip Galvanizing of Irregularly Shaped Articles;

2.3.6.38(45) O86 – Engineering Design in Wood;

2.3.6.38(46) O177 – Qualification Code for Manufacturers of Structural Glued-Laminated Timber;

2.3.6.38(47) S16 – Design of Steel Structures;

2.3.6.38(48) S136 – North American Specification for Design of Cold Formed Steel Structural Members;

2.3.6.38(49) S157-05/S157.1 – Strength Design in Aluminum;

2.3.6.38(50) S269.3-M92 – Concrete Formwork;

2.3.6.38(51) S304 – Design of Masonry Structures;

2.3.6.38(52) S304.1-04 – Masonry Design for Buildings;

2.3.6.38(53) S413 – Parking Structures;

2.3.6.38(54) S478 – Guideline on Durability of Buildings;

2.3.6.38(55) S832 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings);

2.3.6.38(56) W47.1 – Certification of Companies for Fusion Welding of Steel;

2.3.6.38(57) W48 – Filler Metals and Allied Materials for Metal Arc Welding;

2.3.6.38(58) W55.3 – Certification of Companies for Resistance Welding of Steel and Aluminum;

2.3.6.38(59) W59 – Welded Steel Construction (Metal Arc Welding);

2.3.6.38(60) W59.2M – Welded Aluminum Construction;

2.3.6.38(61) W186-M1990 (R2002) – Welding of Reinforcing Bars in Reinforced Concrete Construction;

2.3.6.38(62) Z32.09 – Electrical Safety and Essential Electrical System in Health Care Facilities;

2.3.6.38(63) Z305.12 – Safe storage, handling and use of portable oxygen systems in residential buildings and health care facilities;

2.3.6.38(64) Z305.13 – Plume Scavenging;

2.3.6.38(65) Z314.0 MDR – General requirements;

2.3.6.38(66) Z314.3 – Effective Sterilization in Health Care Settings by the Steam Process;

2.3.6.38(67) Z314.7 – Steam sterilizers for Health Care Facilities;

2.3.6.38(68) Z314.8 – Decontamination of Reusable Medical Devices;

2.3.6.38(69) Z314-18 – Canadian Medical Device Reprocessing;

2.3.6.38(70) Z314.23 – Chemical Sterilization of Reusable Medical Devices;

2.3.6.38(71) Z316.5 – Fume Hoods and Associated Exhaust Systems;

2.3.6.38(72) Z317.1 – Special Requirements for Plumbing Installations in Health Care Facilities;

2.3.6.38(73) Z317.2 – Special Requirements for HVAC Systems in Health Care Facilities;

2.3.6.38(74) Z317.5 – Illumination Systems in Health Care Facilities;

2.3.6.38(75) Z317.10 – Handling of waste materials in Health Care Facilities and Veterinary Health Care Facilities;

2.3.6.38(76) Z317.11 – Area requirements for Health Care Facilities;

2.3.6.38(77) Z317.13 – Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities;

2.3.6.38(78) Z318.5 – Commissioning of Electrical Equipment and Systems in Health Care Facilities;

2.3.6.38(79) Z321 – Signs and Symbols for the Workplace;

2.3.6.38(80) Z358.1 – Emergency Eyewash and Shower Equipment;

2.3.6.38(81) Z462 – Workplace Electrical Safety;

2.3.6.38(82) Z364.2.2 – Water Treatment Equipment and Water Quality Requirements for Hemodialysis;

2.3.6.38(83) Z386 – Safe Use of Lasers in Health Care;

2.3.6.38(84) Z412 – Office Ergonomics;

2.3.6.38(85) Z431 – Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators;

2.3.6.38(86) Z462 – Workplace Electrical Safety (Harmonized with NFPA 70E);

2.3.6.38(87) Z1002 – Occupational Health and Safety;

2.3.6.38(88) Z7396.1 – Medical Gas Pipeline Systems – Part 1: Pipelines for medical gases, medical vacuum, medical support gases, and anaesthetic gas scavenging systems;

2.3.6.38(89) Z8001 – Commissioning of Health Care Facilities;

2.3.6.38(90) Z9170-1 – Terminal Units for Medical gas Pipeline;

2.3.6.38(91) Z10524-2 – Pressure regulators for use with medical gases – Part 2: Manifold and line pressure regulators;

2.3.6.38(92) Z10535.1 – Hoists for the Transfer of Disabled Persons — Requirements and Test Methods;

2.3.6.38(93) Z10535.2 – Lifts for the transfer of persons – Installation, use, and maintenance;

2.3.6.38(94) Z15190 – Medical laboratories – Requirements for Safety;

2.3.6.38(95) Z15883-2 – Washer-disinfectors Requirements and tests for washer disinfectors employing thermal disinfection for surgical instruments, anaesthetic equipment, bowls, dishes, receivers, utensils, glassware, etc.; and

2.3.6.38(96) Z15883-3 – Washer disinfectors – Part 3: Requirements and tests for washer disinfectors employing thermal disinfection for human waste containers.

2.3.6.39 CAN/CSB standards and guidelines, including the following:

2.3.6.39(1) 12.20-M89 – Structural Design of Glass for Buildings;

2.3.6.39(2) 51-GP-52MA – Vapour Barrier, Jacket and Facing Material for Pipe, Duct, and Equipment Thermal Insulation; and

2.3.6.39(3) 51.53 – Poly (Vinyl Chloride) Jacket Sheeting, for Insulated Pipes Vessels and Round Ducts.

2.3.6.40 Federal Specifications, including the following:

2.3.6.40(1) QQL-201F – Chemical Analysis - Grade C;

2.3.6.40(2) DD-G-451 – Flat Glass for Glazing, Mirrors and Other Uses;

2.3.6.40(3) QQL-201F – Chemical Analysis, Grade C; and

2.3.6.40(4) DD-G-451.

2.3.6.41 GA standards, including the following:

2.3.6.41(1) 214 Recommended Levels of Finish for Gypsum Board, Glass-Mat and Fiber-Reinforced Gypsum Panels; and

2.3.6.41(2) 216 Recommended Specifications for the Application and Finishing of Gypsum Board.

2.3.6.42 ICC-ES Standard AC-16;

2.3.6.43 IEEE standards and guidelines, including the following:

2.3.6.43(1) 299 – Standard Method for Measuring, as modified for MRI Testing Methods of Attenuation Measurements for Electromagnetic Shielding Enclosures for Electrical Test Purposes;

2.3.6.43(2) 802.1 – Series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging, and Time Sensitive Networking Standards;

2.3.6.43(3) 1584 – Guide for Performing Arc-Flash Hazard Calculations; and

2.3.6.43(4) C57.19 – Standard Test Code for Dry-type Distribution and Power Transformers.

2.3.6.44 MIL-STD-22A – Method of Insertion – Loss Measurements for Radio Frequency Power Line Filters;

2.3.6.45 MSS standards, including the following:

2.3.6.45(1) SP-25 – Standard Marking System for Valves, Fittings, Flanges, and Unions;

2.3.6.45(2) SP-42 – Corrosion-Resistant Gate, Globe, Angle, and Check Valves with Flanged and Butt Weld Ends (Classes 150, 300, & 600);

2.3.6.45(3) SP-67 – Butterfly Valves;

2.3.6.45(4) SP-68 – High Pressure Butterfly Valves with Offset Design;

2.3.6.45(5) SP-70 – Cast Iron Gate Valves, Flanged and Threaded Ends;

2.3.6.45(6) SP-71 – Cast Iron Swing Check Valves, Flanged and Threaded Ends;

2.3.6.45(7) SP-72 – Ball valves with Flanged or Butt-Welding ends for General Service;

2.3.6.45(8) SP-78 – Cast Iron Plug Valves;

2.3.6.45(9) SP-80 – Bronze Gate, Globe Angle and Check Valves;

2.3.6.45(10) SP-85 – Cast Iron Globe and Angle Valves, Flanged and Threaded Ends;

2.3.6.45(11) SP-97 – Integrally Reinforced Forged Branch Outlet Fittings – Socket Welding, Threaded, and Buttwelding Ends;

2.3.6.45(12) SP-110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends;

2.3.6.45(13) SP-125 – Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves;

2.3.6.45(14) SP-126 – In-Line, Spring-Assisted, Center-Guided Check Valves (Carbon, Alloy Steel, Stainless Steel, & Nickel Alloys);

2.3.6.45(15) SP-136 – Ductile Iron Swing Check Valves;

2.3.6.45(16) SP-139 – Copper Alloy Gate, Globe, Angle, and Check Valves for Low Pressure/Low Temperature Plumbing Applications;

2.3.6.45(17) SP-58 – Pipe Hangers and Supports - Materials Design and Manufacture;

2.3.6.45(18) SP-69 – Pipe Hangers and Supports - Selection and Application;

2.3.6.45(19) SP-77 – Guidelines for Pipe Support Contractual Relationships;

2.3.6.45(20) SP-90 – Guidelines for Terminology for Pipe Hangers and Supports;

2.3.6.45(21) SP-114 – Corrosion Resistant Pipe Fittings Threaded and Socket Welding Class 150 and 1000; and

2.3.6.45(22) SP-127 – Bracing for Piping Systems Seismic - Wind - Dynamic Design, Selection, Application.

2.3.6.46 NEMA standards, including the following:

2.3.6.46(1) WC7 ICEA S 66 524 – Cross Linked Polyethylene Wire and Cable for Transmission and Distribution;

2.3.6.46(2) ICS 7.0 AC – Adjustable Speed Drives;

2.3.6.46(3) VE 1 – Metal Cable Tray Systems; and

2.3.6.46(4) PB2.2 – Application Guide for Ground Fault Protection Devices for Equipment.

2.3.6.47 NETA standards and guidelines, including the following:

2.3.6.47(1) ATS International Electrical Testing Association (Acceptance Testing Specifications); and

2.3.6.47(2) MTS Standards for Maintenance Testing.

2.3.6.48 NFPA (National Fire Protection Association) standards and guidelines, including the following:

2.3.6.48(1) 3: Standard for Commissioning of Fire Protection and Life Safety Systems;

2.3.6.48(2) 4: Standard for Integrated Fire Protection and Life Safety System Training;

2.3.6.48(3) 10: Standard for Portable Fire Extinguishers;

2.3.6.48(4) 11: Standard for Low, Medium and High Expansion Foam;

2.3.6.48(5) 13: Standard for Installation of Sprinkler Systems;

2.3.6.48(6) 14: Standard for Installation of Standpipe and Hose Systems;

2.3.6.48(7) 16: Standard for the Installation of Standpipe and Hose Systems;

2.3.6.48(8) 17: Standard for Dry-Chemical Extinguishing Systems;

2.3.6.48(9) 17A: Standard for Wet Chemical Extinguishing Systems;

2.3.6.48(10) 20: Standard for the Installation of Stationary Pumps for Fire Protection;

2.3.6.48(11) 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances;

2.3.6.48(12) 25: Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems;

2.3.6.48(13) 30: Flammable and Combustible Liquids Code;

2.3.6.48(14) 33: Standard for Spray Application Using Flammable or Combustible Materials;

2.3.6.48(15) 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines;

2.3.6.48(16) 45: Standard on Fire Protection for Laboratories Using Chemicals;

2.3.6.48(17) 55: Compressed Gases and Cryogenic Fluids Code;

2.3.6.48(18) 56F: Non-flammable Medical Gas System;

2.3.6.48(19) 70: National Electrical Code;

2.3.6.48(20) 70B Recommended Practice for Electrical Equipment Maintenance;

2.3.6.48(21) 72: National Fire Alarm and Signaling Code;

2.3.6.48(22) 75: Standard for the Fire Protection of Information Technology Equipment;

2.3.6.48(23) 82: Standard on Incinerators and Waste and Linen Handling Systems and Equipment;

2.3.6.48(24) 90A: Standard for Installation of Air Conditioning and Ventilation Systems;

2.3.6.48(25) 92A: Standard for Smoke Control Systems Utilizing Barriers and Pressure Differences;

2.3.6.48(26) 99: Heath Care Facilities Code;

2.3.6.48(27) 96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations;

2.3.6.48(28) 101: Life Safety Code;

2.3.6.48(29) 141: Standard for Aircraft Rescue and Fire-Fighting Vehicles;

2.3.6.48(30) 214: Standard on Water-Cooling Towers;

2.3.6.48(31) 412: Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment; and

2.3.6.48(32) 2001: Standard on Clean Agent Fire Extinguishing Systems.

2.3.6.49 NSF/ANSI standards and guidelines, including the following:

2.3.6.49(1) 14 – Plastic Piping System Components and Related Materials;

2.3.6.49(2) 61-G – Drinking Water System Components – Health Effects; and

2.3.6.49(3) 372 – Drinking Water System Components – Lead Content.

2.3.6.50 Sustainability standards and guidelines, including the following:

2.3.6.50(1) LEED® Version 4 Reference Guide for Building Design and Construction: Healthcare, US Green Building Council;

2.3.6.50(2) LEED® Building Design + Construction (BD+C) Program;

2.3.6.50(3) The Green Guide for Healthcare;

2.3.6.50(4) Green Globes – Environment Assessment for New Buildings;

2.3.6.50(5) Go Green Program, BOMA;

2.3.6.50(6) ASHRAE Green Healthcare Construction Guidance Statement, Jan 2002;

2.3.6.50(7) ASHRAE 90.1 Energy Standards for Buildings;

2.3.6.50(8) ASHRAE Standard 189.1-2017 – Standard for the Design of High-Performance Green Buildings;

2.3.6.50(9) ASHRAE Standard 189.3-2017 – Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities;

2.3.6.50(10) ASTM E917.24401-1 Life Cycle Cost Assessment Methodology;

2.3.6.50(11) Building Materials for the Environmentally Hypersensitive, CMHC;

2.3.6.50(12) BC Hydro New Construction Program Energy Modelling Guideline;

2.3.6.50(13) BC Hydro High-Performance Building Program;

2.3.6.50(14) Canadian Building Green Hospitals Checklist, Canadian Coalition for Green Healthcare;

2.3.6.50(15) City of Burnaby Green Building Policy for Rezonings;

2.3.6.50(16) City of Burnaby Energy Modelling Guidelines;

2.3.6.50(17) Energy Innovators Initiative, Natural Resources Canada;

2.3.6.50(18) EES Design Guidelines for New Construction and Major Renovations;

2.3.6.50(19) Healthy Built Environment (HBE) Linkages Toolkit;

2.3.6.50(20) Sustainable and Climate-Resilient Healthcare Facilities Toolkit; and

2.3.6.50(21) Sustainable Healthcare Architecture, Robin Guenther and Gail Vittori.

2.3.6.51 ISO standards, including the following:

2.3.6.51(1) ISO 10137:2007 Basis for design of structures – serviceability of buildings and walkways against vibration.

2.3.6.52 USP standards and guidelines, including the following:

2.3.6.52(1) 797 – Guidebook to Pharmaceutical Compounding—Sterile Preparations;

2.3.6.52(2) 800 – Hazardous Drugs—Handling in Healthcare Settings; and

2.3.6.52(3) 825 – Radiopharmaceuticals—Preparation, Compounding, Dispensing, and Repackaging.

2.3.6.53 WorkSafe BC Regulations and guidelines, including the following:

2.3.6.53(1) Illumination

2.3.6.53(1)(a) Part 4, General Conditions, Section 4.64 – 4.69.

2.3.6.53(2) HVAC

2.3.6.53(2)(a) Part 4, General Conditions, Indoor Air Quality, Sections 4.70 – 4.80;

2.3.6.53(2)(b) Part 4, General Conditions, Environmental Tobacco Smoke, Sections 4.81 – 4.82;

2.3.6.53(2)(c) Part 5, Flammable and Combustible Substances, Section 5.35; and

2.3.6.53(2)(d) Part 5, Controlling Exposure, Section 5.56.

2.3.6.53(3) Ergonomics

2.3.6.53(3)(a) Part 4, General Conditions, Ergonomics (MSI) Requirements, Sections 4.46 – 4.53; and

2.3.6.53(3)(b) Guidelines Part 4 – Ergonomics (MSI) Requirements Update 2006, G4.46 – 4.53(2).

2.3.6.53(4) Emergency Eyewash / Showers

2.3.6.53(4)(a) Part 5, Chemical Agents and Biological Agents, Definitions, Section 5.1;

2.3.6.53(4)(b) Part 5, Chemical Agents and Biological Agents, Emergency Washing Facilities, Sections 5.85 – 5.96;

2.3.6.53(4)(c) Guidelines Part 5, Emergency Washing Facilities, Issued 1999; and

2.3.6.53(4)(d) Guidelines Part 30, General Requirements, Plumbing, G30.4, Issued 1999.

2.3.6.53(5) Fall Protection

2.3.6.53(5)(a) Part 4, General Conditions, Work Areas Guards and handrails, Sections 4.54 – 4.63; and

2.3.6.53(5)(b) Part 11, Fall Protection, Section G11.1 – G11.10(0.1).

2.3.6.53(6) Emergency Response

2.3.6.53(6)(a) Part 4, General Conditions, Emergency Preparedness and Response, 4.13 – 4.18.

2.3.6.53(7) Eating Areas / Washrooms / Change Areas / Unsafe Water

2.3.6.53(7)(a) Part 4, General Conditions, Occupational Environment Requirements, Section 4.84 – 4.87.

2.3.6.53(8) Electrical Safety

2.3.6.53(8)(a) Part 4, General Conditions, Buildings, Structures, Equipment and Site Conditions, Conformity to Standards, Section 4.4; and

2.3.6.53(8)(b) Part 19, Electrical Safety, Sections 19.1 – 19.9.

2.3.6.53(9) Radiation Safety

2.3.6.53(9)(a) Division 3 Radiation Exposure (included ionizing and non-ionizing radiation) Section 7.18 – 7.24 Guidelines Part 7 – Division 3 Radiation Exposure G7.18 – G7.19 (4)-2;

2.3.6.53(9)(b) BCICA Quality Standards Manual for Mechanical Insulation;

2.3.6.53(9)(c) TIAC (Thermal Insulation Association of Canada) standards;

2.3.6.53(9)(d) Canadian Council on Health Services Accreditation Program, Latest Edition; and

2.3.6.53(9)(e) Health Canada Safety Code 35: Safety Procedures for the Installation, Use and Control of X-ray Equipment in Large Medical Radiological Facilities.

2.3.6.54 UBC FoM standards and guidelines, including the following:

2.3.6.54(1) Design Guidelines for Learning Space AV Systems and Associated Infrastructure;

2.3.6.54(2) FoM Signage Guidelines; and

2.3.6.54(3) Specifications and Requirements for UBC Clinical Education Facilities.

2.3.6.55 Architectural Woodwork Manufacturer's Association of Canada (AWMAC).

2.4 Submittal Documents

2.4.1 Progressive Submittals

2.4.1.1 In accordance with Schedule 2 and Appendix 2C, Project Co will make submissions of the Design and Construction Documents to the Authority for review at the following progressive stages:

2.4.1.1(1) 30% Design and Construction Documents

2.4.1.1(1)(a) This phase will include supplemental information not included in Appendix 2G [Proposal Extracts] and development of drawings and other documents illustrating the scale and character of the Facility, architecture and all

engineering systems in sufficient detail to describe how all parts of the Facility functionally relate to each other, such as the, roadworks design, Site civil plan, master planning, spatial relationship diagrams, flow diagrams, principal floor plans, Building Systems, sections, and elevations, existing trees and vegetation; together with a draft of the PPA report, and Provide BIM deliverables as per Appendix 2B [BIM].

2.4.1.1(1)(b) At a minimum the following items will be addressed:

2.4.1.1.1.(b).1 Proposal for a Design vision, aesthetics, materials and building character, including Facility elevations;

2.4.1.1.1.(b).2 How the Design promotes close ties with the neighbourhood and integration with the surrounding community;

2.4.1.1.1.(b).3 How the Design promotes coherent and harmonious integration of the architectural elements into the surrounding buildings and the BH Campus;

2.4.1.1.1.(b).4 Description of the provision of building services to the Facility and integration with the BH Campus infrastructure, where appropriate;

2.4.1.1.1.(b).5 Design Objectives and overall approach to achieving Facility Users' objectives, including specific characteristics of the design that reflect FHA's identity and vision;

2.4.1.1.1.(b).6 Site plan, illustrating the Site boundary, distances to creeks and riparian control zones, provision for future buildings including, access, egress and drop-offs (pedestrian, vehicle and fire trucks) and surrounding buildings;

2.4.1.1.1.(b).7 Plans of functional Component blocking, layouts, building stacking and links, internal and external flow of circulation and Component drawings

and its integration into the Future Expansion areas;

2.4.1.1.1.(b).8 Analysis of plans for the flows of Patients, families, providers, equipment, supplies, medications, food and linens, and waste including flows to and from the Facility and adjacent buildings and the BH Campus;

2.4.1.1.1.(b).9 Site and building flexibility concepts and integration into Future Expansion areas;

2.4.1.1.1.(b).10 A comparison table between the required NSM based on Appendix 3A [Clinical Specifications and Functional Space Requirements] and that of the proposed Design on both a space by space basis and Component basis. Indicate the net-to-gross ratio for each Component;

2.4.1.1.1.(b).11 Provide a table indicating the BGSM of each floor of the Facility and the overall BGSM for the Facility. Indicate the net-to-gross ratio between the total Component area and the BGSM;

2.4.1.1.1.(b).12 Analysis of space organization to verify if spaces offer medical and support teams optimal clinical and operational processes compared to the requirements described in Appendix 3A [Clinical Specifications and Functional Space Requirements];

2.4.1.1.1.(b).13 Vertical transportation analysis demonstrating elevator locations and level of service;

2.4.1.1.1.(b).14 Efficient integration of equipment Categories A1 and A2 for optimal operations;

2.4.1.1.1.(b).15 Description of strategy for IM/IT and security systems and how these

systems will enable and enhance clinical functionality;

2.4.1.1.1.(b).16 Description of mechanical strategy including schematic drawings for each system;

2.4.1.1.1.(b).17 Facility Threat and Risk Assessment report;

2.4.1.1.1.(b).18 Sustainability report and LEED scorecard:

(b).18.1 Provide an updated annotated LEED Project checklist indicating all of the credits targeted to be achieved, the responsible party who will sign and prepare the LEED documentation for each prerequisite and targeted credit, and a brief description of the Project approach to achieve the credit and any risks identified;

(b).18.2 Provide a narrative describing the integrative process outcomes related to the LEED prerequisite and credit associated with integrative process (if this credit is pursued);

2.4.1.1.1.(b).19 Provide Owner's Project Requirements (OPR) Review from the Commissioning Authority;

2.4.1.1.1.(b).20 Provide Basis of design review from the Commissioning Authority;

2.4.1.1.1.(b).21 Provide Commissioning plan outline; Design Stage Commissioning activities will be well defined while other sections will be outlined only.

2.4.1.1.1.(b).22 Provide list of Project specific Commissioning responsibilities and responsible parties for each major Building Systems and sub system.

2.4.1.1.1.(b).23 Traffic study and parking analysis;

2.4.1.1.1.(b).24 Rainwater management plan;

2.4.1.1.1.(b).25 Description of strategy for compliance with all waste management programs, including construction and demolition waste management planning;

2.4.1.1.1.(b).26 Construction transportation management plan;

2.4.1.1.1.(b).27 Code report; and

2.4.1.1.1.(b).28 Conformance to City bylaws requirements including zoning restrictions and City design guidelines.

2.4.1.1(1)(c) Before the 50% Design and Construction Documents stage can begin, either the end of the Design phase will result in 30% Design and Construction Documents REVIEWED status or all of the outstanding comments on a Submittal will be agreed by the Authority as not being material in nature.

2.4.1.1(2) 50% Design and Construction Documents;

2.4.1.1(2)(a) This phase will include drawings, minimum room requirements and other documents, including elevations and building and site sections, together with documentation detailing all Building Systems and outline specifications, to fully describe the size and character of the entire Facility including the architectural, landscaping, civil, structural, mechanical, electrical and IM/IT systems, materials and other elements.

2.4.1.1(2)(b) At a minimum the following items will be addressed:

2.4.1.1.2.(b).1 Update of documents based on the comments from the 30% Design and Construction Documents stage;

2.4.1.1.2.(b).2 Developed Design, including context plan, Phasing Plan, Site plan, all floor plans and a roof plan;

2.4.1.1.2.(b).3 Integration into Appendix 3I [Wayfinding Standards for Burnaby Hospital];

2.4.1.1.2.(b).4 Developed exterior elevations of the Facility, cross-sections, including

indication of surface materials for all areas;

2.4.1.1.2.(b).5 Developed integration of exterior spaces, and the Secure Outdoor Spaces, vehicle access/egress (including drop-off and pick-up access to parking, temporary parking, parking numbers, emergency and service vehicle parking, etc.);

2.4.1.1.2.(b).6 Developed interior concepts and key interior elevations, colours and materials;

2.4.1.1.2.(b).7 Developed landscape plans, including serviceability relating to access for machinery for lawn maintenance and snow removal and de-icing;

2.4.1.1.2.(b).8 Site plan showing layout of temporary structures, trailers etc. and construction site access and lay down areas and fencing, public and staff access routes to the existing parkade and to existing buildings and patient access routes from parkade to patient registration on Level 1 SFB, and protected walkways for pedestrians.

2.4.1.1.2.(b).9 Preliminary energy model report showing energy consumption, the Energy Target, the Carbon Target and the target for LEED Gold Certification; and

2.4.1.1.2.(b).10 Commissioning Plan Draft submission including draft content of all sections including Commissioning Schedule and Process Tracking documents.

2.4.1.1(2)(c) At a minimum, the following items will be addressed for the clinical aspects of the Facility:

2.4.1.1.2.(c).1 Update of plans based on the comments from the 30% Design and Construction Documents stage;

2.4.1.1.2.(c).2 1:100 plans of each floor level to include all Components and support space including mechanical and electrical services, colour coded. Rooms and spaces will be numbered according to the reference numbers in Appendix 3A [Clinical Specifications and Functional Space Requirements];

2.4.1.1.2.(c).3 Minimum room requirements listing the following features:

(c).3.1 Architectural requirements such as; interior finishes, doors, Millwork, wall protection, room accessories and window coverings;

(c).3.2 Mechanical requirements such as; HVAC type, plumbing fixtures, room controls, ventilation, medical gases;

(c).3.3 Electrical requirements such as; power, lighting, and lighting controls; and

(c).3.4 Technology requirements such as; IM/IT systems, nurse call, pneumatic tube system, security systems, etc.

2.4.1.1(2)(d) 1:50 scale plans showing all rooms with dimensions, including interior elevations and reflected ceiling plans, with all Furniture and all equipment shown and including mechanical and electrical layouts, IM/IT devices, security devices, and clearance and service requirements.

2.4.1.1.2.(d).1 A full lighting and switching layout for each room and floor plate;

2.4.1.1.2.(d).2 Develop interior finishes (flooring, walls, wall protection and ceiling finishes) for all rooms and floor plates, including three options for interior finishes' colour and materials selection boards;

2.4.1.1.2.(d).3 Efficient integration into the plans of all equipment and Furniture for optimal operations;

2.4.1.1.2.(d).4 Updated Wayfinding strategy and how it will be incorporated with details in the current Design;

2.4.1.1.2.(d).5 Effective integration of all Millwork and Systems Furniture;

2.4.1.1.2.(d).6 Door controls and hardware concepts/strategies;

2.4.1.1.2.(d).7 Review of security strategies, including updated security systems floor plans and equipment details and locations of all equipment, connection points and control points;

2.4.1.1.2.(d).8 Review of IM/IT detailed plans and integration into existing systems enabling and enhancing clinical functionality;

2.4.1.1.2.(d).9 Review of detailed plans for post disaster management;

2.4.1.1.2.(d).10 A comparison table between the required NSM based on Appendix 3A [Clinical Specifications and Functional Space Requirements] and that of the proposed Design on both a space by space basis and Component basis. Indicate the net-to-gross ratio for each Component;

2.4.1.1.2.(d).11 Provide a table indicating the BGSM of each floor of the Facility and the overall BGSM for the Facility. Indicate the net-to-gross ratio between the total Component area and the BGSM;

2.4.1.1.2.(d).12 At a minimum the following items will be addressed for the technical aspects of the Facility and any other submission that the Authority reasonably requires:

(d).12.1 1:100 plans of all levels including the roof plan and penthouse showing all requirements previously listed and in addition providing an indication of all fire separations and the required fire resistance rating, areas of refuge, contained use areas and Outbreak Control Zones;

(d).12.2 Main engineering component drawings that relate to the connection of municipal Utilities;
(d).12.3 Main engineering component drawings that relate to the clinical design;
(d).12.4 Main engineering component drawings that relate to Equipment infrastructure;
(d).12.5 Main engineering component drawings that relate to the mechanical HVAC system;
(d).12.6 Main engineering component drawings that relate to the plumbing system;
(d).12.7 Main engineering component drawings that relate to the medical gas system;
(d).12.8 Main engineering component drawings that relate to the fire protection system;
(d).12.9 Main engineering component drawings that relate to the electrical system;
(d).12.10 Main engineering component drawings that relate to landscaping, exterior lighting and stormwater retention;
(d).12.11 Main engineering component drawings that relate to the structural system.
(d).12.12 Main engineering component drawings that relate to the Life Safety Systems;
(d).12.13 Drawings indicating future engineering system flexibility; and
(d).12.14 Redundancy and spare capacity calculations.

2.4.1.1(2)(e) Clinical and technical aspects may be combined.

2.4.1.1.2.(e).1 At a minimum the following items will be addressed for clinical equipment and IM/IT:
(e).1.1 Main component drawings that relate to the clinical equipment.

(e).1.2 Main component drawings that relate to all IM/IT.

2.4.1.1(3) 70% Design and Construction Documents;

2.4.1.1(3)(a) At a minimum the following items will be addressed:

2.4.1.1.3.(a).1 Update of documents based on the comments from the 50% Design and Construction Documents stage;

2.4.1.1.3.(a).2 Developed room numbering plan for Authority use (public and Patient Wayfinding); and

2.4.1.1.3.(a).3 Commissioning Plan Rev. 1 Submission including development of all sections. Commissioning Schedule and Process Tracking documents will be at a 50% state of development including project specific system and equipment. Content of Technical Requirements (including acceptance criteria), Forms and Checklist sections will be partially developed.

2.4.1.1(4) 90% Design and Construction Documents;

2.4.1.1(4)(a) At a minimum the following items will be addressed:

2.4.1.1.4.(a).1 Update of documents based on the comments from the 70% Design and Construction Documents stage;

2.4.1.1.4.(a).2 Commissioning Plan Rev. 2 Submission including progressed detail of all sections. Commissioning Schedule and Process Tracking documents will be at a 70% state of development including project specific system and equipment. Content of Technical Requirements (including acceptance criteria), Forms and Checklist sections will be at a 30% state of development; and

2.4.1.1.4.(a).3 Cx Authority review of 70% Construction Documents (including

back-check of previous comments and design team responses)

2.4.1.1(5) 100% Design and Construction Documents.

2.4.1.1(5)(a) This phase (issued for Construction documents) will include construction documents consisting of drawings and specifications describing in detail the requirements for the construction of all components, systems and equipment of the Facility delivered to the Authority in accordance with the Submittal Schedule, in a timely way in advance of Construction with sufficient detail to permit the Authority to understand and assess the Design of the Facility;

2.4.1.1(5)(b) If Project Co intends to proceed with Construction of an element of the Facility in advance of the completion of the Design of the entire Facility, then Project Co will schedule and deliver the appropriate Design and Construction Documents for that element with sufficient accompanying detail to permit the Authority to understand and assess the design of that element in advance of the Design and Construction Documents for other elements of the Facility;

2.4.1.1(5)(c) Commissioning Plan Rev. 3 Submission including progressed detail in all sections. Commissioning Schedule and Process Tracking documents will be at an 85% state of development. Content of Technical Requirements (including acceptance criteria), Forms and Checklist sections will be at a 60% state of development;

2.4.1.1(5)(d) Cx Authority review of 90% Construction Documents (including back-check of previous comments and design team responses); and

2.4.1.1(5)(e) For subsequent Commissioning Plan Submissions post-design stage, refer to Section 5.5.

2.4.1.2 Project Co will provide to the Authority the level of detail and documentation that the Authority would customarily receive, or expect to receive, for a building similar to the Facility in accordance with Good Industry Practice, including as applicable to a particular phase:

2.4.1.2(1) Dimensioned floor plans and elevations showing all Millwork;

2.4.1.2(2) Furniture, Category 1 Equipment and Category 2 Equipment, and Systems Furniture;

2.4.1.2(3) Interior elevations for all rooms and spaces, including all interior finishes, Millwork, IM/IT, mechanical and electrical;

2.4.1.2(4) Exterior Facility elevations;

2.4.1.2(5) Completed Site and landscaping plans;

2.4.1.2(6) Room finish schedules;

2.4.1.2(7) Room Data Sheets;

2.4.1.2(8) Reflected ceiling plans;

2.4.1.2(9) Provide read only Revit model with all disciplines represented for review of Phase 1A, and Phase 1B.

2.4.1.2(10) Clearly identifying sections for:

2.4.1.2(10)(a) architectural design;

2.4.1.2(10)(b) site development and landscaping;

2.4.1.2(10)(c) structural design;

2.4.1.2(10)(d) mechanical design;

2.4.1.2(10)(e) electrical and technology design; and

2.4.1.2(10)(f) sustainable design.

2.4.1.3 Project Co will only issue drawings and specifications for Construction purposes based on Reviewed Design and Construction Documents as described in Appendix 2C [User Consultation and Review Procedure].

2.4.1.4 This Section 2.4 does not limit Project Co's obligation to comply with any requirements set out in Schedule 2 [Design and Construction Protocols] and this Schedule in relation to the stages and requirements for Design.

2.4.1.5 Refer to the corresponding sections and tables within this Section 2.4 for minimum list of Design and Construction submittal documents to be submitted at each stage.

2.4.1.6 Project Co is to make submissions to the Authority for review, of the following, at appropriate times during Construction:

2.4.1.6(1) Shop Drawings;

2.4.1.6(2) Samples;

2.4.1.6(3) Studies;

2.4.1.6(4) Reports; and

2.4.1.6(5) Certificates.

2.4.1.7 Non-Conformances:

2.4.1.7(1) Project Co will provide a list of non-conformances with its progress submittals;

2.4.1.7(2) Requests for acceptance of non-conformance will be submitted in writing to the Authority;

2.4.1.7(3) Acceptance of any non-conformances is at the Authority's sole discretion; and

2.4.1.7(4) Review by the Authority will not be deemed as acceptance of any non-conformance; acceptance by the Authority will be in writing only.

2.4.1.8 Project Co will deliver five (5) hardcopies of each Design and 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 two (2) USB A 3.0 devices of each document. Submissions will be delivered; consult the Authority prior to printing and shipping to confirm submission requirements and destination(s).

2.4.1.9 Should the Authority deem submissions to be incomplete; the cost of resubmission in accordance with Appendix 2C [User Consultation and Review Procedure].will be the responsibility of Project Co, at its cost.

2.4.1.10 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 2.4 will be submitted in accordance with the submittal schedule as reviewed and approved by the Authority through the Review Procedure.

2.4.1.11 Drawings, Models, and Visualization

2.4.1.11(1) Project Co will provide:

2.4.1.11(1)(a) A BIM model using Revit in accordance with the requirements of Appendix 2B [BIM];

2.4.1.11(1)(b) It is agreed that the BIM process is required to provide valuable information for FMO at the end of the implementation stage of the Project; the intentions of the parties is that the format, extents and process by which this information is accrued will allow the information to be gathered by Project Co efficiently throughout the Project;

2.4.1.11(1)(c) Project Co 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 will be established through a collaborative PEP development process, which will include Project Co and Authority representatives from Project Co. Some examples of the deliverables, which will be defined, include:

2.4.1.11.1.(c).1 Omniclass and assembly code meta data; and

2.4.1.11.1.(c).2 Model audit process.

2.4.1.11(1)(d) Fabrication files used for Virtual Coordination and Prefabrication will be defined by Project Co. Project Co 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 assist with the tracking and management of comments and revisions during the design review process;

2.4.1.11(1)(e) AutoCAD drawings including plot configuration files;

2.4.1.11(1)(f) Energy Model and Study as part of the BC Hydro New Construction Program Energy Modelling Guideline;

2.4.1.11(1)(g) Individual PDF sheets and compiled PDFs of all drawing submittals by discipline; and

2.4.1.11(1)(h) 3-Dimensional, photo-realistic colour exterior renderings, including:

2.4.1.11.1.(h).1 All Facility elevations, as viewed from the two (2) corners of the BH along Kincaid Street;

2.4.1.11.1.(h).2 The BH Energy Centre, if a standalone building, as viewed from the BH Loading Dock and from the Elmwood Street site entrance;

2.4.1.11.1.(h).3 Main Entrance Lobby to the Facility, as viewed from the arrival points; and

2.4.1.11.1.(h).4 Secure Outdoor Spaces.

2.4.1.11(1)(i) 3-Dimensional photo realistic colour interior renderings, including:

2.4.1.11.1.(i).1 Main Entrance Lobby including, passenger elevators; and

2.4.1.11.1.(i).2 Retail Food Services/Seating area.

2.4.1.11.1.(i).3 A typical inpatient bedroom in each of the following components;

(i).3.1 Inpatient Unit;
(i).3.2 Maternal/Child Unit;
(i).3.3 Mental Health; and
(i).3.4 Operating Room.

2.4.1.11.1.(i).4 The Lecture Room.

2.4.1.11(2) All 3-Dimensional photo realistic renderings will be updated as the Design progresses and provided at each of the Design and Construction Documents stages as indicated in this Section.

2.4.1.11(3) All drawings will be in metric (millimetre) and prepared to current industry standards.

2.4.1.11(4) All drawings will be to 1:100 scale unless otherwise specified.

2.4.1.11(5) Site context plan will be to 1:500 scale.

2.4.1.12 Specifications

2.4.1.12(1) Submit specifications as hard copies and electronic copies in original and editable PDF and Word format.

2.4.1.12(2) Specifications for all disciplines will be organized according to CSI/CSC Master Format using CSC full-page Section Format/Page Format.

2.4.1.12(3) Project Co will provide specifications for all disciplines progressively with sufficient information to enable the Authority to verify the compliance with the requirements of this Schedule and the Project Agreement and to accurately construct the Facility as intended. The Authority will review and provide comments to Project Co, but Project Co is responsible for ensuring compliance

2.4.1.12(4) Use proprietary specifications where proprietary products are known:

2.4.1.12(4)(a) Research sufficient additional materials to provide a range of acceptable products that will match the performance requirements specified;

2.4.1.12(4)(b) When a single source product, type and model are listed within the specification, it will 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.

2.4.1.12(5) Shop Drawings and product data sheets are not considered as specifications for the progress submittals.

2.4.1.13 Design Narratives

2.4.1.13(1) Project Co will provide, at the 30% and 50% Design and Construction Document stages, the corresponding Design narratives for each discipline, which will also address the methodology and solutions for design in addition to the following items:

2.4.1.13(1)(a) Functionality:

2.4.1.13.1.(a).1 Direct Line of Sight: as required per Appendix 3A [Clinical Specifications and Functional Space Requirements]; and

2.4.1.13.1.(a).2 Travel distances.

2.4.1.13(1)(b) Security and Safety:

2.4.1.13.1.(b).1 Asset Protection: Choice of materials, Vandal Resistant equipment and fixtures;

2.4.1.13.1.(b).2 Personal safety of Patients, visitors and Staff: Direct Line of Sight, vision from corridors into rooms, personal safety devices and access control; and

2.4.1.13.1.(b).3 CPTED principles.

2.4.1.13(1)(c) Accessibility:

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

2.4.1.13(1)(d) Logistics

2.4.1.13.1.(d).1 Food delivery; and

2.4.1.13.1.(d).2 Clean and dirty material and equipment flows.

2.4.1.13(1)(e) Wellness:

2.4.1.13(1)(f) Natural Light:

2.4.1.13.1.(f).1 Artificial light: Lighting design including controls;

2.4.1.13.1.(f).2 Material/Colour: Natural colours related to the local environment. Use of wood, glass, stone;

2.4.1.13.1.(f).3 External views: Ability to see out of the windows in a chair or in a bed; and

2.4.1.13.1.(f).4 Art: Place to display.

2.4.1.13(1)(g) Acoustics:

2.4.1.13.1.(g).1 Speech privacy: Wall assembly details and assignments, control of sound flanking paths, sound masking, penetration details;

(g).1.1 Reverberation: Use of acoustically absorbent finishes to control reverberation;

(g).1.2 Background noise: Design systems to provide appropriate level of comfort for each space;

(g).1.3 Noise isolation: Interior spaces protection from equipment noise in other spaces and from external noise;

(g).1.4 Exterior noise control: Satisfy environmental noise limits and envelope design; and

(g).1.5 Vibration: Satisfy performance criteria.

2.4.1.13(1)(h) Wayfinding:

2.4.1.13.1.(h).1 Intuitive: Use of landmarks, visual distinctiveness of spaces, finishes and sightlines of destination; and

2.4.1.13.1.(h).2 Signage: Sign format, location at decision points, ease of maintenance and replacement.

2.4.1.13(1)(i) Serviceable:

2.4.1.13.1.(i).1 Access to equipment: Access and appropriate clearances for maintenance and replacement, standardization of equipment;

2.4.1.13.1.(i).2 Energy: Functionality of the energy saving features;

2.4.1.13.1.(i).3 Durability: Material selection, protection of surfaces/finishes, warranties; and

2.4.1.13.1.(i).4 Construction strategies: Ease of replacement in the future of materials chosen.

2.4.1.13(1)(j) External Environment:

2.4.1.13.1.(j).1 Pedestrian connection: Connection to the neighbourhood, Site and transit;

2.4.1.13.1.(j).2 Streetscape: Facility façade to the neighbourhood;

2.4.1.13.1.(j).3 Vehicle connection: Drop off; maintenance vehicles, and parking to the Facility;

2.4.1.13.1.(j).4 Bicycle connections;

2.4.1.13.1.(j).5 Landscape: Sustainability, ease of maintenance; and

2.4.1.13.1.(j).6 Exterior lighting: Directionality of lighting, light pollution, dark spots.

2.4.1.13(1)(k) Standardization:

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

2.4.1.13.1.(k).2 Consistent room stacking, service core locations: Consistency of location, number of shafts.

2.4.1.13(1)(l) Sustainability and LEED:

2.4.1.13.1.(l).1 Construction activity pollution: control plan addressing loss of soil during

construction, sedimentation of storm sewers and streams, air pollution with construction dust;

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

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

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

2.4.1.13.1.(l).5 Additional credits: breakdown and details of targeted innovation in design and/or exemplary performance credits, if included on Project scorecard.

2.4.1.13(2) Connection with Natural Surroundings:

2.4.1.13.2.(a).1 Project Co will provide a summary of the views and images of nature in the Design that support the Authority's intention to help speed healing and recovery time, boost positive feelings and reduce negative ones;

2.4.1.13.2.(a).2 Project Co will provide a summary indicating the design elements incorporated into the Facility to nurture the innate human-nature connection within the Project, as follows:

(a).2.1 Provide a description of the environmental design elements, lighting and space layouts that incorporate nature into the Project;

(a).2.2 Provide a description of the Design elements that create place-based relationships to uniquely connect people to the climate, culture and identity of place;

(a).2.3 Provide a description of the minimally processed materials and elements from nature that are incorporated into

the Project to reflect the local ecology or geology to create a distinct sense of place;

(a).2.4 Provide a description of the nature-inspired design elements that enhance the experience of connection to nature through greater diversity and frequency of exposure, as follows:

(a).2.4.1 use nature's patterns and forms to create a visually preferred environment that enhances cognitive performance while helping to reduce stress;

(a).2.4.2 generate such forms and patterns as symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature; and avoid the overuse of forms and patterns that may lead to visual toxicity.

(a).2.5 Provide a description of the opportunities the Design affords for human-nature interactions within the Facility and external to the Facility within the Site.

2.4.1.13(2)(b) Artwork

2.4.1.13.2.(b).1 Project Co will provide a plan that includes a description of how the Design can incorporate meaningfully integrated artwork in entrances, lobbies, convenience stairs, and all regularly occupied space greater than 25 NSM. Spaces will include lighting, backing and electrical requirements in consultation with the Authority as set out in Appendix 2C [User Consultation and Review Procedure].

2.4.1.14 Shop Drawings

2.4.1.14(1) “Shop Drawings” means drawings, diagrams, illustration, samples, schedules, performance charts, literature, brochures, and other data

to be provided by Project Co to illustrate details of a portion of the work.

2.4.1.14(2) Submit fully detailed Shop Drawings, indicating the location of where the item will be installed, 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 and paint drawdowns 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 the Section under which such adjacent items are supplied and installed. Indicate cross references to the requirements of this Agreement.

2.4.1.14(3) Shop Drawings will be in metric measurements.

2.4.1.14(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 Project Co. Such review does not relieve responsibility for meeting requirements of this Agreement, unless the Authority has accepted a deviation in writing.

2.4.1.15 Submit Shop Drawings in accordance with the following list:

2.4.1.15(1) 01 35 33 Infection Control Procedures;

2.4.1.15(2) 01 50 00 Temporary Facilities and Controls;

2.4.1.15(3) 03 30 00 Cast-in-Place Concrete;

2.4.1.15(4) 03 53 00 Concrete Topping;

2.4.1.15(5) 04 21 00 Clay Unit Masonry Assemblies;

2.4.1.15(6) 04 22 00 Concrete Unit Masonry;

2.4.1.15(7) 05 10 00 Structural Steel;

2.4.1.15(8) 05 31 00 Steel Decking;

2.4.1.15(9) 05 45 00 Load Bearing Steel Studs (Metal Support Assemblies);

2.4.1.15(10) 05 50 00 Metal Fabrications;

2.4.1.15(11) 05 59 63 Glazed Detention and Windscreen Enclosures;

2.4.1.15(12) 06 10 00 Rough Carpentry;

2.4.1.15(13) 06 20 00 Finish Carpentry;

2.4.1.15(14) 06 40 00 Architectural Woodwork;

2.4.1.15(15) 07 13 00 Below Grade Sheet Waterproofing;

2.4.1.15(16) 07 14 16 Cold Fluid Applied Waterproofing;

2.4.1.15(17) 07 16 16 Crystalline Waterproofing;

2.4.1.15(18) 07 18 13 Pedestrian Traffic Coatings;

2.4.1.15(19) 07 18 16 Vehicular Traffic Coatings;

2.4.1.15(20) 07 21 00 Building Insulation;

2.4.1.15(21) 07 21 19 Foamed in Place Polyurethane Insulation;

2.4.1.15(22) 07 21 29 Spray Applied Mineral Fibre Insulation;

2.4.1.15(23) 07 25 00 Weather Barriers;

2.4.1.15(24) 07 42 13 Metal Wall Panels;

2.4.1.15(25) 07 42 63 Zinc Wall Panel Assemblies;

2.4.1.15(26) 07 43 00 Composite Wall Panels;

2.4.1.15(27) 07 43 23 Ext Grade Wood Composite Panels;

2.4.1.15(28) 07 44 19 Terra Cotta Clay Wall Panel Assemblies;

2.4.1.15(29) 07 46 23 Wood Siding;

2.4.1.15(30) 07 46 43 Mineral Fibre Reinforced Composite Panels;

2.4.1.15(31) 07 52 16 SBS Membrane Roofing;

2.4.1.15(32) 07 61 13 Standing Seam Metal Roofing;

2.4.1.15(33) 07 62 00 Sheet Metal Flashing and Trim;

2.4.1.15(34) 07 81 00 Applied Fireproofing;

2.4.1.15(35) 07 81 23 Intumescent Fireproofing;

2.4.1.15(36) 07 84 00 Firestopping and Smoke Seals;

2.4.1.15(37) 07 92 00 Joint Sealants;

2.4.1.15(38) 08 11 00 Metal Doors and Frames;

2.4.1.15(39) 08 21 00 Wood Doors;

2.4.1.15(40) 08 31 00 Access Doors and Panels;

2.4.1.15(41) 08 33 00 Coiling Doors and Grilles;

2.4.1.15(42) 08 34 73 Sound Control Door Assemblies;

2.4.1.15(43) 08 35 13 Folding Security Grilles;

2.4.1.15(44) 08 41 13 Aluminum Framed Entrances and Storefronts;

2.4.1.15(45) 08 42 29 Automatic Entrances;

2.4.1.15(46) 08 44 13 Glazed Aluminum Curtain Walls;

2.4.1.15(47) 08 63 00 Metal Framed Skylights;

2.4.1.15(48) 08 71 00 Door Hardware;

2.4.1.15(49) 08 74 00 Access Control Hardware;

2.4.1.15(50) 08 81 00 Glass and Glazing;

2.4.1.15(51) 08 90 00 Louvres and Vents;

2.4.1.15(52) 09 21 16 Gypsum Board Assemblies;

2.4.1.15(53) 09 30 00 Ceramic Tiling;

2.4.1.15(54) 09 51 00 Acoustical Ceilings;

2.4.1.15(55) 09 65 00 Resilient Flooring;

2.4.1.15(56) 09 67 00 Fluid Applied Flooring;

2.4.1.15(57) 09 68 13 Tile Carpeting;

2.4.1.15(58) 09 84 00 Acoustic Room Components;

2.4.1.15(59) 09 90 00 Painting and Coating;

2.4.1.15(60) 10 11 00 Visual Display Surfaces;

2.4.1.15(61) 10 14 00 Signage;

2.4.1.15(62) 10 21 14 Toilet Compartments;

2.4.1.15(63) 10 21 23 Cubicle Curtain and Track;

2.4.1.15(64) 10 26 00 Wall and Door Protection;

2.4.1.15(65) 10 28 13 Toilet and Bath Accessories;

2.4.1.15(66) 10 44 00 Fire Protection Specialties;

2.4.1.15(67) 10 51 00 Metal Lockers;

2.4.1.15(68) 10 71 13 Exterior Sun Control Devices;

2.4.1.15(69) 11 24 23 Fall Arrest Equipment;

2.4.1.15(70) 11 40 00 Food Services Equipment;

2.4.1.15(71) 12 10 00 Art;

2.4.1.15(72) 12 24 00 Window Coverings;

2.4.1.15(73) 12 36 00 Countertops;

2.4.1.15(74) 12 48 16 Entrance Floor Grilles;

2.4.1.15(75) 12 50 00 Furniture;

2.4.1.15(76) 12 93 00 Site Furnishings;

2.4.1.15(77) 12 93 33 Manufactured Planters;

2.4.1.15(78) 13 12 13 Exterior Fountains;

2.4.1.15(79) 14 21 00 Traction Elevators;

2.4.1.15(80) 14 24 00 Holeless Hydraulic Elevators;

2.4.1.15(81) Motors Starters and Wiring;

2.4.1.15(82) Adjustable Frequency Drives;

2.4.1.15(83) Flex Connections, Expansion Joints, Anchors and Guides;

2.4.1.15(84) Flow and Energy Meters;

2.4.1.15(85) Indicating Gauges;

2.4.1.15(86) Valves;

2.4.1.15(87) Hangers and Supports;

2.4.1.15(88) Vibration and Seismic Controls;

2.4.1.15(89) Seismic Restraint Systems;

2.4.1.15(90) Identification Equipment Insulation;

2.4.1.15(91) Piping Insulation;

2.4.1.15(92) Start-Up and Performance Testing Reporting;

2.4.1.15(93) Wet Pipe Sprinkler System;

2.4.1.15(94) Dry Pipe Sprinkler System;

2.4.1.15(95) Preaction Sprinkler System;

2.4.1.15(96) Packaged Fire Pump;

2.4.1.15(97) Plumbing Pumps;

2.4.1.15(98) Domestic Water Piping;

2.4.1.15(99) Domestic Water Heaters;

2.4.1.15(100) Plumbing Specialties;

2.4.1.15(101) Plumbing Fixtures and Trim;

2.4.1.15(102) Medical Gas Systems;

2.4.1.15(103) Facility Fuel Oil Piping;

2.4.1.15(104) Natural Gas Systems;

2.4.1.15(105) Oil Storage Tanks;

2.4.1.15(106) Fuel Oil Pumps;

2.4.1.15(107) Fuel Filtration Systems;

2.4.1.15(108) Fuel Management System;

2.4.1.15(109) Water Specialties-Heating and Cooling;

2.4.1.15(110) Steel Pipe and Fittings – Heating and Cooling;

2.4.1.15(111) Pumps – Heating and Cooling;

2.4.1.15(112) Steam Specialties;

2.4.1.15(113) Steel Pipe and Fittings – Steam and Condensate;

2.4.1.15(114) Central Plant Condensate Receiver;

2.4.1.15(115) HVAC Water Treatment Systems;

2.4.1.15(116) Fans;

2.4.1.15(117) Terminal Boxes;

2.4.1.15(118) Grilles, Registers and Diffusers;

2.4.1.15(119) Fabricated Breeching and Accessories;

2.4.1.15(120) Fabricated Stacks;

2.4.1.15(121) Insulated Sectional Chimneys;

2.4.1.15(122) Packaged Hot Water Boiler - Condensing;

2.4.1.15(123) Packaged Boiler – Fire Tube;

2.4.1.15(124) Deaerator;

2.4.1.15(125) Heat Exchangers;

2.4.1.15(126) Refrigerant Detection System;

2.4.1.15(127) Chillers;

2.4.1.15(128) Cooling Towers;

2.4.1.15(129) Air Handling Units;

2.4.1.15(130) Makeup Air Units;

2.4.1.15(131) Ducted and Ductless Split Air Conditioners;

2.4.1.15(132) Electric Reheat Coils;

2.4.1.15(133) Unit Heaters;

2.4.1.15(134) Humidifiers;

2.4.1.15(135) Dehumidification System

2.4.1.15(136) EMC General Requirements;

2.4.1.15(137) 31 00 00 Earthwork;

2.4.1.15(138) 31 23 01 Excavating Trenching and Backfilling;

2.4.1.15(139) 32 01 90.33 Tree Protection;

2.4.1.15(140) 32 11 16.1 Granular Subbase;

2.4.1.15(141) 32 11 23 Granular Base;

2.4.1.15(142) 32 12 13.2 Asphalt Prime;

2.4.1.15(143) 32 12 16 Asphalt Paving;

2.4.1.15(144) 32 13 13 Portland Cement Concrete Pavement;

2.4.1.15(145) 32 14 13 Precast Concrete Unit Paving;

2.4.1.15(146) 32 17 23 Painted Pavement Markings;

2.4.1.15(147) 32 18 16 Synthetic Resilient Surfacing;

2.4.1.15(148) 32 31 13 Chain Link Fences and Gates;

2.4.1.15(149) 32 32 00 Retaining Walls;

2.4.1.15(150) 32 33 00 Exterior Site Furnishings;

2.4.1.15(151) 32 80 00 Irrigation;

2.4.1.15(152) 32 91 13 Growing Medium Preparation;

2.4.1.15(153) 32 92 93 Sodding;

2.4.1.15(154) 32 92 19 Seeding and Hydroseeding;

2.4.1.15(155) 32 93 00 Planting;

2.4.1.15(156) 33 11 01 Waterworks;

2.4.1.15(157) 33 30 01 Sanitary Sewers;

2.4.1.15(158) 33 40 01 Storm Sewers; and

2.4.1.15(159) 33 44 01 Manholes and Catch basins.

2.4.1.16 Samples

2.4.1.16(1) Submit samples of luminaires for review by the Authority. Each approved sample will be retained on job site until Total Completion of Project.

2.4.1.16(2) Luminaires that do not match quality and workmanship of standard sample will be rejected.

2.4.1.16(3) Submit 8.5” x 11.0” paint colour drawdown samples for review by the Authority. Each approved sample will be retained on job site until Total Completion of Project.

2.4.1.17 All equipment plans will show installation, removal and maintenance clearances. These are to include plans showing the transportation routes through BH and the Facility, with design load information for floors and elevators indicated along the route.

2.4.2 Architectural Design and Construction Documents

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Title sheet, legends, drawing list, key plans and assembly listings | X | X | X | X | X | X |
| Site plans, context site plan | X | X | X | X | X | X |
| Floor plans and roof plans | X | X | X | X | X | X |

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As Built |
|---|---|---|---|---|---|---|
| Reflected ceiling plans | - | X | X | X | X | X |
| Exterior elevations | X | X | X | X | X | X |
| Interior elevations | - | X | X | X | X | X |
| Facility sections, transverse, longitudinal | X | X | X | X | X | X |
| Wall sections | - | X | X | X | X | X |
| Large Scale (1:50) Minimum Room Requirement Sheets | X | X | X | X | X | X |
| Plan and section details | - | X | X | X | X | X |
| Vertical Movement (stairs, ramps, elevators) – Sections and Details | - | X | X | X | X | X |
| Special elements, signage, etc. | - | X | X | X | X | X |
| Schedules, doors, windows, hardware, finishes, etc. | - | X | X | X | X | X |
| Millwork - plans, sections, and details | - | X | X | X | X | X |
| Code Compliance Fire Separations (vertical and horizontal) which are to also include all BH existing buildings, Exiting Travel Distance Plans including Occupant loads, and exit width capacities | X | X | X | X | X | X |
| Code Compliance Report | X | X | X | X | X | X |
| *Specifications* | | | | | | |
| Table of Contents | - | X | X | X | X | - |
| General Requirements | - | X | X | X | X | - |
| Existing Conditions (if any) | - | X | X | X | X | - |
| Concrete | - | X | X | X | X | - |
| Masonry | - | X | X | X | X | - |
| Metals | - | X | X | X | X | - |
| Wood, Plastics and Composites | - | X | X | X | X | - |
| Thermal and Moisture Protection | - | X | X | X | X | - |
| Openings | - | X | X | X | X | - |
| Finishes | - | X | X | X | X | - |
| Specialties | - | X | X | X | X | - |
| Equipment | - | X | X | X | X | - |
| Furnishings | - | X | X | X | X | - |
| Conveying Equipment -Elevators | - | X | X | X | X | - |
| *Other* | | | | | | |
| Colour Boards Master Colour Palette | - | X | X | X | X | - |
| Minimum room requirements (including all mechanical, electrical and IM/IT information) | X | X | X | - | - | - |
| Exterior Improvements | X | X | X | X | X | - |

2.4.2.1 Project Co will provide construction documents that include the following items as required to achieve the percentage of completion for the submissions.

2.4.2.1(1) Project Co will clearly indicate:

2.4.2.1(1)(a) Floor elevations (geodetic, on floor plans, sections and elevations) complete with floor level changes, stairs and ramps; and

2.4.2.1(1)(b) Floor finishing tolerances, slopes for drainage, drain openings, etc. will be identified.

2.4.2.2 Code construction documents

2.4.2.2(1) Code compliance report will contain the following:

2.4.2.2(1)(a) BCBC data matrix including design considerations;

2.4.2.2(1)(b) Fire and life safety data summary (may be illustrated graphically); and

2.4.2.2(1)(c) Fire access during all phases of Construction.

2.4.2.2(2) When applicable, alternative solutions will contain:

2.4.2.2(2)(a) All information required by the relevant Governmental Authority;

2.4.2.2(2)(b) Any operational impacts of the alternate solution; and

2.4.2.2(2)(c) Any maintenance impacts of the alternate solution.

2.4.2.3 Plans, sections and elevations will contain:

2.4.2.3(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;

2.4.2.3(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.);

2.4.2.3(3) The location of doors and windows, and other openings complete with cross-references to door, window and hardware schedules;

2.4.2.3(4) The location of fixtures and equipment for washrooms, kitchens, Multimedia Rooms, equipment/ mechanical/electrical/ Communications Rooms complete with cross-references to equipment schedules, notes and dimensions;

2.4.2.3(5) Clearly indicated barrier-free access, path of travel, clearances complete with notes and dimensions;

2.4.2.3(6) Designate room name and number of interior spaces. Maintain the Authority room reference number as stated in Appendix 3A [Clinical Specifications and Functional Space Requirements]. The As-built Drawings will include final room numbering as set out in Section 5.12

and as coordinated with and approved by the Authority through the Review Procedure;

2.4.2.3(7) Graphically represent construction and finish materials for walls and floors;

2.4.2.3(8) Illustrate built-in Furniture, Millwork and equipment;

2.4.2.3(9) Graphically illustrate fire separation(s) including fire, smoke and hour ratings, acoustic separation(s) including STC ratings, security separation(s), etc.; and

2.4.2.3(10) Gridlines and gridline dimensions.

2.4.2.4 Reflected ceiling plans will contain:

2.4.2.4(1) Graphical representation of ceiling finishes, equipment (such as ceiling mounted ceiling lifts), luminaires complete with cross-reference to lighting, security, sprinkler, HVAC, fire alarm, multimedia equipment including cameras speakers and microphones, service access points and Ceiling Heights etc.;

2.4.2.4(2) Clearly indicated bulkheads complete with graphical representation of construction and materials, notes, Ceiling Heights and dimensions; and

2.4.2.4(3) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, security, etc., complete with cross-reference notes and dimensions.

2.4.2.5 Penthouse and roof plans will contain:

2.4.2.5(1) The location of fixtures and equipment for mechanical, electrical, maintenance, etc. complete with notes and dimensions;

2.4.2.5(2) Clearly indicated roof penetrations for equipment, hatches, access paver paths, fall arrest anchors, antennae supports/ties, etc.;

2.4.2.5(3) Graphically represent construction and finish materials for roof; and

2.4.2.5(4) Graphically representation of the two (2) metre distance from unprotected roof edges for fall protection planning.

2.4.2.6 Exterior elevations will contain:

2.4.2.6(1) The location of doors and windows, Borrowed Lights, and other openings;

2.4.2.6(2) Graphical representation of construction and finish materials, including a legend and notations;

2.4.2.6(3) Scuppers, downs spouts or drainage systems, hose bibs and electrical outlet and exterior light locations, to be provided with the 50% submittal and subsequent submittals; and

2.4.2.6(4) Landscape treatment proposed in relation to exterior and windows.

2.4.2.7 Interior elevations will contain:

2.4.2.7(1) The location of doors, windows, and other openings; all wall-mounted equipment, mechanical, electrical, and IM/IT devices, dimensions of vertical changes in material, room numbers;

2.4.2.7(2) Graphical representation of construction and finish materials including a legend and notations is to be provided: and

2.4.2.7(3) Clearly indicate wall finishes, colour choices and details.

2.4.2.8 Facility sections will contain:

2.4.2.8(1) Clearly indicated floor construction/assemblies, floor elevations, dimensions and ceiling lines; and

2.4.2.8(2) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, multimedia, security, etc., complete with cross-reference notes and dimensions.

2.4.2.9 Wall sections (scale 1:20) will contain:

2.4.2.9(1) Clearly indicated detail location tags and references; wall type notations; and critical dimensions; and

2.4.2.9(2) Clearly indicated graphical representation of systems and equipment interference for structural, mechanical, electrical, telecommunications, security, etc., complete with cross- reference notes and dimensions.

2.4.2.10 Large scale plans (scale 1:50 or larger) will include:

2.4.2.10(1) The following spaces, including all rooms related to them as shown in the Space Table in Appendix 3A [Clinical Specifications and Functional Space Requirements]:

2.4.2.10(1)(a) Exam Room (A1.2.1 and A1.5.1);

2.4.2.10(1)(b) Exam Room-Neuro Diagnostic (A1.6.1);

2.4.2.10(1)(c) Patient Room-LDRP (B1.2.7) and Patient Room-NICU (B1.3.2);

2.4.2.10(1)(d) Medication Room (B1.4.1);

2.4.2.10(1)(e) Medication Room (C1.3.1);

2.4.2.10(1)(f) Patient Room (C1.2.3) and Ensuite/Shower (C1.2.4);

2.4.2.10(1)(g) Consult Room-Large (D1.2.4);

2.4.2.10(1)(h) Dining/Lounge-Patient (D1.2.18);

2.4.2.10(1)(i) Secure Room (D1.2.9) and Anteroom-Secure Room (D1.2.10);

2.4.2.10(1)(j) Group Therapy Room, Large (D1.2.14);

2.4.2.10(1)(k) Trauma/Resuscitation Suite (G1.3.1);

2.4.2.10(1)(l) Treatment Room (G1.3.7);

2.4.2.10(1)(m) Lecture Room (J1.1.1);

2.4.2.10(1)(n) Meeting Room-Large-EOC (L1.1.5);

2.4.2.10(1)(o) Medical Device Reprocessing Department;

2.4.2.10(1)(p) Mechanical Rooms;

2.4.2.10(1)(q) Electrical Rooms; and

2.4.2.10(1)(r) Communications Rooms.

2.4.2.11 Provide interior elevations to 1:50 scale for the spaces listed above.

2.4.2.12 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.

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

2.4.2.14 Equipment access and replacement route plans will clearly indicate access provisions and routes designed for the installation and replacement of Equipment.

2.4.2.15 Special elements, furnishings, Systems Furniture, signage, etc. will contain:

2.4.2.15(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;

2.4.2.15(2) Detailed location of fixtures and equipment for telecommunications, IM/IT, multimedia, security, etc. complete with cross- reference to equipment schedules, notes and dimensions; and

2.4.2.15(3) Base-building elements will be graphically distinct from special elements.

2.4.2.16 Schedules (doors, hardware, windows, room finishes, Furniture, signage, etc.) will contain:

2.4.2.16(1) Clearly indicated material, size, fire / thermal / acoustic / security resistance rating, colour, texture, pattern, etc.; and

2.4.2.16(2) Schedules will be graphical and/or tabular in drawing or specification format.

2.4.2.17 Acoustic and Vibration Submittals

2.4.2.17(1) Project Co will demonstrate compliance with the Agreement, through submittals and reports as listed below:

2.4.2.17(1)(a) Site noise and vibration survey at 30% Design and Construction;

2.4.2.17(1)(b) Building structural vibration assessment for sensitive spaces at 30% Design and Construction;

2.4.2.17(1)(c) Room acoustics at 30% Design and Construction;

2.4.2.17(1)(d) Envelope sound isolation at 50% Design and Construction;

2.4.2.17(1)(e) Partitions at 50% Design and Construction;

2.4.2.17(1)(f) Environmental noise at 70% Design and Construction;

2.4.2.17(1)(g) Mechanical noise and vibration control at 90% Design and Construction;

2.4.2.17(1)(h) ASTC compliance testing in early phase of partition installation;

2.4.2.17(1)(i) Follow-up ASTC compliance testing, as required;

2.4.2.17(1)(j) Background noise and vibration compliance testing after HVAC system balancing;

2.4.2.17(1)(k) Room acoustic compliance testing after finishes are installed;

2.4.2.17(1)(l) Confidential sound isolation compliance testing after confidential spaces are complete; and

2.4.2.17(1)(m) Exterior noise compliance testing after the Facility is fully operational.

2.4.3 Civil Construction Design and Construction

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| On-site Drawings<br><br>Title sheet, typical sections and details used on this Project | X | X | X | X | X | X |
| | | | | | | |
| Existing Conditions | X | X | X | X | X | |
| Erosion and Sediment Control | - | X | X | X | X | |
| Temporary Service during Construction | X | X | X | X | X | |
| Site Coordination Layout, turning templates for emergency and service vehicles | X | X | X | X | X | |
| Storm Water Drainage Plan | X | X | X | X | X | X |
| Grading, site servicing, roads, parking lot(s), | X | X | X | X | X | X |
| Hardscape and street lights | | | | | | |
| Utilities Plan and profile | X | X | X | X | X | X |
| Retaining Walls Plan and Profile | - | X | X | X | X | X |
| Sections and details | X | X | X | X | X | X |
| Pavement Marking and Signage Plans | X | X | X | X | X | X |
| Constructing phasing<br>Rainwater Management Plan<br>Sanitary and Water Analysis Design Brief | X<br>X<br>X | X<br>X<br>X | X<br>X<br>X | X<br>X<br>X | X<br>X<br>X | |
| Off-site Drawings<br><br>Deep and Shallow Utilities Plan and profile<br>Right-of-way Plans | X<br>X | X<br>X | X<br>X | X<br>X | X<br>X | X |
| *Specifications* | | | | | | |
| Civil Specifications | | | | X | X | - |

2.4.3.1 Project Co will provide diagrams with its submission describing:

2.4.3.1(1) How vehicle and pedestrian traffic works during Construction;

2.4.3.1(2) How parking stall allocation works during Construction; and

2.4.3.1(3) Location of crane(s) as required if it will impact vehicle and pedestrian traffic works during construction, or other existing infrastructures in the vicinity.

2.4.3.2 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.

2.4.3.3 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.

2.4.3.4 Site coordination and layout drawing will contain:

2.4.3.4(1) Horizontal and vertical control, the principal site elements to be constructed, survey monuments and/or nearby buildings or structures that 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, water main, sanitary sewer, storm sewer, etc.), site removals; and

2.4.3.4(2) Demonstrated vehicle and pedestrian movements for all types of expected traffic to and from the Facility.

2.4.3.5 Grading plan will contain the footprint and finished floor elevation of the Facility, 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;

2.4.3.6 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 where applicable;

2.4.3.7 Site servicing plan will include phasing plan for water main flushing, pressure testing and disinfecting the services to the Facility. Plan to be submitted and reviewed by the relevant Governmental Authority for approval;

2.4.3.8 Storm water management plan will contain catchment areas, existing storm sewer system, flow direction, calculations for pre-development and post-development flows, detention calculations, proposed drainage infrastructures (where applicable) including LID (low impact development) and/or green infrastructures as per LEED Rainwater Management requirements, and other best management practices; Project Co. will coordinate and confirm with the City of Burnaby for any additional requirements to be included in the final storm water management plan and will comply with such requirements.

2.4.3.9 Offsite drawings will include all drawings and details required by the City to secure a works and services agreement for the offsite works.

2.4.4 Structural Design and Construction Documents

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Title Sheet, General Notes | X | X | X | X | X | X |
| Typical Details | X | X | X | X | X | X |
| Slab, Column, Beam, Wall Schedules | X | X | X | X | X | X |
| Foundation Plans | X | X | X | X | X | X |
| Floor and Roof Framing Plans | X | X | X | X | X | X |
| Sections and Details | X | X | X | X | X | X |
| Wall and Bracing Elevations | | X | X | X | X | X |
| Wall Sections | | X | X | X | X | X |
| *Specifications* | | | | | | |
| Concrete (Division 03) | X | X | X | X | X | - |
| Masonry (Division 04) | - | X | X | X | X | - |
| Metals (Division 05) | - | X | X | X | X | - |
| Wood (Division 06) | - | X | X | X | X | - |
| Earthwork and Piling (Division 31) | X | X | X | X | X | - |
| *Reports* | | | | | | |
| FEMA P-58 analysis report or approved equivalent | - | - | - | X | X | - |
| Basis of Design report (including base isolation, if applicable) | X | X | X | X | X | - |
| Calculation reports | Upon request | | | | | - |
| Base isolation calculation and testing reports (if applicable) | - | X | X | X | X | - |
| Condition Survey | - | - | X | - | - | X |
| Construction Plan | - | - | X | X | X | - |
| Foundation Survey Report | - | - | - | - | - | X |

2.4.4.1 Title Sheet, General Notes, will contain:

2.4.4.1(1) Codes and standards, with dates of issue, to which the design conforms;

2.4.4.1(2) Description of the lateral load resisting system will indicate values of Rd (ductility factor) and Ro (over strength factor) and drift limits used in the design;

2.4.4.1(3) Importance factors used in the design;

2.4.4.1(4) Design criteria indicating vertical design loads including dead and superimposed dead loads (including partition and external cladding assumption); occupancy live loads; snow loads (including drift); wind uplift loads; mechanical equipment loads; construction loads; ceiling lift loads; special loading considerations;

2.4.4.1(5) Horizontal design loads indicated including seismic loads, wind loads, lateral earth pressures and hydrostatic pressures;

2.4.4.1(6) Loading plans showing area loads not covered by design criteria information such as planter and soil loads with an indication of maximum soil depth;

2.4.4.1(7) Geotechnical information used in the design including reference to geotechnical report, footing or pile bearing capacities, site classification and site coefficients;

2.4.4.1(8) Concrete mix requirements indicating application, exposure classification, minimum 28-day compressive strength, and maximum aggregate size; and

2.4.4.1(9) Concrete cover requirements, based on weather and soil exposure, fire resistance rating, or chloride penetration.

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

2.4.4.3 Foundation plans, fully coordinated with other consultants' drawings, will contain:

2.4.4.3(1) Gridlines and gridline dimensions;

2.4.4.3(2) Foundation types, sizes and reinforcement, including strip footings, pad footings, rafts, piles and pile caps, soil anchors and grade beams. Foundations must 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 freeze mitigation measures;

2.4.4.3(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;

2.4.4.3(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;

2.4.4.3(5) Concrete columns, pedestals and pilasters including dimensions and reinforcement, including tie arrangement details;

2.4.4.3(6) Steel columns and other steel framing elements including size and base plate details;

2.4.4.3(7) Load bearing masonry walls if applicable, including masonry unit dimensions, reinforcement and grouting. Stud walls, if applicable, including stud sizes and spacing, plywood sheathing thickness and fastening requirements. Provide sufficient details as required; and

2.4.4.3(8) As built drawings are to include reference elevations for spread footings.

2.4.4.4 Floor and roof framing plans, fully coordinated with other consultants' drawings, will contain:

2.4.4.4(1) Gridlines and gridline dimensions;

2.4.4.4(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;

2.4.4.4(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;

2.4.4.4(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;

2.4.4.4(5) Concrete beams including dimensions and reinforcement. Elevate beams with complex reinforcement. Ensure beams are sufficiently detailed;

2.4.4.4(6) Detail concrete stairs, including throat thickness, reinforcement and sufficient details for cast in place stairs. For precast concrete stairs provide sufficient seating details;

2.4.4.4(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;

2.4.4.4(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;

2.4.4.4(9) Steel columns including size, base plate, embed plate and cap plate details; and

2.4.4.4(10) Detail steel stairs, including stringer sizes and connection details.

2.4.4.5 Elevations, fully coordinated with other consultants' drawings, which as a minimum should include the following items:

2.4.4.5(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;

2.4.4.5(2) Concrete beam elevations for beams with complex reinforcement;

2.4.4.5(3) Steel bracing elevations including member sizes, forces and sufficient information for connection designer; and

2.4.4.5(4) Any other elevations deemed necessary to convey sufficient structural information.

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

2.4.4.7 The FEMA P-58 analysis report or the report for an approved equivalent method, will include the following information: methodology, seismic demand inputs, summary of structural and non-structural elements, repair time and repair cost results for hazards levels stated in the post-disaster requirements section of this Schedule.

2.4.4.8 The foundation survey report will include reference elevations for newly constructed spread footings and provide spot elevations of original and newly built structures at a minimum of 3 points per building elevation. The location of spot elevations will be clearly noted and must be visible after cladding and backfilling have been completed.

2.4.5 Mechanical Design and Construction Documents

2.4.5.1 Quality Assurance System

2.4.5.1(1) Utilize a quality assurance system refer to Section 8 of Schedule 2 [Design and Construction Protocols] throughout the Design process to ensure all Standards, and specifications are being adhered to. Align the system with the Commissioning requirements. Provide documentation of the quality assurance system to the Authority, at

each milestone submission. Provide quality assurance system and check sheets for Authority's approval through the Review Procedure prior to starting work.

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

2.4.5.2(1) Design load assumptions and calculations.

2.4.5.3 Fire Suppression, Plans, Sections, Details will contain:

2.4.5.3(1) Design calculations for water flow with water supply flow data, fire pump (if required), and smoke control;

2.4.5.3(2) Sprinkler zoning including indication of dry pipe and pre-action systems, main and branch line sizing, and sprinkler head locations;

2.4.5.3(3) Provisions to accommodate security hazard classifications;

2.4.5.3(4) Clearly indicated ceiling and slab elevations (geodetic) complete with level changes, bulkheads, beams, etc.;

2.4.5.3(5) The location of doors and windows, and other openings;

2.4.5.3(6) The location of "special fire hazard / load" conditions such as compact storage shelving, vaults, electronic data processing rooms, etc.;

2.4.5.3(7) The location of interconnected floor spaces;

2.4.5.3(8) The location of fixtures and equipment for washrooms, kitchens, Multimedia Rooms, equipment/ mechanical/ electrical/ Communications Rooms;

2.4.5.3(9) The designation (usually by room name and number) of interior spaces including sprinkler head type;

2.4.5.3(10) Graphic indication of fire separation(s) with ratings, acoustic separation(s), security separation(s), etc.; and

2.4.5.3(11) Any specialist fire suppression elements required as part of an alternative solution.

2.4.5.3(12) If Scenario 2 is used by the Engineer of Record the Fire Suppression engineers design will keep pace and align with the design evolution and the design drawings will be provided for review at each submission stage.

2.4.5.4 Plumbing, Plans, Sections, Details will contain:

2.4.5.4(1) The following design calculations will be required to be submitted at the time of Project submission for Building Permit to the City of Burnaby and at the completion of the Project:

2.4.5.4(1)(a) Domestic cold water system;

2.4.5.4(1)(b) Domestic hot water system;

2.4.5.4(1)(c) Domestic hot water storage tank sizing;

2.4.5.4(1)(d) Storm water system complete with all rainfall calculations;

2.4.5.4(1)(e) Sanitary drainage system;

2.4.5.4(1)(f) Contaminated waste system;

2.4.5.4(1)(g) Grease / solids / acid neutralizer / interceptor sizing calculations;

2.4.5.4(1)(h) RO system sizing;

2.4.5.4(1)(i) Instrument Air compressor and pipe sizing;

2.4.5.4(1)(j) Shop (Utility) Air compressor and pipe sizing;

2.4.5.4(1)(k) Medical Gas pipe sizing;

2.4.5.4(1)(l) Medical Gas Compressor and Vacuum Pump sizing (including all intake and exhaust piping);

2.4.5.4(1)(m) Medical Gas AGSS system pump and pipe sizing (including all intake and exhaust piping); and

2.4.5.4(1)(n) Medical Gas Cylinder manifold sizing for both normal use and Post Disaster conditions.

2.4.5.4(2) All design calculations will be on an excel spreadsheet that is not locked, or password protected;

2.4.5.4(3) All design calculations will indicate the actual design conditions and will show and indicated the allowance for the future amounts that have been requested in this Schedule;

2.4.5.4(4) All design calculations will indicate the number of, and the rationale for, the amount of bottle storage that has been provided in the medical gas systems for the Post Disaster Condition;

2.4.5.4(5) All design calculations will be updated during the course of the construction and the final submission will reflect the final construction conditions as released to the Authority;

2.4.5.4(6) All final design calculations will be provided to the Authority at the completion of the Project to assist in calculating any changes that occur in the Facility post completion;

2.4.5.4(7) A documented plan of action for both the design and future maintenance of the domestic hot water system will need to be provided during the design period. The Legionella mitigation plan will incorporate the requirements of the latest version of CSA 317.1, ASHRAE AE / NSF Standard 514, NSF, and ASPE standards on Legionella design and control in Health Care Facilities;

2.4.5.4(8) Design calculations for water supply including pressure, hot water heating, sanitary waste sizing and roof drainage;

2.4.5.4(9) Riser diagrams with flows indicated for domestic hot and cold water lines, waste and vent lines; and

2.4.5.4(10) Plumbing fixture schedule and built up shower design.

2.4.5.5 Heating and Cooling (Hydronic), Plans, Sections, Details will contain:

2.4.5.5(1) Design calculations for water supply including pressure, hot water heating, glycol solution and chilled water;

2.4.5.5(2) Riser diagrams with flows indicated for hot, steam and chilled water lines; and

2.4.5.5(3) Equipment schedule.

2.4.5.6 Heating, Cooling and Ventilation (HVAC) Plans, Sections, Details will contain:

2.4.5.6(1) Design calculations for block loads for heating and refrigeration, system load and airflow calculations including minimum outside air to be admitted and duct leakage allowance, 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;

2.4.5.6(2) HVAC piping layouts including valves complete with locations where temperature, pressure, flow, contaminant/combustion gases, vibration gauges and remote sensing is required;

2.4.5.6(3) HVAC duct layouts and true sizes (double line) including fire dampers and volume control dampers;

2.4.5.6(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.);

2.4.5.6(5) Roof plan with roof-mounted equipment and penthouses complete with indication of Serviceability for equipment servicing and maintenance access;

2.4.5.6(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;

2.4.5.6(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;

2.4.5.6(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;

2.4.5.6(9) Equipment schedule including chillers, boilers, pumps, air handling units, fans, terminal units, diffusers and grilles;

2.4.5.6(10) Clear indication of seismic restraints for HVAC systems and equipment; and

2.4.5.6(11) Plans indicating fire compartments with matrices indicating relative pressurization between compartments during normal and fire modes of operation.

2.4.5.7 Integrated automation plans, sections, details will contain:

2.4.5.7(1) Design calculations; and

2.4.5.7(2) Integrated automation layout.

2.4.5.8 Schematic and schedules will contain:

2.4.5.8(1) Clearly indicated type, flow, head, speed, class, BHP, electrical, etc.; and

2.4.5.8(2) Schedules maybe graphical and/or tabular in drawing and/or specification format.

2.4.5.9 Energy Modeling

2.4.5.9(1) Using ASHRAE 140 compliant software, demonstrate that the proposed Design meets the energy use provisions of this Schedule as detailed in Appendix 2D;

2.4.5.9(2) Provide energy models and reporting, per Attachment 1 of Appendix 2D [Energy and Carbon Guarantees].

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Legends, regulatory data, drawing list, key plans | X | X | X | X | X | X |
| Fire suppression - plans, sections, details | X | X | X | X | X | X |
| Plumbing - plans, sections, details | X | X | X | X | X | X |
| Heating and Cooling (Hydraulic) - plans, sections, details | X | X | X | X | X | X |
| HVAC - plans, sections, details | X | X | X | X | X | X |
| IBMP Riser and Systems Diagram | X | X | X | X | X | X |
| FMO Network Structured Cabling Riser Diagram | X | X | X | X | X | X |
| FMO Network System Diagram | X | X | X | X | X | X |
| FMO Network Data Drop Floorplans | - | X | X | X | X | X |
| BMS - plans, sections, details Schematics and schedules, air and water flow diagrams, equipment schedules, control schematics, sequence of operations, etc. | - | X | X | X | X | X |
| *Specifications* | | | | | | |
| General Requirements | X | X | X | X | X | - |
| Fire Suppression | X | X | X | X | X | - |
| Plumbing | X | X | X | X | X | - |
| Heating, Ventilating and Air Conditioning | X | X | X | X | X | - |
| HVAC Integrated Automation | X | X | X | X | X | - |

2.4.6 Electrical Design and Construction Documents

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Legends, regulatory data, drawing list, key plans | X | X | X | X | X | X |
| Site plans | X | X | X | X | X | X |
| Power Single Line Diagram | X | X | X | X | X | X |
| Power Riser Diagram | X | X | X | X | X | X |
| Large Scale - Electrical room equipment layouts (only one typical room of each type required for 30% submission) | X | X | X | X | X | X |
| Large Scale - Electrical room 3-D equipment layouts including equipment dimensions. | - | X | X | X | X | X |
| Grounding Riser Diagram | X | X | X | X | X | X |
| Grounding Details | - | - | - | X | X | X |
| Lightning Protection Riser, Plans | X | X | X | X | X | X |

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| Lightning Protection Details | - | - | - | X | X | X |
| Lighting Control Riser | X | X | X | X | X | X |
| Lighting Control Details | - | - | X | X | X | X |
| Clock System Riser | - | - | X | X | X | X |
| Other Systems Risers | - | - | X | X | X | X |
| Fire Alarm and Voice Communication System Riser | X | X | X | X | X | X |
| Lighting and Lighting Control: | | | | | | |
| Plans | X | X | X | X | X | X |
| Circuiting | - | - | - | X | X | X |
| Power: | | | | | | |
| Plans | X | X | X | X | X | X |
| Circuiting | - | - | - | X | X | X |
| Fire Alarm and Voice Communication Systems Plans | X | X | X | X | X | X |
| Other Systems Plans | - | X | X | X | X | X |
| Switchgear/switchboard/unit substation, elevations and schedules | - | X | X | X | X | X |
| Fire Alarm and Voice Communication Systems schedules | - | - | X | X | X | X |
| Site Service details | - | X | X | X | X | X |
| Miscellaneous details | - | - | - | X | X | X |
| All other drawings | - | - | - | X | X | X |
| *Specifications* | | | | | | |
| Table of Contents: listing all sections | X | X | X | X | X | - |
| General Requirements | X | X | X | X | X | - |
| Electrical | - | X | X | X | X | - |
| Branch Circuit Panelboard Schedules | - | - | - | X | X | - |
| Luminaire Schedules | X | X | X | X | X | - |
| Lighting Control Schedules | - | - | X | X | X | - |
| Communications (clock system and interval timers) | - | X | X | X | X | - |
| Electronic Safety and Security | | | X | X | X | - |
| *Other* | | | | | | |
| Total load calculations (Utility electric service) | X | X | X | X | X | - |
| Total load calculations (generator power) | X | X | X | X | X | - |
| Load calculations (transformer loadings) | X | X | X | X | X | - |
| Load calculations (generator loadings) | X | X | X | X | X | - |
| Load calculations (UPS power) | X | X | X | X | X | - |
| Power system ground grid calculations | - | X | X | X | X | - |
| Voltage drop calculations | - | - | - | X | X | - |
| Short circuit calculations | - | X | X | X | X | - |
| Arc flash calculations | - | - | - | X | X | - |
| Co-ordination study | - | - | X | X | X | - |
| EMF study | - | - | - | X | X | - |
| Lighting calculations | - | - | X | X | X | - |
| Cable tray calculations | - | - | - | X | X | - |

2.4.6.1 Regulatory Data – will contain design load assumptions and calculations to demonstrate code compliance.

2.4.6.2 Site plans will include:

2.4.6.2(1) Property limits;

2.4.6.2(2) LEED boundary;

2.4.6.2(3) Public roadways and lighting;

2.4.6.2(4) Driveways and sidewalks;

2.4.6.2(5) Parking lots;

2.4.6.2(6) Electric Utility services;

2.4.6.2(7) Electrical high voltage feeders;

2.4.6.2(8) Site lighting and underground conduits;

2.4.6.2(9) Exterior Facility lighting;

2.4.6.2(10) Parking control systems;

2.4.6.2(11) Electric vehicle supply equipment and bike share power infrastructure;

2.4.6.2(12) Maintenance hole locations with sump pump circuits as applicable;

2.4.6.2(13) Hand holes, duct banks, pull pits;

2.4.6.2(14) High voltage and lightning protection ground grid; and

2.4.6.2(15) Nearest electrical connect point for on-site services.

2.4.6.3 Power Single Line Diagram will include:

2.4.6.3(1) The entire electrical system from the Utility service to and including switchgear, switchboards, CDPs, panelboards, MCCs, chillers, imaging equipment, motors over 50 HP;

2.4.6.3(2) Ratings of transformers, generators, breakers, switches, fuses, transfer switches, switchgear, CDPs, MCCs;

2.4.6.3(3) Ratings of grounding resistors, zig-zag grounding transformers, fuses, bus ducts, feeders, splitters, safety switches, panelboards, power factor / harmonic correction units, etc., for 50%, 90% and 100% submissions;

2.4.6.3(4) Transformer and generator winding arrangements, phase shifts, and system grounding locations;

2.4.6.3(5) Calculated maximum fault levels, symmetrical and asymmetrical, equipment short circuit current ratings, and protective device

symmetrical interrupting ratings, for 50%, 90% and 100% submissions;

2.4.6.3(6) Calculated arc flash incident energy level and corresponding PPE requirements at each power distribution equipment bus, for 90% and 100% submissions;

2.4.6.3(7) Interlock schemes;

2.4.6.3(8) Potential and current transformers, including neutral or ground fault current sensors;

2.4.6.3(9) Protective and control relays on high voltage breakers including transfer switches;

2.4.6.3(10) Metering, for 50%, 90% and 100% submissions; and

2.4.6.3(11) Equipment names, following a consistent equipment naming methodology.

2.4.6.4 Power Riser Diagram will include:

2.4.6.4(1) The entire electrical system from the Utility service to and including switchgear, CDPs, panelboards, MCCs, chillers, imaging equipment, motors over 50 HP;

2.4.6.4(2) Equipment shown in elevation relative to its actual size;

2.4.6.4(3) Equipment shown on the floor level where it will be installed;

2.4.6.4(4) A two-dimensional relative representation of where the equipment will be located;

2.4.6.4(5) Feeders to equipment with fire protection methods noted where applicable;

2.4.6.4(6) A two-dimensional representation of the routing of the feeders; and

2.4.6.4(7) Equipment names, following a consistent equipment naming methodology.

2.4.6.5 Large Scale - Electrical Room Equipment Layouts will include:

2.4.6.5(1) All electrical rooms drawn to a scale of not less than 1:50;

2.4.6.5(2) All equipment in the room shown to scale;

2.4.6.5(3) Dimensions of equipment shown, for 50%, 90% and 100% submissions;

2.4.6.5(4) Widths of access aisles dimensioned, and paths for removal and replacement of large equipment, for 50%, 90% and 100% submissions;

2.4.6.5(5) Dimensions of drawn-out equipment components shown in their drawn-out positions, for 50%, 90% and 100% submissions;

2.4.6.5(6) Dimensions of spare floor space, wall space, and adjacent areas reserved for Future Expansion requirements;

2.4.6.5(7) Equipment door swings indicated;

2.4.6.5(8) Room doors shown;

2.4.6.5(9) Room names and numbers; and

2.4.6.5(10) Three-dimensional drawing files provided, for 50%, 90% and 100% submissions.

2.4.6.6 Grounding Riser Diagram and Details will include:

2.4.6.6(1) The entire electrical grounding system from the ground grid to each electrical room, generator room, and Communications Room;

2.4.6.6(2) Ground rods, buried ground grid conductors, ground buses, grounding and equipotential bonding conductors;

2.4.6.6(3) Equipment shown in elevation;

2.4.6.6(4) Equipment shown on the floor level where they will be installed;

2.4.6.6(5) A two-dimensional relative representation of where the equipment will be located;

2.4.6.6(6) A two-dimensional representation of the routing of the conductors;

2.4.6.6(7) Ground bus names, following a consistent naming methodology, for 50%, 90% and 100% submissions;

2.4.6.6(8) Equipment and conductor sizing; and

2.4.6.6(9) Details of ground bus design and mounting, for 90% and 100% submissions.

2.4.6.7 Lightning Protection Riser Plans and Details will include:

2.4.6.7(1) The entire lightning protection system from the ground grid to the air terminals and roof top equipment connected to the system;

2.4.6.7(2) Ground electrode and grid down conductors, interconnecting conductors and bonding details;

2.4.6.7(3) Equipment shown in elevation;

2.4.6.7(4) Equipment shown on the floor level where they will be installed;

2.4.6.7(5) A two-dimensional relative representation of where the equipment will be located;

2.4.6.7(6) A two-dimensional representation of the routing of the down conductors and interconnecting conductors;

2.4.6.7(7) Equipment sizing;

2.4.6.7(8) Details of:

2.4.6.7(8)(a) Air terminal parapet mounting;

2.4.6.7(8)(b) Air terminal roof mounting;

2.4.6.7(8)(c) Roof penetrations;

2.4.6.7(8)(d) Air terminal to conductor connections;

2.4.6.7(8)(e) Conductor interconnections; and

2.4.6.7(8)(f) Bonding straps for other equipment.

2.4.6.8 Lighting Control Riser and Details will include:

2.4.6.8(1) All lighting controllers and network connections;

2.4.6.8(2) Lighting controllers shown on the floor level where they will be installed;

2.4.6.8(3) A two-dimensional relative representation of where the lighting controllers will be located and the areas they serve;

2.4.6.8(4) Wiring runs to equipment;

2.4.6.8(5) A two-dimensional representation of the routing of the wiring runs;

2.4.6.8(6) Wiring details for each type of control device and major space types, showing wiring topology and methods, clearly indicating how luminaires, sensors, switches, controllers and network interfaces connect;

2.4.6.8(7) Equipment names, following a consistent equipment naming methodology; and

2.4.6.8(8) Details of integration with other systems.

2.4.6.9 Clock System Riser will include:

2.4.6.9(1) Clock system communications network nodes and links;

2.4.6.9(2) Equipment shown on the floor level where they will be installed;

2.4.6.9(3) A two-dimensional relative representation of where the equipment will be located;

2.4.6.9(4) Wiring runs and wireless communications links between equipment and to remote time servers;

2.4.6.9(5) Equipment names, following the FHA standards for a consistent equipment naming methodology; and

2.4.6.9(6) Details of integration with existing clock system and other systems.

2.4.6.10 Metering Riser will include:

2.4.6.10(1) The entire system;

2.4.6.10(2) Equipment shown on the floor level where they will be installed;

2.4.6.10(3) A two-dimensional relative representation of where the equipment will be located;

2.4.6.10(4) Wiring runs to equipment;

2.4.6.10(5) A two-dimensional representation of the routing of the wiring runs; and

2.4.6.10(6) Equipment names, following the FHA standards for a consistent equipment naming methodology.

2.4.6.11 Fire Alarm System Riser Diagram will include:

2.4.6.11(1) The entire fire alarm and voice communication system;

2.4.6.11(2) Equipment shown on the floor level where they will be installed;

2.4.6.11(3) A two-dimensional relative representation of where the equipment will be located;

2.4.6.11(4) Communication wiring between the head end and local panels, and between local panels;

2.4.6.11(5) A two-dimensional representation of the routing of the wiring between the head end and the local panels and between the local panels;

2.4.6.11(6) Each initiating loop out of a local panel, including every isolation module used in the loop;

2.4.6.11(7) Indication of each initiating zone;

2.4.6.11(8) Indication of each notification zone;

2.4.6.11(9) A typical representation of the initiating, monitoring and control devices installed on each segment of a loop (i.e. between isolation modules);

2.4.6.11(10) Each notification circuit out of a local panel;

2.4.6.11(11) A typical representation of the notification devices installed on each signal circuit;

2.4.6.11(12) Interconnections with other systems; and

2.4.6.11(13) Equipment names, following a consistent equipment naming methodology approved by the Authority through the Review Procedure.

2.4.6.12 Lighting and Lighting Control Plans will include:

2.4.6.12(1) Reflected ceiling plans to scale showing all luminaires, including emergency lighting and exit signs, in their relative locations;

2.4.6.12(2) An indication of the luminaire types, corresponding to the luminaire schedules;

2.4.6.12(3) Circuiting of each luminaire;

2.4.6.12(4) Lighting control devices, in their relative locations;

2.4.6.12(5) Control panels, in their relative locations;

2.4.6.12(6) Lighting control zoning;

2.4.6.12(7) Lighting panelboards, in their relative locations; and

2.4.6.12(8) Room names and numbers, doors and windows, corridor names.

2.4.6.13 Power Plans will include:

2.4.6.13(1) Floor plans to scale showing all;

2.4.6.13(1)(a) branch circuits;

2.4.6.13(1)(b) receptacles;

2.4.6.13(1)(c) outlets;

2.4.6.13(1)(d) safety switches;

2.4.6.13(1)(e) transfer switches;

2.4.6.13(1)(f) dry type transformers;

2.4.6.13(1)(g) feeders;

2.4.6.13(1)(h) splitters;

2.4.6.13(1)(i) distribution panels;

2.4.6.13(1)(j) lighting/receptacle/lab panels;

2.4.6.13(1)(k) switches controlling receptacles or outlets;

2.4.6.13(1)(l) timers;

2.4.6.13(1)(m) clocks;

2.4.6.13(1)(n) contactors;

2.4.6.13(1)(o) switchgear;

2.4.6.13(1)(p) switchboards;

2.4.6.13(1)(q) power factor correction units;

2.4.6.13(1)(r) transformers;

2.4.6.13(1)(s) generators;

2.4.6.13(1)(t) UPS equipment;

2.4.6.13(1)(u) motor control centres;

2.4.6.13(1)(v) chillers;

2.4.6.13(1)(w) motors over 150 HP;

2.4.6.13(1)(x) cable tray layout;

2.4.6.13(1)(y) automatic door controls;

2.4.6.13(1)(z) control equipment (other than lighting control); etc., shown in their relative locations;

2.4.6.13(1)(aa) An indication of the equipment types, corresponding to the legend;

2.4.6.13(1)(bb) Circuiting of each item of equipment;

2.4.6.13(1)(cc) Room names and numbers, doors and windows, corridor names; and

2.4.6.13(1)(dd) Floor plans to indicate the removal aisle ways and routes for major electrical equipment such as diesel generators, switchgear, ATS, UPS, and transformers sized 200 KVA and greater.

2.4.6.14 Fire Alarm System Plans will include:

2.4.6.14(1) Reflected ceiling plans to scale showing all initiating devices, notification devices, control devices, monitoring devices, isolation modules, in their relative locations;

2.4.6.14(2) An indication of the equipment types, corresponding to the legend;

2.4.6.14(3) Annunciators, head end equipment, local panels, battery cabinets, paging stations, control centres, in their relative locations;

2.4.6.14(4) Identification of each zone boundary;

2.4.6.14(5) Circuiting of items requiring power for 90% and 100% submissions;

2.4.6.14(6) Room names and numbers, doors and windows, corridor names;

2.4.6.14(7) Zone names; and

2.4.6.14(8) Fire walls, fire separations and ratings of the walls.

2.4.6.15 Switchgear/CDP/Unit Substation, Elevations and Schedules will include:

2.4.6.15(1) The elevation of each item of switchgear, each CDP and each unit substation showing protective devices, switching devices, bus arrangements, protective relays, control relays, metering, labelling, surge protective devices; and

2.4.6.15(2) Schedules identifying each protective device, switching device, transformer, bus, showing the ratings of these plus the settings of each protective device, including:

2.4.6.15(2)(a) Long-time pickup;

2.4.6.15(2)(b) Long-time delay;

2.4.6.15(2)(c) Short time pickup;

2.4.6.15(2)(d) Short time delay;

2.4.6.15(2)(e) Instantaneous (if required);

2.4.6.15(2)(f) Ground fault pickup; and

2.4.6.15(2)(g) Ground fault delay, etc. as applicable.

2.4.6.16 Fire Alarm Systems Schedules will include, in a matrix format:

2.4.6.16(1) All initiating, monitoring and control zone designations;

2.4.6.16(2) All notification zone designations;

2.4.6.16(3) A description of the area or equipment involved;

2.4.6.16(4) An indication of the system operation related to that zone;

2.4.6.16(5) All voice communications zone designations; and

2.4.6.16(6) A description of the area involved for each voice communications zone.

2.4.6.17 Site Service Details will include:

2.4.6.17(1) Maintenance holes and hand holes;

2.4.6.17(1)(a) Provide Confined Space (CS) plan for maintenance access with detailed description of any possible chemical substance, gases, etc. The CS plan must include:

2.4.6.17.1.(a).1 Entry procedure;

2.4.6.17.1.(a).2 Hazard Assessment;

2.4.6.17.1.(a).3 Rescue Procedure; and

2.4.6.17.1.(a).4 Provide appropriate signage.

2.4.6.17(2) Cable racking inside maintenance holes;

2.4.6.17(3) Cable pulling provisions inside maintenance holes;

2.4.6.17(4) Built in ladders inside maintenance holes;

2.4.6.17(5) Means of draining maintenance holes including gravity drainage and sump pump systems;

2.4.6.17(6) High water alarms for maintenance holes;

2.4.6.17(7) Lighting and power provisions inside maintenance holes;

2.4.6.17(8) Cross sections of each duct bank;

2.4.6.17(9) Cross sections of any direct buried cables;

2.4.6.17(10) Bases for lighting standards;

2.4.6.17(11) Bases for bollards;

2.4.6.17(12) Bases for other equipment;

2.4.6.17(13) Snow melting details; and

2.4.6.17(14) Roof and gutter de-icing details.

2.4.6.18 Miscellaneous Details will include:

2.4.6.18(1) All details required for the full description of the Project not included on other drawings.

2.4.6.19 All Other Drawings will include:

2.4.6.19(1) Drawings as required for the full description of the Project not included on other drawings.

2.4.6.20 As Built Drawings will include:

2.4.6.20(1) Drawings included in the 100% submission plus any changes made and any drawings added up to the completion of construction;

2.4.6.20(2) Updating of each drawing to the final “as built” condition;

2.4.6.20(3) Final locations and elevations of duct banks, maintenance holes, hand holes, conduit, outlets, panels, branch wiring, system wiring, pull boxes, bus ducts, and equipment;

2.4.6.20(4) Dimensions from column lines or edge of roadways to the location and depth of buried services;

2.4.6.20(5) Project surveyor’s information on the Site services as-built drawings;

2.4.6.20(6) Provide master single line diagrams that incorporate the entire Campus as-built conditions for all main electrical rooms. Provide five (5) full size sets, framed, glassed and locate in the BH Energy Centre, Support Facilities Building, Nursing Tower, and Phase 1A and Phase 2 main electrical rooms; and

2.4.6.20(7) Provide two (2) 36” x 48” sized sets of the master single line diagram for the entire campus including CAD files to be provided to the Authority.

2.4.6.21 Electrical Specifications will include:

2.4.6.21(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;

2.4.6.21(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; and

2.4.6.21(3) Identification of the codes and standards that the materials, equipment, and systems will be provided in accordance with.

2.4.6.22 Branch Circuit Panelboard Schedules will include:

2.4.6.22(1) A separate schedule for each panelboard;

2.4.6.22(2) Panelboard ratings, voltage and ampacity;

2.4.6.22(3) Main breaker ratings (where applicable);

2.4.6.22(4) Maximum number of branch breaker poles that the panelboard can accommodate;

2.4.6.22(5) The rating and number of poles for each branch breaker;

2.4.6.22(6) The phase that each breaker pole is connected to;

2.4.6.22(7) The name of the load supplied by each branch breaker;

2.4.6.22(8) The anticipated circuit loading in Amperes;

2.4.6.22(9) Spare breakers;

2.4.6.22(10) Breaker spaces;

2.4.6.22(11) The interrupting rating of the circuit breakers; and

2.4.6.22(12) Circuits equipped with breaker “lock-on” devices.

2.4.6.23 Lighting Control Schedules will include:

2.4.6.23(1) A separate schedule for each control panel;

2.4.6.23(2) Lighting control zone designations;

2.4.6.23(3) Circuits and sub-circuits controlled;

2.4.6.23(4) Designation of each control relay;

2.4.6.23(5) Rating of each control relay;

2.4.6.23(6) A description of the type of control;

2.4.6.23(7) A listing of “scenes” allocated to the zone; and

2.4.6.23(8) Interfaces with other panels, head end equipment, other systems.

2.4.6.24 Communications Specifications Sections will include:

2.4.6.24(1) Sections in sufficient detail to fully describe each material and each item of equipment to be used on the clock system and interval

timers, including manufacturers, materials, assembly, functions, features and performance requirements;

2.4.6.24(2) The method of installation, testing, Commissioning and documenting for each material, piece of equipment, and system, and interface; and

2.4.6.24(3) Identification of the codes and standards that the materials, equipment, and systems will be provided in accordance with.

2.4.6.25 Electronic Safety and Security Specifications Sections will include:

2.4.6.25(1) Sections in sufficient detail to fully describe each item of equipment to be used on the fire alarm and voice communication system, including manufacturers, materials, assembly, functions, features and performance requirements;

2.4.6.25(2) The method of installation, testing, Commissioning and documenting for each material, piece of equipment, system, and interface; and

2.4.6.25(3) Identification of the codes and standards that the materials, equipment and systems will be provided in accordance with.

2.4.6.26 Calculations will be:

2.4.6.26(1) Published, handwritten calculations will not be submitted;

2.4.6.26(2) Fully detailed to allow review of each step of the calculations;

2.4.6.26(3) With power demand and diversity factors identified; and

2.4.6.26(4) With all assumptions clearly stated.

2.4.6.27 Total Load Calculations (Utility Electric Service) will include:

2.4.6.27(1) Calculation of the annual peak demand load, in kW and kVA, expected for the BH Campus including spare capacity requirements;

2.4.6.27(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; and

2.4.6.27(3) Calculation of the annual peak demand load, in kW and kVA, on each Utility service with one Utility service shutdown.

2.4.6.28 Total Load Calculations (Generator Power) will include:

2.4.6.28(1) Calculation of the annual peak demand load on the generating system, in kW and kVA, expected for the BH Campus including spare capacity requirements;

2.4.6.28(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;

2.4.6.28(3) Calculation of the annual peak demand load, in kW and kVA, on each generator with one generator out of service; and

2.4.6.28(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.

2.4.6.29 Load Calculations (Transformer Loadings) will include:

2.4.6.29(1) Calculation of the annual peak demand load, in kW and kVA, on each transformer under typical operating conditions;

2.4.6.29(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);

2.4.6.29(3) Calculation of the anticipated future load growth on each transformer; and

2.4.6.29(4) Calculation of the spare capacity provided for in each transformer.

2.4.6.30 Load Calculations (Generator Loadings) will include:

2.4.6.30(1) Calculation of the annual peak demand load, in kW and kVA, on each generator under typical operating conditions;

2.4.6.30(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);

2.4.6.30(3) Calculation of the anticipated future load growth on each generator; and

2.4.6.30(4) Calculation of the spare capacity provided for in each generator.

2.4.6.31 Load Calculations (UPS Power) will include:

2.4.6.31(1) Calculation of the annual peak demand load, in kW and kVA, on each UPS system under typical operating conditions;

2.4.6.31(2) Calculation of the anticipated future load growth on each UPS system;

2.4.6.31(3) Calculation of the spare capacity provided for in each UPS system; and

2.4.6.31(4) Calculation of the battery support time of each UPS system, based on:

2.4.6.31(4)(a) full load operation;

2.4.6.31(4)(b) with the redundant system not available;

2.4.6.31(4)(c) with the battery capacity derated to the actual ambient room temperature, and

2.4.6.31(4)(d) with the batteries at “end of life”.

2.4.6.32 Power System Ground Grid Calculations will include:

2.4.6.32(1) Identification of soil resistivity based on site testing, two level resistivity if applicable; and

2.4.6.32(2) Calculation of the GPR, step and touch potentials, in accordance with ANSI/IEEE-80.

2.4.6.33 Voltage Drop Calculations will include:

2.4.6.33(1) Calculations of the steady state voltage drop from the Utility service though to every power utilizing device;

2.4.6.33(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;

2.4.6.33(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 (e.g.: a single motor) in which case the fixed known load can be used; and

2.4.6.33(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.

2.4.6.34 Short Circuit Calculations will include:

2.4.6.34(1) Calculations of symmetrical and asymmetrical values of fault currents, based on the calculated X/R ratio of the system;

2.4.6.34(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;

2.4.6.34(3) The maximum fault currents based on the Utility supply in parallel with the generator supply, where closed transition transfer switches are used;

2.4.6.34(4) The Utility ultimate design fault levels;

2.4.6.34(5) Motor contribution; and

2.4.6.34(6) Actual transformer impedances, but until actual impedances are available, worst case (low) impedances.

2.4.6.35 Arc Flash Calculations will include:

2.4.6.35(1) Calculations of the arc flash level at every protective device, panelboard and every switching device in the system, excluding local switches on branch circuits.

2.4.6.36 Coordination Study will include:

2.4.6.36(1) Graphs of each portion of the electrical system on log-log paper showing:

2.4.6.36(1)(a) The operating characteristics of each protective device;

2.4.6.36(1)(b) Full load ratings of transformers;

2.4.6.36(1)(c) Full load ratings of individual generators and generators in parallel;

2.4.6.36(1)(d) The maximum and minimum fault level at each protective device and each switching device;

2.4.6.36(1)(e) Transformer inrush current;

2.4.6.36(1)(f) Motor starting current;

2.4.6.36(1)(g) Cable damage curves;

2.4.6.36(1)(h) Transformer damage curves;

2.4.6.36(1)(i) Full load ratings of generators;

2.4.6.36(1)(j) Generator damage curves;

2.4.6.36(1)(k) Generator decrement curves for individual generators and paralleled generators;

2.4.6.36(1)(l) Full load ratings of UPS systems;

2.4.6.36(1)(m) UPS system fault levels;

2.4.6.36(1)(n) UPS system maintenance bypass fault levels; and

2.4.6.36(1)(o) A single line diagram of the portion of the system involved including the equipment names, ratings and settings.

2.4.6.36(2) No more than five times current curves of protective devices on each graph;

2.4.6.36(3) Graphs showing operation on Utility power;

2.4.6.36(4) Graphs showing operation on generator power;

2.4.6.36(5) Graphs showing operation on UPS power;

2.4.6.36(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 centres, chillers, motors of 50 HP and larger;

2.4.6.36(7) Separate graphs for phase currents;

2.4.6.36(8) Separate graphs for ground currents;

2.4.6.36(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;

2.4.6.36(10) Identification of areas where equipment protection is not adequate; and

2.4.6.36(11) Identification of areas where full co-ordination is not achieved.

2.4.6.37 Magnetic Field Study will include:

2.4.6.37(1) Post-installation magnetic field measurements (60Hz magnetic field strength, in milligauss) in any areas with sensitive equipment located near transformers, motors, or other field-producing equipment; and

2.4.6.37(2) Field measurements to be made where requested by the Authority.

2.4.6.38 Lighting Calculations will include:

2.4.6.38(1) Photometrical computation to provide illuminance levels;

2.4.6.38(2) Lighting layouts including fixture types and dimensions from fixtures to fixtures and fixtures to walls;

2.4.6.38(3) IES information; and

2.4.6.38(4) Minimum/maximum horizontal and vertical illuminance.

2.4.6.39 Cable Tray Calculations will include:

2.4.6.39(1) Cable type and dimensions; and

2.4.6.39(2) Cable fill including spare capacity.

2.4.7 Electrical Shop Drawings

2.4.7.1 Submit Shop Drawings for the following:

2.4.7.1(1) Switchgear;

2.4.7.1(2) CDPs;

2.4.7.1(3) Panelboards;

2.4.7.1(4) SPDs;

2.4.7.1(5) Generators;

2.4.7.1(6) Paralleling control and load management systems;

2.4.7.1(7) UPS;

2.4.7.1(8) Transformers;

2.4.7.1(9) Power factor and harmonic correction equipment;

2.4.7.1(10) Firestop details;

2.4.7.1(11) Maintenance holes;

2.4.7.1(12) Wiring products and raceways;

2.4.7.1(13) Wiring devices;

2.4.7.1(14) EVSE;

2.4.7.1(15) Luminaires;

2.4.7.1(16) Lighting control systems and devices;

2.4.7.1(17) Clocks;

2.4.7.1(18) Fire Alarm System and devices; and

2.4.7.1(19) Fire alarm annunciator graphic and CACF layout.

2.4.8 Electrical Samples and Mock-ups

2.4.8.1 Submit Samples of the following:

2.4.8.1(1) Each luminaire type; and

2.4.8.1(2) Each type of illuminated sign.

2.4.8.2 Prepare Mock-Ups of the following:

2.4.8.2(1) Each type of Patient service unit, e.g. headwalls (vertical or horizontal), consoles, ceiling columns, booms, telescoping booms, etc.

2.4.9 Electrical Studies

2.4.9.1 Submit documentation of the following studies:

2.4.9.1(1) IR study of electrical switch gear and all breakers including panelboards;

2.4.9.1(2) RF study of the property;

2.4.9.1(3) Short circuit studies;

2.4.9.1(4) Protective device Co-ordination studies; and

2.4.9.1(5) Arc flash studies.

2.4.10 Electrical Reports

2.4.10.1 Submit reports for the following:

2.4.10.1(1) Operating and Maintenance Manuals;

2.4.10.1(2) Training session records;

2.4.10.1(3) Panelboard loading test results;

2.4.10.1(4) Transformer loading test results;

2.4.10.1(5) Motor control centre loading test results;

2.4.10.1(6) Motor control centre performance testing;

2.4.10.1(7) Seismic restraints;

2.4.10.1(8) Testing of Patient care areas to CSA Z32;

2.4.10.1(9) Illumination level measurements;

2.4.10.1(10) Factory witness testing;

2.4.10.1(11) Site acceptance (pre-service) testing;

2.4.10.1(12) Ground resistance measurements;

2.4.10.1(13) Lightning protection grounding resistance;

2.4.10.1(14) UPS battery testing;

2.4.10.1(15) UPS performance testing;

2.4.10.1(16) Generator testing;

2.4.10.1(17) Transfer switch testing;

2.4.10.1(18) Transformer testing;

2.4.10.1(19) High voltage cable testing;

2.4.10.1(20) Switchgear/switchboard testing;

2.4.10.1(21) Distribution system dynamic performance verification;

2.4.10.1(22) EMF levels in sensitive areas; and

2.4.10.1(23) Clock system signal coverage indicated graphically on floor plans.

2.4.11 Electrical Certificates and Verifications

2.4.11.1 Submit the following certificates and verifications:

2.4.11.1(1) Manufacturers' letters verifying that the equipment has been installed in accordance with their instructions for the following:

2.4.11.1(1)(a) Fire stopping;

2.4.11.1(1)(b) Fire rated wiring;

2.4.11.1(1)(c) Lighting control systems;

2.4.11.1(1)(d) Clock system;

2.4.11.1(1)(e) Automatic transfer switches;

2.4.11.1(1)(f) Generators;

2.4.11.1(1)(g) Paralleling and load management systems;

2.4.11.1(1)(h) UPS systems;

2.4.11.1(1)(i) UPS batteries;

2.4.11.1(1)(j) EVSE;

2.4.11.1(1)(k) Power factor and harmonic correction units; and

2.4.11.1(1)(l) Metering.

2.4.11.1(2) Seismic certifications and letters of assurance for:

2.4.11.1(2)(a) Transformers;

2.4.11.1(2)(b) Generators;

2.4.11.1(2)(c) Transfer switches;

2.4.11.1(2)(d) Switchgear /CDPs /MCCs;

2.4.11.1(2)(e) Seismic restraints/anchorage of other electrical components;

2.4.11.1(3) Other documentation:

2.4.11.1(3)(a) Fire Alarm System verification;

2.4.11.1(3)(b) Radio license for clock system;

2.4.11.1(3)(c) Request for final review;

2.4.11.1(3)(d) Electrical engineer's letter of assurance; and

2.4.11.1(3)(e) Equipment warranties.

2.4.12 Communication Construction Documents

2.4.12.1 In addition to all other applicable Submittal requirements the communications documents will include the information indicated in the following table for the different design stages:

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Cover Page | X | X | X | X | X | X |
| Site Plan and Details | X | X | X | X | X | X |
| Floor Plans | X | X | X | X | X | X |
| Stairwell Elevations | X | X | X | X | X | X |
| Communications Room Layouts and Room Elevations | X | X | X | X | X | X |
| Equipment Rack/Server Cabinet Elevations | - | - | - | X | X | X |
| Structured Cabling Labelling Details | - | - | - | X | X | X |
| Telecommunications Bonding and Grounding Riser Diagram | X | X | X | X | X | X |
| Backbone Communications Pathway System Riser Diagram | X | X | X | X | X | X |
| Isometric Backbone Communications Pathway System Riser Diagram | X | X | X | X | X | X |
| Backbone Cabling Riser diagram | X | X | X | X | X | X |
| Public Address Block Diagram | X | X | X | X | X | X |
| Intercommunications Block Diagram | X | X | X | X | X | X |
| Multimedia Room Layouts and Lighting Design | X | X | X | X | X | X |
| AV and Multimedia System Block Diagrams | X | X | X | X | X | X |

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| Digital Signage | X | X | X | X | X | X |
| Nurse Call Block Diagram | X | X | X | X | X | X |
| *Specification and other Submittals* | | | | | | |
| Communications (Division 27) All Systems | X | X | X | X | X | X |
| Reflected Ceiling Plans showing communications devices and equipment (See Architectural Documents Section) | X | X | X | X | X | X |
| Category 6A Data Drop Inventory | - | X | X | X | X | X |
| Cable Fill Calculations | - | X | X | X | X | X |

2.4.12.2 Drawings

2.4.12.2(1) Drawings related to the Communications (Division 27) scope of work will be identified as “T” series (Telecommunications) drawings.

2.4.12.2(2) The “T” series drawings will be kept separated from “E” (Electrical-Division 26) drawings and will not contain any information related to the Division 28 scope of work.

2.4.12.2(3) The “T” series drawings as well as other disciplines’ drawings for the Facility will include information relating to systems that are designed by the Authority. This includes, information relating to the IM/IT Wi-Fi network, the DAS system and locating services system detailed in the Division 27 section of Schedule 3 [Design and Construction Specifications]. This information will be kept current on the “T” series drawings as well as other disciplines’ drawings for the Facility throughout the duration of the Project.

2.4.12.2(4) The “T” series drawings and renderings will be produced, reviewed and stamped or certified by the RCDD employed by Project Co.

2.4.12.2(5) Industry standard graphic symbols and legends will be employed when creating the “T” series drawings. Refer to 2020 Edition of the PHSA Communications Infrastructure Standards and Specifications for Authority approved symbols.

2.4.12.2(6) Drawing notes provide information that clarifies the requirements for the item(s) delineated. As such, drawing notes will be identified on the drawing they are associated with. Notes will not be identified on a drawing if the information conveyed on the note is not relevant to the item(s) delineated on that specific drawing or rendering.

2.4.12.2(7) All existing, proposed and future features of the design shown on the T” series drawings and renderings will be clearly distinguishable from each other. Grey scales are not allowed because of their tendency to be lost during typical reproduction or photocopying.

2.4.12.2(8) When a design spans more than one drawing or sheet, a design match mark will be established to reference the continuation of the design from one sheet to another.

2.4.12.2(9) Where available, manufacturer's Revit models or AutoCAD blocks for materials and equipment specified in the project agreement or selected through the

2.4.12.2(10) Submittal process for the project will be employed in the design to improve accuracy of the information conveyed on all "T" series drawings.

2.4.12.2(11) The cover page will include:

2.4.12.2(11)(a) Drawing list;

2.4.12.2(11)(b) Legend of all drawing symbols used for each system within the Division 27 scope of work;

2.4.12.2(11)(c) Abbreviations; and

2.4.12.2(11)(d) General, construction and key notes.

2.4.12.2(12) The site plan and associated details will include:

2.4.12.2(12)(a) Property limits;

2.4.12.2(12)(b) Outline of existing buildings and structures and the Facility and proposed structures;

2.4.12.2(12)(c) Public roadways;

2.4.12.2(12)(d) Landscaped areas;

2.4.12.2(12)(e) Driveways;

2.4.12.2(12)(f) Parking lots and lay byes indicating parking spaces;

2.4.12.2(12)(g) CPPS, service entrance facility and other underground communications pathways systems including:

2.4.12.2.12.(g).1 Plan view of existing and new communications ducts and pre- cast manholes and service vaults and boxes in relation to grade and other existing and proposed utilities and underground services. The plan views will indicate locations where ducts are to be off-set and the number of degrees associated with any

manufactured bends identified in the design of the duct bank;

2.4.12.2.12.(g).2 Sections and profiles showing elevation and location of existing and new communications ducts and pre-cast manholes and service vaults and boxes in relation to grade and other existing and proposed utilities and underground services. All parallel utilities and underground services within 3m of the communications ducts are to be shown in the profile as well as any utilities and underground services that cross the communications ducts;

2.4.12.2.12.(g).3 Typical communications trench details (for each type of trench) showing backfill information, concrete encasement, rebar, duct spacers, placement of warning tape, separation between ducts, duct bank depth and overall dimensions and clearances from other utilities;

2.4.12.2.12.(g).4 Three-dimensional coloured rendering of new communications duct banks showing the changes in elevations, horizontal alignment, offsets and manufactured bends and relationship between other existing and proposed utilities and underground services and structures;

2.4.12.2.12.(g).5 Butterfly drawings for each pre-cast manhole and service vault and box (including those existing manholes impacted by the work) showing vault size, depth, lid marking and traffic rating. Each butterfly drawing is to have an associated duct schedule that identifies the size and destination of each duct;

2.4.12.2.12.(g).6 Typical details for pre-cast manholes and service vaults showing plan and elevation views, racking, grounding,

sump detail, manhole lid, manhole signage and any special items cast into manhole sections such as pulling eyes;

2.4.12.2.12.(g).7 Clearances between existing and new communications ducts and pre-cast manholes and service vaults from retaining walls, buildings, monument signs, landscaping and landscaping structures and other utilities. The clearances from existing and new pre-cast manholes and service vaults from the curb radius or right of way line of any new vehicular access point, driveway, road, lane or loading bay and parking entrances;

2.4.12.2.12.(g).8 Locations of telecommunications outlets required for systems and devices located on the exterior of the Facility and on the site; and

2.4.12.2(12)(h) Locations of telecommunications outlets required for systems and devices located on the exterior of the Facility and on the site; and

2.4.12.2(12)(i) Typical details for mounting a Wi-Fi access points to the exterior of the Facility and to other structures on site such as street light poles. Street light pole detail to show all elements required as per Schedule 3 [Design and Construction Specifications].

2.4.12.2(13) The floor plans for each level of the Facility will include:

2.4.12.2(13)(a) The locations of all communications rooms and their associated serving zone boundaries;

2.4.12.2(13)(b) The boundary of each cell associated with Category 6A cabling grid that will be provided for the IM/IT wireless network;

2.4.12.2(13)(c) The location and routing of the Communications Pathway System including:

2.4.12.2.13.(c).1 Communications cable tray;

2.4.12.2.13.(c).2 Sections and profiles of the cable tray systems showing elevation and

location of new communications cable trays in relation to all other services in the ceiling space including HVAC, power cable tray, lighting, conduit larger than 25.4mm, power devices and junctions and other systems to help identify any potential clashes;

2.4.12.2.13.(c).3 103 mm Hilti speed sleeves (horizontal and riser);

2.4.12.2.13.(c).4 Conduits that are 50 mm or larger (horizontal and riser);

2.4.12.2.13.(c).5 Pull boxes associated with Service Entrance Facilities and backbone Communications Pathway System; and

2.4.12.2.13.(c).6 Roof penetration housings.

2.4.12.2(13)(d) The location and routing of the backbone cabling subsystem;

2.4.12.2(13)(e) The location and routing of the telecommunications grounding backbone;

2.4.12.2(13)(f) The locations and elevations of all Telecommunications Outlets, AV wall boxes and floor boxes:

2.4.12.2.13.(f).1 The drawings will identify the type and quantity of cables terminated in each Telecommunications Outlet, and floor box;

2.4.12.2.13.(f).2 Furniture layouts (including Systems Furniture and Millwork) will be shown on the drawings in order to confirm Telecommunications Outlets, AV wall boxes and source connection panels (and floor boxes are correctly located); and

2.4.12.2.13.(f).3 The location of each Telecommunications Outlet, AV wall box and floor box will be fully coordinated with the rest of the Design of the Facility.

2.4.12.2(13)(g) For each serving zone, provide a measurement with supporting data for the maximum Permanent Link Length of a horizontal cable from the Communications Room to the extremities of a building's interior space. Provide the supporting data associated with these measurements so they can be validated by the Authority;

2.4.12.2(13)(h) Access paths denoting clearances and floor loading capacities for the installation and removal of equipment and materials between the Facility, loading dock and each Communications Room; and

2.4.12.2(13)(i) Locations and types of equipment and components associated with following:

2.4.12.2.13.(i).1 Wi-Fi network – specifically wireless access point placement;

2.4.12.2.13.(i).2 Physiological monitoring network (including telemetry antennas);

2.4.12.2.13.(i).3 AV and multimedia systems;

2.4.12.2.13.(i).4 Public address system;

2.4.12.2.13.(i).5 Intercommunications system;

2.4.12.2.13.(i).6 Nurse Call systems;

2.4.12.2.13.(i).7 DAS – specifically antenna placement;

2.4.12.2.13.(i).8 Location Services- specifically transmitters, antennas and beacons; and

2.4.12.2.13.(i).9 Security IP Cameras.

2.4.12.2(13)(j) Stairwell elevations will include the locations of:

2.4.12.2.13.(j).1 Wall and ceiling Telecommunications Outlets (denoting the serving zone each outlet is associated with);

2.4.12.2.13.(j).2 Transmitters, antennas, and beacons; and

2.4.12.2.13.(j).3 Speakers.

2.4.12.2(13)(k) For each individual Communications Room in the Facility, a layout drawing drawn to scale will be provided that includes:

2.4.12.2.13.(k).1 Plan views, reflected ceiling plans and interior wall elevations in a scale not less than 1:50;

2.4.12.2.13.(k).2 A three-dimensional coloured rendering of the room and the components, materials and equipment that reside in it;

2.4.12.2.13.(k).3 The outlines of the interior partitions in relation to the structural framework complete with finishing details such as plywood backboards;

2.4.12.2.13.(k).4 The location of doors and door swings;

2.4.12.2.13.(k).5 The location and sizes of all components, materials and equipment noted in this clause:

- (k).5.1 Equipment racks;
- (k).5.2 Server cabinets;
- (k).5.3 Vertical cable managers;
- (k).5.4 Vertical ePDUs;
- (k).5.5 Plywood (elevations will show the outline of the plywood);
- (k).5.6 Telecommunications ground busbar (TGB/TMGB);
- (k).5.7 Wall mount panels associated with Division 27 systems;
- (k).5.8 Gigabix termination blocks;
- (k).5.9 Communications Pathway System – vertical and horizontal cable tray, sleeves and conduits (50 mm or larger);
- (k).5.10 Cable tray drop outs and waterfall fittings;
- (k).5.11 Telecommunications Outlets;
- (k).5.12 Wi-Fi antennas;
- (k).5.13 DAS antennas;
- (k).5.14 Location transmitters, antennas and beacons; and
- (k).5.15 Public Address speakers.

2.4.12.2.13.(k).6 Wall space allocation for DAS equipment;

- (k).6.1 Identification of wall space for future use;
- (k).6.2 Identification of floor space for future equipment racks, server cabinets and cable management;
- (k).6.3 Server cabinet and wall mount panel door swings indicated; and
- (k).6.4 Maintenance and operational clearances.

2.4.12.2(13)(l) In addition to the requirements in Section 7.10.15 Enhanced Room Data Sheets for each Communications Room will:

2.4.12.2.13.(l).1 Include a coloured photometric map;

2.4.12.2.13.(l).2 Identify the location, sizes and elevations of all components, materials and equipment noted in Clause 2.4.12.2(13)(k) drawn to scale;

2.4.12.2.13.(l).3 Identify using the correct scale the location, sizes and elevation of all components, materials and equipment related to other disciplines that will occupy space within each Communications Room. This includes the following:

- (l).3.1 Door dimensions;
- (l).3.2 Humidistats and thermostats;
- (l).3.3 Mechanical equipment, louvres, diffuser; grilles and ducts;
- (l).3.4 Sprinkler piping and sprinkler heads;
- (l).3.5 Drip trays and shields;
- (l).3.6 Electrical conduits and sleeves (50 mm or larger) and cable tray;
- (l).3.7 Electrical panels;
- (l).3.8 Electrical outlets (including twist lock receptacles situated above equipment racks and server cabinets). Annotations will be provided indicating the branch the outlet is connected to and whether the outlet is surface mounted or recessed into the wall;
- (l).3.9 Dimmer switches;
- (l).3.10 Lighting fixtures;

(l).3.11 Occupancy sensors;
(l).3.12 Clock system equipment;
(l).3.13 Fire alarm speakers and devices;
(l).3.14 Smoke detectors;
(l).3.15 Wall mount panels associated with all Division 28 systems – access control, intrusion, panic duress and other;
(l).3.16 Power supply enclosures;
(l).3.17 Card readers (wired and wireless);
(l).3.18 CCTV cameras;
(l).3.19 Keypads;
(l).3.20 Motion detectors;
(l).3.21 Location transmitters, antennas and beacons associated with Division 28 systems; and
(l).3.22 All other passive and active wall mount equipment associated with any system that is permitted to be installed in a Communications Room (regardless of whether the equipment is supplied by the Project Co or the Authority).

2.4.12.2.13.(l).4 Include a calculation of unused or spare wall space expressed as a percentage of total useable wall space. This calculation will not consider unusable wall space or wall space above 2700 mm in elevation. Furthermore, the entire wall area below 2700 mm needs to be completely free of wall mounted equipment for it to be classified as spare.

2.4.12.2(13)(m) For each equipment rack and server cabinet installed in the Facility, an elevation drawing will be provided that includes:

2.4.12.2.13.(m).1 The Communication Room ID where the equipment rack or server cabinet is located;

2.4.12.2.13.(m).2 Equipment rack or server cabinet identifier;

2.4.12.2.13.(m).3 A rack unit scale placed adjacent to the equipment rack or server cabinet

shown on the elevation drawing. For equipment racks, the rack unit scale will start with one (1) at the top end with forty-four (44) or forty-eight (48) at the bottom, depending on height of the equipment rack. For server cabinets, the rack unit scale will start with fourty four (44) or forty eight (48) at the top, and end with one (1) at the bottom refer Section 7.10..8.9;

2.4.12.2.13.(m).4 To scale graphic representation of the following components:

(m).4.1 Equipment rack or server cabinet;

(m).4.2 Vertical and horizontal cable managers;

(m).4.3 Fiber and copper patch panels;

(m).4.4 Shelves, blanking plates and other hardware;

(m).4.5 Horizontal ePDUs;

(m).4.6 All other passive and active rack mount equipment associated with any system that is permitted to be installed in a Communications Room (regardless of whether the equipment is supplied by the Project Co or the Authority); and

(m).4.7 Unassigned space in the equipment rack or server cabinet.

2.4.12.2.13.(m).5 An equipment schedule in table format that provides the make, model, description and location (expressed in rack units occupied of each item installed in the equipment rack or server cabinet; and

2.4.12.2.13.(m).6 A calculation of unused rack space expressed as a percentage of total rack space available in a given equipment rack or server cabinet.

2.4.12.2(13)(n) Structured Cabling Labelling Details

2.4.12.2.13.(n).1 Diagrams detailing the labelling requirements for the Structured Cabling system in the Facility will be

provided. This includes, the following components:

(n).1.1 Communications Rooms;
(n).1.2 Equipment racks;
(n).1.3 Server cabinets;
(n).1.4 Copper patch panels;
(n).1.5 Fiber patch panels;
(n).1.6 Fiber cassettes;
(n).1.7 Category 6A cabling and patch cords;
(n).1.8 Coaxial cables;
(n).1.9 Category 3 multi-conductor cable;
(n).1.10 Multimode fiber cable;
(n).1.11 Singlemode fiber cable;
(n).1.12 Powered fiber cable systems;
(n).1.13 Fiber patch cords;
(n).1.14 Gigabix components;
(n).1.15 Wireless antenna enclosures;
(n).1.16 Faceplates;
(n).1.17 Outlets (all types); and
(n).1.18 Related components such as access hatches, ceiling grid, etc.

2.4.12.2(13)(o) The telecommunications bonding and grounding riser diagram will include:

2.4.12.2.13.(o).1 The entire telecommunications grounding system in the Facility from the main electrical ground busbar to each Communications Room including:

(o).1.1 The sizing of the telecommunications bonding backbone and its interconnection to telecommunications ground busbars and to the main electrical ground busbar;
(o).1.2 The locations of the telecommunications ground busbars (where the make, model number and the label associated with each busbar is correctly identified as per the requirements in the 2020 Edition of the PHSA Communications Infrastructure Standards and Specifications;
(o).1.3 Communications Rooms;
(o).1.4 Elevations for each floor in the Facility;

(o).1.5 The location of the main electrical ground busbar; and

(o).1.6 The locations of connectors.

2.4.12.2.13.(o).2 Typical grounding details and instructions related to bonding specific items including:

(o).2.1 Communications Pathway Systems;

(o).2.2 Static dissipative or anti-static floor coverings (in Communications Rooms);

(o).2.3 Equipment racks;

(o).2.4 Server cabinets;

(o).2.5 Electrical panels (in Communications Rooms);

(o).2.6 Exposed steel structure (in Communications Rooms)

(o).2.7 Armoured cable jackets or shields; and

(o).2.8 Cable surge protectors

2.4.12.2(13)(p) The backbone Communications Pathway System riser diagram will include:

2.4.12.2.13.(p).1 Service Entrance Facility (interior portion);

2.4.12.2.13.(p).2 Communications cable tray on each floor of the Facility (noting size);

2.4.12.2.13.(p).3 Horizontal and vertical riser sleeves (noting size and quantity);

2.4.12.2.13.(p).4 Horizontal and vertical riser conduits (noting size and quantity);

2.4.12.2.13.(p).5 Location and size of pull boxes (connected to the Service Entrance Facility and the backbone Communications Pathway System);

2.4.12.2.13.(p).6 Communications Rooms;

2.4.12.2.13.(p).7 Elevations for each floor in the Facility; and

2.4.12.2.13.(p).8 Typical labelling and identification details for all components of the system.

2.4.12.2(13)(q) Three-dimensional coloured rendering of the backbone Communications Pathway system will be provided identifying the information noted in the section above with the exception of the typical labelling and identification details.

2.4.12.2(13)(r) The backbone cabling riser diagram will include:

2.4.12.2.13.(r).1 Point to point routing of intra-building copper and fiber cables;

(r).1.1 Routing of the cables to follow the backbone Communications Pathway System, but the backbone Communications Pathway system will not be shown; and

(r).1.2 The intra-building copper and fiber cables will be shown on different drawings.

2.4.12.2.13.(r).2 The strand or copper pair count of each cable installed (each type of cable and pair count will be identified using different colours);

2.4.12.2.13.(r).3 Cross connect locations (include rack IDs);

2.4.12.2.13.(r).4 Communications Rooms; and

2.4.12.2.13.(r).5 Elevations for each floor in the Facility.

2.4.12.2(13)(s) The public address block diagram will include:

2.4.12.2.13.(s).1 Point to point wiring details (including the type of wiring) between speakers and amplifiers showing amplifier and channel assignment per speaker;

2.4.12.2.13.(s).2 Speaker counts by type and by floor;

2.4.12.2.13.(s).3 Communications Rooms;

2.4.12.2.13.(s).4 Elevations for each floor in the Facility;

2.4.12.2.13.(s).5 Equipment locations (include room and area name and architectural room number);

2.4.12.2.13.(s).6 Equipment pictures complete with make and model numbers. Correlate

equipment pictures with drawing symbols;

2.4.12.2.13.(s).7 Physical and logical connections or interfaces to other systems such as the fire alarm system in the Facility and the public address system in the Existing Hospital. The diagram is to detail all new and existing wiring and active and passive equipment involved in these connections;

2.4.12.2.13.(s).8 Elevation drawings for public address system equipment racks; and

2.4.12.2.13.(s).9 Typical labelling and identification details for all components of the system.

2.4.12.2(14) The intercommunications block diagram will include:

2.4.12.2(14)(a) Point to point cabling details (including cable type) detailing the end to end connection requirements for all intercom equipment (servers, stations, loudspeakers, microphones, etc.);

2.4.12.2(14)(b) Intercom station in table format showing the function of each door station button;

2.4.12.2(14)(c) Master intercom matrix in table format showing which door stations are controlled by each master station and nature and function of that control (ex. Communication only, communication and door release, etc.);

2.4.12.2(14)(d) Communications Rooms;

2.4.12.2(14)(e) Elevations for each floor in the Facility;

2.4.12.2(14)(f) Equipment locations (include room and area name and architectural room number);

2.4.12.2(14)(g) Equipment pictures complete with make and model numbers. Correlate equipment pictures with drawing symbols;

2.4.12.2(14)(h) Physical and logical connections or interfaces to other systems Facility as described in Schedule 3 [Design and Construction Specifications]. The diagram is to detail all new and existing wiring and active and passive equipment involved in these connections; and

2.4.12.2(14)(i) Typical labelling and identification details for all components of the system.

2.4.12.2(15) For each individual Multimedia Room in the Facility, a layout drawing will be provided that includes:

2.4.12.2(15)(a) Plan views, reflected ceiling plans and interior wall elevations in a scale not less than 1:50;

2.4.12.2(15)(b) A three-dimensional coloured rendering of the EOC and the Type 4 rooms and the components, materials and equipment that reside in those rooms;

2.4.12.2(15)(c) The location, sizes and elevation of all components, materials and equipment including:

2.4.12.2.15.(c).1 Cameras;

2.4.12.2.15.(c).2 Microphones;

2.4.12.2.15.(c).3 Speakers (those used for AV, multimedia and Public Address);

2.4.12.2.15.(c).4 Ultra HD Display Screens;

2.4.12.2.15.(c).5 Monitors;

2.4.12.2.15.(c).6 Soundbars;

2.4.12.2.15.(c).7 Control panels and other user interfaces,

2.4.12.2.15.(c).8 Telecommunications Outlets, AV wall boxes and source connection panels;

2.4.12.2.15.(c).9 Floor boxes;

2.4.12.2.15.(c).10 Wi-Fi antennas;

2.4.12.2.15.(c).11 DAS antennas; and

2.4.12.2.15.(c).12 Location transmitters, antennas and beacons.

2.4.12.2(15)(d) The drawings for the EOC will demonstrate that the locations and quantities of floor boxes illustrated in the Design provides sufficient and convenient under-table connections to accommodate the various different furniture configurations required by the Authority either when the room is divided by its operable partition or combined into one space;

2.4.12.2(15)(e) Sightline plan cross-sections showing horizontal and vertical viewing angles to projection screens, display monitors and multimedia cameras.

2.4.12.2(16) In addition to the requirements in Section 7.10.15 multimedia layout drawings for each Multimedia Room will:

2.4.12.2(16)(a) Include a photometric map;

2.4.12.2(16)(b) Identify the location, sizes and elevations of all components, materials and equipment noted in Section 2.4.12.2(15) drawn to scale;

2.4.12.2(16)(c) Identify using the correct scale the location, sizes and elevation of all components, materials and equipment related to other disciplines that will occupy space within each Multimedia Room. This includes the following:

2.4.12.2.16.(c).1 Furniture and Millwork layout;

2.4.12.2.16.(c).2 Window blinds;

2.4.12.2.16.(c).3 Whiteboards and other fixtures;

2.4.12.2.16.(c).4 Wall and ceiling backing;

2.4.12.2.16.(c).5 Wall and ceiling acoustic treatments

2.4.12.2.16.(c).6 Humidistats and temperature sensors;

2.4.12.2.16.(c).7 Mechanical equipment, louvres, diffusers and grilles;

2.4.12.2.16.(c).8 Sprinkler heads;

2.4.12.2.16.(c).9 Electrical outlets;

2.4.12.2.16.(c).10 Lighting fixtures and controls;

2.4.12.2.16.(c).11 Occupancy sensors;

2.4.12.2.16.(c).12 Clocks;

2.4.12.2.16.(c).13 Fire alarm speakers and devices;

2.4.12.2.16.(c).14 Smoke detectors;

2.4.12.2.16.(c).15 Card readers;

2.4.12.2.16.(c).16 CCTV cameras;

2.4.12.2.16.(c).17 Wi-Fi Antenna

2.4.12.2.16.(c).18 Keypads;

2.4.12.2.16.(c).19 Motion detectors; and

2.4.12.2.16.(c).20 Location transmitters, antennas and beacons associated with Division 28 systems.

2.4.12.2.16.(c).21 DAS antennas

2.4.12.2(17) AV and multimedia system block diagrams will include:

2.4.12.2(17)(a) Interconnections of AV equipment and multimedia equipment, and control panels; and

2.4.12.2(17)(b) Signal path of audio, video, control and data signals including source, signal processing, signal distribution, presentation, recording and storage (where required), monitoring and control.

2.4.12.2(18) Digital Signage details will be produced for each location identified in Schedule 3 [Design and Construction Specifications] regardless of whether the screen or display monitor will be initially installed or not. These details will include:

2.4.12.2(18)(a) Side and front elevations showing:

2.4.12.2.18.(a).1 Screen size, orientation and elevation suitable for location and intended use;

2.4.12.2.18.(a).2 Location and elevation of electrical outlets and Telecommunications Outlets;

2.4.12.2.18.(a).3 Wall backing;

2.4.12.2.18.(a).4 Wall cavity details (where required) showing dimensions, space allocation for equipment such as screens, mounting brackets and media players; thermal management or venting and backing; and

2.4.12.2.18.(a).5 Wall enclosure details (where required) showing dimensions, space allocation for equipment such as screens, mounting brackets and media players; thermal management

or venting, backing and access panels.

2.4.12.2(18)(b) Unobstructed horizontal and vertical viewing angles to demonstrate that the content can be easily viewable in a manner that aligns to the functional need (i.e. the need to make decisions based on information on the display or the need to do more analytical decision making based on minute details displayed on the screen); and

2.4.12.2(18)(c) Closest and farthest viewing distances.

2.4.12.2(19) Nurse Call drawings will include:

2.4.12.2(19)(a) Floorplans showing zoning, and locations and types of all devices, panels and equipment to be installed as part of the Nurse Call System;

2.4.12.2(19)(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;

2.4.12.2(19)(c) Network interface with other systems; and

2.4.12.2(19)(d) Integration with Existing Hospital nurse call systems.

2.4.12.3 Specifications

2.4.12.3(1) Iterations of the Division 27 specification will be included as part each Design submission from Schematic Design 30% complete through to Issued for Construction 100% complete. At Schematic Design 30% complete, the minimum the Authority will accept is a list of the sections associated with the Division 27 specification that will form table of contents for the digital manual included in the IFC submission. For all other Design Stages, the Division 27 specifications are to be developed and elaborated in accordance with the percentage of completeness associated with each Design stage. A roadmap detailing the development of the Division 27 specifications will be provided to the Authority by Project Co to ensure expectations are aligned through Design process.

2.4.12.3(2) The Division 27 specifications will be written, reviewed and stamped or certified by the RCDD employed by the Project Co. Given the importance of specifications relative to drawings, no one without an active RCDD certification will be permitted to be involved in the writing and overall development of the Division 27 specifications.

2.4.12.3(3) The RCDD will be expected to develop Division 27 specifications specific to this Project.

2.4.12.3(4) The RCDD can leverage, where appropriate and applicable, the 2020 Edition of the PHSA Communications Infrastructure Standards and Specifications for guidance in the development of the Division 27 specifications for this Project. However, this does not permit the RCDD to copy content in whole or in part from the 2020 edition of the PHSA Communications Infrastructure Standards and Specifications or from any other schedule, sub-schedule, appendix or attachments associated with the Project Agreement to create the Division 27 specifications for this Project without first obtaining permission from the Authority. If permission is to be granted, it will be done in each instance where the RCDD wishes to copy content from any schedule, sub-schedule, appendix or attachments associated with the Project Agreement.

2.4.12.3(5) As part of the IFC submission, the Division 27 specification will be presented to the Authority in a digital manual organized into sections where each section covers one or more elements of the Project. Requirements for digital manual is as follows:

2.4.12.3(5)(a) The files making up the Manual will be arranged in a folder structure:

2.4.12.3(5)(b) All items in the Table of Contents will have “hypertext links” within the document;

2.4.12.3(5)(c) All digital content will be PDF versions, text searchable bookmarked contents; and

2.4.12.3(5)(d) Manual (typically less than 100 Mb) will be presented in one document.

2.4.12.3(6) The sections of the Division 27 specification cannot stand alone. They will function and be coordinated with other sections that are part of the Division 27 specification and with sections belonging to the other divisions associated with the overall specification for the Project.

2.4.12.3(7) Each section of the Division 27 specification will be broken into three parts – Part 1 General, Part 2 Products and Part 3 Execution:

2.4.12.3(7)(a) Part 1 General: Describes administrative and procedural requirements, quality control and assurance requirements, references and identifies the codes and standards that the materials, equipment, systems, software and applications will be provided in accordance with:

2.4.12.3(7)(b) Part 2 Products: Describes each item of material and equipment, system, software and application to be used in the Division 27 scope of work for the Project; and

2.4.12.3(7)(c) Part 3 Execution: Describes the method of installation, testing, commissioning and documenting for each item of material and equipment, system, software and application that is part of the Division 27 scope of work for the Project.

2.4.12.3(8) The requirements described in a part of a specific section will not duplicate statements that are made in:

2.4.12.3(8)(a) Other parts of the same section;

2.4.12.3(8)(b) Other sections of the Division 27 specification; and

2.4.12.3(8)(c) Sections belonging to the other divisions associated with the overall specification for the Project.

2.4.12.3(9) In the case where a limited number of manufacturers or vendors are deemed acceptable by the Authority for specific materials, equipment, systems, software and applications, the Division 27 specification will either:

2.4.12.3(9)(a) Identify the specific material, equipment, system, software and application by name and model or part number that has been prescribed by the Authority in the Project Agreement and detail the information associated with its method of installation, testing, commissioning and documentation:

2.4.12.3(9)(b) Identify the material, equipment, system, software and application by name and model or part number that has been granted reviewed status by the Authority through a formal shop drawing submission and detail the information associated with its method of installation, testing, commissioning and documentation; and

2.4.12.3(9)(c) Accurately describe the characteristics and performance criteria and the information associated with the method of installation, testing, commissioning and documentation of each acceptable product option prescribed in the Project Agreement.

2.4.12.4 Additional Design Requirements and Submittals

2.4.12.4(1) In Communications and Multimedia Rooms of same or similar dimensions and layout, the location and elevation of equipment and

room controls will be represented consistently wherever possible in the Design.

2.4.12.4(2) Any post-IFC changes or modifications made to Reviewed Drawings and Specifications that do not result in any adjustments to the Contract Price and Project Schedule will be issued as a site or supplemental instructions.

2.4.12.4(3) An inventory of Category 6A Data Drops will be produced for the Facility. This inventory will be provided in an Excel spreadsheet with a tab for each Communications Room and a summary tab that provides the totals for the Facility. The inventory of Category 6A Data Drops will be Included as part of each Design submission from Design Development 30% complete through to Issued for Construction 100% complete including the As-Built/Record:

2.4.12.4(3)(a) The inventory is used by the Authority primarily to determine port counts, cross connect requirements and switch quantities;

2.4.12.4(3)(b) The inventory will only capture the Category 6A Data Drops that will or are intended to physically connect to Authority provided network equipment in the Facility. Do not include any Category 6A drops that are connected to equipment provided by Project Co.

2.4.12.4(3)(c) Each tab of the spreadsheet (with the exception of the summary tab) will identify the following:

2.4.12.4.3.(c).1 The level of the Facility;

2.4.12.4.3.(c).2 The drawing number where the Data Drops are shown;

2.4.12.4.3.(c).3 The room or areas name and corresponding architectural room number where the Data Drop is terminated in an outlet. The rooms identified will only be those that exist within the serving zone boundary of the Communications Room;

2.4.12.4(3)(d) Also, on each tab, the count of Data Drops will be broken down into categories that include;

2.4.12.4.3.(d).1 General-purpose Telecommunications Outlets, AV wall boxes and floor boxes. This category will be broken down further into types of general-

purpose outlets based on Data Drop count;

2.4.12.4.3.(d).2 Security (Division 28) systems broken down by specific devices and or equipment such as CCTV; access control panels, intrusion panels, wired and wireless panic duress devices, patient wandering and fire alarm panels, etc.;

2.4.12.4.3.(d).3 AV and multimedia system broken down by specific devices and or equipment such as touch panels, cameras, display monitors, Codec, audio system components, signal processors, digital signage, and any other components that connect to the Authority' network;

2.4.12.4.3.(d).4 Intercommunications systems broken down by specific devices and or equipment such door stations, master stations, etc.;

2.4.12.4.3.(d).5 Wireless Telecommunications Outlets broken down by Wi-Fi, DAS, etc.;

2.4.12.4.3.(d).6 Clinical equipment systems broken down by specific devices and or equipment such as physiological monitors, central stations, telemetry antennas, etc.;

2.4.12.4.3.(d).7 Other Division 27 systems such as Locating Services, Public Address and Nurse Call; and

2.4.12.4.3.(d).8 Other systems and devices such as BMS, lighting control, parking meters, elevators, SNMP management ports on UPS units, etc.

2.4.12.4(3)(e) The Authority will provide a sample of the inventory spreadsheet and will work with the Project Co prior to the 60% submission to refine the format of the spreadsheet to be specific for this Project.

2.4.12.4(4) Any single line drawings produced for systems specified in the Project Agreement will identify:

2.4.12.4(4)(a) The specific rooms or areas where network switches and equipment, servers and workstations provided by Project Co will be physically located; and

2.4.12.4(4)(b) A requirement to physically and or logically connect network switches and equipment, servers and workstations provided by Project Co to any of the Authority's IM/IT networks.

2.4.12.4(5) Cable fill calculations for communications cable tray and 103 mm conduits and sleeves will be included as part of each Design submission from Design Development 30% complete through to Issued for Construction 100% complete including the As-Built/Record. The calculation will include:

2.4.12.4(5)(a) The maximum cable fill based on the cable sizes that will be installed; and

2.4.12.4(5)(b) Spare capacity provided in the cable tray, conduit or sleeve.

2.4.12.4(6) The reflected ceiling plans provided in the architectural drawing package will show all ceiling mounted communications devices and equipment:

2.4.12.4(6)(a) Identify using the correct scale all ceiling mounted communications devices and equipment. This includes:

2.4.12.4.6.(a).1 Wi-Fi antennas;

2.4.12.4.6.(a).2 Telemetry antennas;

2.4.12.4.6.(a).3 DAS antennas;

2.4.12.4.6.(a).4 Locating Services transmitters, antennas and beacons;

2.4.12.4.6.(a).5 Antenna enclosures;

2.4.12.4.6.(a).6 Ceiling hatches required to access pull boxes or Telecommunication Outlets;

2.4.12.4.6.(a).7 Ceiling mounted Telecommunications Outlets;

2.4.12.4.6.(a).8 Speakers associated with Public Address and AV and multimedia systems;

2.4.12.4.6.(a).9 Microphones;

2.4.12.4.6.(a).10 Cameras;

2.4.12.4.6.(a).11 Ceiling mounts for displays;

2.4.12.4(6)(b) Identify any ceiling tiles that will be kept free and clear of any devices in order to provide access to pull boxes associated with the service entrance facility, backbone communications pathway system or the rooftop communications pathway system;

2.4.12.4(6)(c) Unique symbols will be used on the reflected ceiling plans to denote which communications system the communications device or equipment belongs to. For example, fire alarm, public address and multimedia of AV speakers will each be given a unique symbol to differentiate them from one another. The same practice will be employed as it pertains to different antenna systems;

2.4.12.4(6)(d) With each Design Submittal, mark-ups of the reflected ceiling plans will be provided by Project Co to the Authority identifying where there are physical conflicts:

2.4.12.4.6.(d).1 Between antennas, transmitters and beacons associated with different Authority provided wireless systems; and

2.4.12.4.6.(d).2 Between antennas, transmitters and beacons associated with Authority provided wireless systems and other ceiling elements such as lighting fixtures and devices, cameras and security devices, speakers, microphones, nurse call devices, smoke detectors, enclosures and access panels; outlets, projectors. Motorized screens; grills, diffusers; sprinklers; bulkheads and other structural or ceiling features.

2.4.12.5 Project Co will submit to the Authority the following:

2.4.12.5(1) RCDD certifications for the person(s) responsible for the Division 27 drawings and specifications;

2.4.12.5(2) A letter of approval or other certification from the manufacturer indicating that its contractor (and their personnel) is a manufacturer certified installer of the cabling systems and equipment required for the Division 27 scope of work;

2.4.12.5(3) Manufacturers' instructions for storage, handling, protection, examination, preparation, operation, maintenance, and installation of all products;

2.4.12.5(4) All applicable Material Safety Data Sheets;

2.4.12.5(5) All factory test information of cables prior to installation of the product;

2.4.12.5(6) A complete test plan and procedures for all cabling as per the latest TIA standards;

2.4.12.5(7) Test results for all cabling as per the 2020 Edition of the PHSA Communications Infrastructure Standards and Specifications;

2.4.12.5(8) Cabling information as per the 2020 Edition of the PHSA Communications Infrastructure Standards and Specifications – sub Appendix A;

2.4.12.5(9) Calibration reports for all equipment used to test cabling;

2.4.12.5(10) Training plans for all Division 27 systems;

2.4.12.5(11) Proposed labeling materials and nomenclature; and

2.4.12.5(12) All other Submittals as specified in the Project Agreement.

2.4.12.6 Shop Drawings

2.4.12.6(1) Before the installation of any product, material or equipment associated with Division 27 scope of work, Project Co will submit shop drawings and product data sheets to the Authority for review;

2.4.12.6(2) Each shop drawing Submittal will have a separate table of contents. Each product, material and equipment item in the shop drawing Submittal will be identified in the table of contents. The table of contents will also identify the manufacturer, make and model number of each product, material and equipment item;

2.4.12.6(3) Individual shop drawings and product data sheets included in a shop drawing Submittal will be marked or highlighted to show which

products, materials and equipment and associated options are applicable for review; and

2.4.12.6(4) Shop drawing and product data submitted for this Project will include the following:

2.4.12.6(4)(a) Telecommunications Grounding and Bonding System:

2.4.12.6.4.(a).1 Busbars;

2.4.12.6.4.(a).2 Grounding Conductors;

2.4.12.6.4.(a).3 Connecting devices such as pressure connectors, lugs, clamps, etc.;

2.4.12.6(4)(b) Communications Pathway System:

2.4.12.6.4.(b).1 Cable tray;

2.4.12.6.4.(b).2 Conduit;

2.4.12.6.4.(b).3 Hilti speed sleeves and firestopping products and systems;

2.4.12.6.4.(b).4 Surface raceway systems;

2.4.12.6.4.(b).5 Pull boxes;

2.4.12.6.4.(b).6 Outlet boxes;

2.4.12.6.4.(b).7 Access hatches;

2.4.12.6.4.(b).8 Cable tray drop outs, waterfall fittings and miscellaneous hardware;

2.4.12.6.4.(b).9 Mule tape and pull rope;

2.4.12.6.4.(b).10 Roof penetration vaults or doghouses; and

2.4.12.6.4.(b).11 Non-penetrative support and step over systems for the rooftop of the Facility.

2.4.12.6(4)(c) Racks and Cabinets:

2.4.12.6.4.(c).1 Four post open relay racks;

2.4.12.6.4.(c).2 Server cabinets (including internal accessories);

| | | |
|---|---|---|
| | 2.4.12.6.4.(c).3 | Vertical and horizontal cable management; |
| | 2.4.12.6.4.(c).4 | Cable slack management spools; |
| | 2.4.12.6.4.(c).5 | Vertical and horizontal ePDUs; |
| | 2.4.12.6.4.(c).6 | Rack mounted blanking plates, shelves; and |
| | 2.4.12.6.4.(c).7 | Miscellaneous hardware. |
| 2.4.12.6(4)(d) | Service entrance facility and other underground communications pathway systems: | |
| | 2.4.12.6.4.(d).1 | PVC duct, manufactured bends, fittings, connectors and end caps; |
| | 2.4.12.6.4.(d).2 | Duct spacers; |
| | 2.4.12.6.4.(d).3 | Duct plugs; |
| | 2.4.12.6.4.(d).4 | Mule tape; |
| | 2.4.12.6.4.(d).5 | Warning tape; |
| | 2.4.12.6.4.(d).6 | Manholes, service vaults, service boxes; |
| | 2.4.12.6.4.(d).7 | Signage; |
| | 2.4.12.6.4.(d).8 | Risers, grade rings and lids; |
| | 2.4.12.6.4.(d).9 | Sump; and |
| | 2.4.12.6.4.(d).10 | Hardware and racking; |
| 2.4.12.6(4)(e) | Copper Twisted Pair Cabling: | |
| | 2.4.12.6.4.(e).1 | Category 3 multi-conductor backbone cable; |
| | 2.4.12.6.4.(e).2 | Category 6A cabling; |
| | 2.4.12.6.4.(e).3 | Patch panels; |
| | 2.4.12.6.4.(e).4 | Patch cords; |
| | 2.4.12.6.4.(e).5 | Cable surge protectors; |
| | 2.4.12.6.4.(e).6 | Gigabix components; |

| | | |
|---|---|---|
| | 2.4.12.6.4.(e).7 | Cross connect wire; and |
| | 2.4.12.6.4.(e).8 | Outlets and jacks. |
| 2.4.12.6(4)(f) | Fiber Cabling; | |
| | 2.4.12.6.4.(f).1 | Multimode; |
| | 2.4.12.6.4.(f).2 | Singlemode; |
| | 2.4.12.6.4.(f).3 | Powered fiber cable systems; |
| | 2.4.12.6.4.(f).4 | Patch panels; |
| | 2.4.12.6.4.(f).5 | Splice Cassettes; |
| | 2.4.12.6.4.(f).6 | Pigtails; |
| | 2.4.12.6.4.(f).7 | Patch cords; and |
| | 2.4.12.6.4.(f).8 | Wire management rings. |
| | 2.4.12.6.4.(f).9 | Fibre cabling required for the DAS system |
| 2.4.12.6(4)(g) | Outlets: | |
| | 2.4.12.6.4.(g).1 | Floor boxes; |
| | 2.4.12.6.4.(g).2 | Surface mount boxes; |
| | 2.4.12.6.4.(g).3 | Faceplates; and |
| | 2.4.12.6.4.(g).4 | Dust covers and blank inserts. |
| 2.4.12.6(4)(h) | Wireless antenna enclosures, vanity skins and covers and specialized mounts and brackets; | |
| 2.4.12.6(4)(i) | Labelling materials and nomenclature for all Division 27 systems; | |
| 2.4.12.6(4)(j) | AV and multimedia systems: | |
| | 2.4.12.6.4.(j).1 | Block diagrams; |
| | 2.4.12.6.4.(j).2 | Cables and wiring; |
| | 2.4.12.6.4.(j).3 | Display monitors; |
| | 2.4.12.6.4.(j).4 | Soundbars; |

| | | |
|---|---|---|
| | 2.4.12.6.4.(j).5 | Mounts, brackets and related hardware and materials required to mount AV and multimedia components to walls and ceilings; |
| | 2.4.12.6.4.(j).6 | AV wall boxes and source connection plates; |
| | 2.4.12.6.4.(j).7 | Control panels (shop drawings will include coloured details for each screen, illustrating the proposed graphic layout for the Authority's approval through the Review Procedure prior to commencing Creston programming); |
| | 2.4.12.6.4.(j).8 | Speakers; |
| | 2.4.12.6.4.(j).9 | Backboxes, enclosures and miscellaneous hardware; |
| | 2.4.12.6.4.(j).10 | Codecs; |
| | 2.4.12.6.4.(j).11 | Cameras; |
| | 2.4.12.6.4.(j).12 | Microphones and microphone controllers; |
| | 2.4.12.6.4.(j).13 | Video controllers; |
| | 2.4.12.6.4.(j).14 | Switching and signal processing equipment; and |
| | 2.4.12.6.4.(j).15 | Remote controls. |
| 2.4.12.6(4)(k) | Public address system: | |
| | 2.4.12.6.4.(k).1 | Block diagram; |
| | 2.4.12.6.4.(k).2 | Speaker wiring; |
| | 2.4.12.6.4.(k).3 | Speakers; |
| | 2.4.12.6.4.(k).4 | Backboxes, enclosures and miscellaneous hardware; |
| | 2.4.12.6.4.(k).5 | Amplifiers; |
| | 2.4.12.6.4.(k).6 | Microphone; and |

2.4.12.6.4.(k).7 Components required to integrate the public address system in the Facility with the public address system in the Existing Hospital.

2.4.12.6(4)(l) Intercommunications system:

2.4.12.6.4.(l).1 Block diagram;

2.4.12.6.4.(l).2 Stations;

2.4.12.6.4.(l).3 Expansion modules;

2.4.12.6.4.(l).4 Handsets and headsets;

2.4.12.6.4.(l).5 Microphones;

2.4.12.6.4.(l).6 Loudspeakers;

2.4.12.6.4.(l).7 Specialized wiring;

2.4.12.6.4.(l).8 Desk and wall mounting kits and miscellaneous hardware;

2.4.12.6.4.(l).9 Licensing;

2.4.12.6.4.(l).10 Servers;

2.4.12.6.4.(l).11 Physical input and output cards;

2.4.12.6.4.(l).12 Plug-in cards; and

2.4.12.6.4.(l).13 Management software.

2.4.12.6(4)(m) Nurse Call system:

2.4.12.6.4.(m).1 Single line diagram;

2.4.12.6.4.(m).2 UTP cabling and other system wiring;

2.4.12.6.4.(m).3 System devices;

2.4.12.6.4.(m).4 Components; and

2.4.12.6.4.(m).5 Equipment.

2.4.12.7 As-Built/Record Documentation

2.4.12.7(1) As-Built/Record documentation will be:

2.4.12.7(1)(a) Stamped or certified by the RCDD; and

2.4.12.7(1)(b) Complete, legible and reproducible with a revision log, titled and dated.

2.4.12.7(2) The As-Built/Record documentation that will be provided for the project will include the following:

2.4.12.7(2)(a) Floor plans complete with jack IDs;

2.4.12.7(2)(b) Fire-stop design and records documentation:

2.4.12.7(2)(c) Equipment rack and server cabinet elevations;

2.4.12.7(2)(d) Structured cabling labelling details;

2.4.12.7(2)(e) Riser diagrams;

2.4.12.7(2)(f) System block diagrams;

2.4.12.7(2)(g) Isometric drawings;

2.4.12.7(2)(h) 360-degree JPEG photographs of Communications Rooms in digital format embedded onto 1:50 construction floor plan PDFs for each photo location. Provide text description of each photo. Multiple 360 photographs will be taken to clearly document all wall, cable tray and rack elevations.; Minimum camera quality acceptance: Ricoh Theta V;

2.4.12.7(2)(i) Bill of materials with quantities, model numbers and serial numbers;

2.4.12.7(2)(j) Manufacturer manuals, data sheets, shop drawings and submittals for equipment, products and materials used;

2.4.12.7(2)(k) Manufacturer representatives and telephone numbers;

2.4.12.7(2)(l) Engineer’s certification of seismic installation of equipment racks, server cabinets and cable tray;

2.4.12.7(2)(m) Excel spreadsheets and other databases and inventories as required under the Project Agreement; and

2.4.12.7(2)(n) Names, addresses, phone numbers and facsimile numbers of Project Co, Project Co’s RCDD, sub-contractors and suppliers used on the Project together with a specification reference of the portion of the work they undertook.

2.4.12.7(3) Construction Pictures:

2.4.12.7(3)(a) Pictures need to be labelled so it is clear as to the location, the component being photographed and the date the picture was taken. Where required, include directional information;

2.4.12.7(3)(b) Need to be clear and detailed. Pictures that are out of focus, poorly lit, under or over exposed or have motion blur will not be accepted;

2.4.12.7(3)(c) Only one picture of each item, rotated correctly; and

2.4.12.7(3)(d) Pictures are to be saved on a USB Key as well as included in the Maintenance Manual with a photo index.

2.4.13 Electronic Security Construction

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Legends, drawing list, key plans | X | X | X | X | X | X |
| Location, Site - plans, and details | X | X | X | X | X | X |
| Security Systems Overall Floorplans (IP Video Surveillance, Access Control, Intercom, Intrusion Detection, and Fixed Duress). | X | X | X | X | X | X |
| Communications Room Layouts & Elevations | - | X | X | X | X | X |
| Patient Wandering Floorplans | X | X | X | X | X | X |
| Patient Wandering Riser and System Diagrams | X | X | X | X | X | X |
| Fire Alarm Overall Reflected Ceiling Plans | X | X | X | X | X | X |
| IP Video Surveillance Riser and System Diagrams | X | X | X | X | X | X |
| IP Video Surveillance Camera FOV Floorplans | - | - | X | X | X | X |
| Access Control Riser and System Diagrams | X | X | X | X | X | X |
| Intercommunications Riser and System Diagrams | X | X | X | X | X | X |
| Intrusion Detection Riser and System Diagrams | X | X | X | X | X | X |
| Fixed Duress Riser and System Diagrams | X | X | X | X | X | X |
| Wireless Staff Duress Floorplans/Reflected Ceiling Plans | X | X | X | X | X | X |
| Wireless Staff Duress Riser and System Diagrams | X | X | X | X | X | X |
| *Bill of Materials* | | | | | | |
| Electronic Security (Division 28) All Systems | - | - | - | - | X | - |

2.4.13.1 All drawings, specifications, submittals and construction documents will be produced and reviewed and stamped by the RCDD employed by Project Co.

2.4.13.2 The Authority's construction standard drawings (C-STD) and details can be referenced in FHA Communications Infrastructure Standards and Specifications.

2.4.13.3 The drawings will use industry-standard symbols and legends. Refer to FHA Communications Infrastructure Standards and Specifications for the Authority-approved symbols.

2.4.13.4 Floor layouts will indicate:

2.4.13.4(1) The locations of all Communications Rooms and their associated serving zone boundaries;

2.4.13.4(2) All telecommunications outlets identifying types of cables, label details and number of cable drops per outlet;

2.4.13.4(3) Locations, quantity and sizes of all low voltage conduits, raceways, cable tray, sleeves, junction boxes and pull boxes;

2.4.13.4(4) Backbone cabling routes including the routes of the telecommunications grounding backbone;

2.4.13.4(5) Communications Room layouts will be provided in 2D and 3D;

2.4.13.4(6) 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; and

2.4.13.4(7) DAS system predicative study with graphical floor plans.

2.4.13.5 Layout will include:

2.4.13.5(1) Maintenance and operational clearances;

2.4.13.5(2) Non-telecom related materials, equipment, devices and structures (all dimensions are to be included). This includes 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;

2.4.13.5(3) High voltage gear situated adjacent to Communications Rooms with clearance elements of telecom items from all such objects;

2.4.13.5(4) 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; and

2.4.13.5(5) Elevation drawings of all walls of each Communications Room, clearly showing the layout of all termination hardware, grounding and

bonding components, horizontal pathway penetrations, and wall-mounted equipment cabinets.

2.4.13.6 Telecommunications Schematic Drawings will be provided for the following elements:

2.4.13.6(1) Telecommunications bonding and grounding system;

2.4.13.6(2) Intra-building backbone pathway system including the Service Entrance Facilities identifying quantity and sizes of conduits, trays and sleeves; and

2.4.13.6(3) 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.

2.4.13.7 Public Address Plans, Sections, Details will contain:

2.4.13.7(1) Reflected ceiling plans showing locations of all speakers;

2.4.13.7(2) 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; and

2.4.13.7(3) Layouts of equipment and appurtenances and their relationship to other parts of the work including clearances for maintenance and operation.

2.4.13.8 Audio Visual

2.4.13.8(1) Floor layouts of each Multimedia Room identifying quantities and types of cables, endpoint locations, pathways, floorbox locations;

2.4.13.8(2) Elevation drawings of each Multimedia Room identifying locations of all power/data outlets, wall backing for equipment mounts, locations for display screens, control panels and switches, device connection and patch panels, cameras, speakers and other AV components;

2.4.13.8(3) 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; and

2.4.13.8(4) Layout and cross section drawings of the Lecture Room showing horizontal vertical sightlines for cameras, projectors, presenter on stage, and seated audience members.

2.4.13.9 Nurse Call drawings will include:

2.4.13.9(1) Floorplans showing zoning, and locations and types of all devices, panels and equipment to be installed as part of the nurse call system;

2.4.13.9(2) 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;

2.4.13.9(3) Network interface with other systems; and

2.4.13.9(4) Existing Campus nurse call system plans with details illustrating how the existing nurse call system will be upgraded and replaced with new including all required components, devices, wiring, pathways, headend devices and interconnection with the Facility nurse call System. Seamless integration to provide a fully functional system with complete functionality between the upgraded nurse call system and the new nurse call system as so they act as one system is required.

2.4.13.10 Submittals

2.4.13.10(1) The purpose of Shop Drawing submittals is to demonstrate Project Co'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 will be utilized;

2.4.13.10(2) Before installation of any cable, structured cabling component, pathway, firestop assembly or related material, equipment or hardware, Project Co will submit Shop Drawings and product data sheets for each component supplied to the Authority for review and approval through he Review Procedure;

2.4.13.10(3) Shop Drawings and product data sheets will indicate operating characteristics for each required item and design conditions;

2.4.13.10(4) Shop Drawings and product data will include the following:

2.4.13.10(4)(a) Copper Cabling;

2.4.13.10(4)(b) Fiber Cabling;

2.4.13.10(4)(c) Coaxial Cabling;

2.4.13.10(4)(d) Fiber Connector Housings;

2.4.13.10(4)(e) Faceplates;

2.4.13.10(4)(f) Floor boxes;

2.4.13.10(4)(g) Jacks/Inserts;

2.4.13.10(4)(h) Patch Panels;

2.4.13.10(4)(i) Multimedia (AV) Source Connection Panels;

2.4.13.10(4)(j) 110 Punch Block System (Gigabix);

2.4.13.10(4)(k) Fiber Connectors;

2.4.13.10(4)(l) Equipment Racks, Cabinets and Enclosures;

2.4.13.10(4)(m) Vertical and Horizontal Cable Management;

2.4.13.10(4)(n) Cable Tray;

2.4.13.10(4)(o) Firestop Details (Product and System Number);

2.4.13.10(4)(p) Telecommunications Bonding and Grounding System Materials;

2.4.13.10(4)(q) UPS and ePDUs;

2.4.13.10(4)(r) Broadband Distribution System Cable, Components and Connectors;

2.4.13.10(4)(s) Overhead Paging System Cable, Equipment (paging amplifiers, speakers, power supplies and other support equipment) and Connectors;

2.4.13.10(4)(t) Intercommunication Systems Cable, Components and Connectors; and

2.4.13.10(4)(u) Nurse call system devices, Components and Equipment.

2.4.13.11 The submittals will be reviewed for general compliance and not for dimensions, quantities, etc. The submittals that are returned will be used for procurement. The responsibility of correct procurement remains solely with Project Co. The submittal review will not relieve Project Co of responsibility for errors or omissions and deviations from the contract requirements.

2.4.13.12 Equipment and material substitutions are prohibited. If the submittal shows variations from the requirements of the contract documents for any reason, Project Co will provide written detail of each variation in the letter of transmittal.

2.4.13.13 Shop Drawings will be submitted in an electronic format on USB key to the Authority. File format will be editable Adobe Portable Data File (.pdf) and CAD files.

2.4.13.14 As-built documentation

2.4.13.14(1) At a minimum, the as-built drawing package supplied by Project Co will include all information detailed in Section 2.4.13.

2.4.13.15 Project Co will provide maintenance manual at a minimum containing the following:

2.4.13.15(1) 2 sets of final reviewed Shop Drawings;

2.4.13.15(2) A copy of all as-built drawings;

2.4.13.15(3) A copy of the code compliance drawings;

2.4.13.15(4) Details of wiring including a sequence of operations for each electrically-connected door;

2.4.13.15(5) Digital photos of all Communications Rooms showing each wall and rack elevations;

2.4.13.15(6) Circuit spreadsheets for horizontal cabling and fiber backbone. Refer to FHA Communications Infrastructure Standards and Specifications;

2.4.13.15(7) Manufacturer warranty documents for equipment and workmanship;

2.4.13.15(8) Copper warranty certification test result printouts;

2.4.13.15(9) Optical fiber power meter/light source test result printouts;

2.4.13.15(10) Fire-stop design and records documentation as set out in FHA Communications Infrastructure Standards and Specifications; and

2.4.13.15(11) Names, addresses, phone numbers and facsimile numbers of Project Co, Project Co's RCDD, subcontractors and suppliers used on the work together with a specification reference of the portion of the work they undertook.

2.4.13.16 In addition to the applicable requirements in this agreement, Project Co will submit the following:

2.4.13.16(1) Full size sets (x 3) of as-built drawings, printed on 24lb or heavier acid free bond;

2.4.13.16(2) (3) Memory keys of as-built drawings;

2.4.13.16(3) PDF and drawing files in CAD format (all files combined into a single document); and

2.4.13.16(4) Two (2) maintenance manuals must be provided in expandable hinge lock type binders with embossed lettering front and spine.

2.4.13.16(4)(a) Each 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;

2.4.13.16(4)(b) All maintenance manual data will be printed on acid free 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 labelled "Operation and Maintenance Manual" with an associated table of contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required; and

2.4.13.16(4)(c) Soft copy of the maintenance manual in unprotected editable PDF format on a separate memory key.

2.4.13.17 Electronic Security Construction Documents

2.4.13.17(1) For the "Documents" required to be provided by Project Co to the Authority pursuant to this Schedule refer to Section 2.4.13; and

2.4.13.17(2) For the "Drawings" requirements refer to Section 2.4.13 [see table 2.4.13 indicating requirements for Percent Complete at Submission Stage].

2.4.13.18 Construction Drawings

2.4.13.18(1) The Authority's Construction Standard Drawings (C-STD) and details can be referenced in FHA Communications Infrastructure Standards and Specifications; and

2.4.13.18(2) The drawings will use industry standard symbols and legends. Refer to FHA Communications Infrastructure Standards and Specifications for the Authority-approved symbols.

2.4.13.19 Floor Layouts and Site Plans will indicate:

2.4.13.19(1) Locations, quantity and types of all devices, components and equipment required for the Electronic Security Systems;

2.4.13.19(2) Security zoning (interior and exterior);

2.4.13.19(3) Locations, quantity and sizes of all low voltage conduits, raceways, cable tray, sleeves, junction boxes and pull boxes;

2.4.13.19(4) Location of head-end equipment and storage;

2.4.13.19(5) Overall system riser wiring diagram identifying control units, circuits, terminations, terminal numbers, conductors and raceways;

2.4.13.19(6) 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;

2.4.13.19(7) Control layout, including interconnections between Electronic Security Systems as well as the Authority's network;

2.4.13.19(8) Typical electrified door hardware diagrams, indicating hardware devices, conduit, controllers, junction boxes and the responsibility of various trades to ensure operability; and

2.4.13.19(9) Provide sequence of operations for all sensitive areas and departments as directed by the Authority.

2.4.13.20 Schematic Drawings will be provided for the following elements:

2.4.13.20(1) Intra-building connections of Electronic Security Systems identifying quantity and sizes of conduits, trays and sleeves.

2.4.13.21 Submittals

2.4.13.21(1) The purpose of Shop Drawing submittals is to demonstrate Project Co'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 will be utilized;

2.4.13.21(2) Before installation of any device, cable, component, pathway, or related material, equipment or hardware, Project Co will submit Shop Drawings and product data sheets for each component supplied to the Authority for review and approval through the Review Procedure;

2.4.13.21(3) Shop Drawings and product data sheets will indicate operating characteristics for each required item and design conditions;

2.4.13.21(4) Shop drawing and product data will include the following:

2.4.13.21(4)(a) Access Controls;

2.4.13.21(4)(b) All devices and components;

2.4.13.21(4)(c) Door controllers;

2.4.13.21(4)(d) Field panels;

2.4.13.21(4)(e) Power supplies;

2.4.13.21(4)(f) Video Surveillance;

2.4.13.21(4)(g) All devices and components;

2.4.13.21(4)(h) Cameras;

2.4.13.21(4)(i) Encoders;

2.4.13.21(4)(j) Monitors, keyboards and controllers;

2.4.13.21(4)(k) Storage;

2.4.13.21(4)(l) Interface to existing DVMS;

2.4.13.21(4)(m) Intrusion detection;

2.4.13.21(4)(n) All devices and components;

2.4.13.21(4)(o) Panels;

2.4.13.21(4)(p) Keypads;

2.4.13.21(4)(q) Interfaces to other systems;

2.4.13.21(4)(r) Panic/Duress system;

2.4.13.21(4)(s) All devices and components;

2.4.13.21(4)(t) Pendants;

2.4.13.21(4)(u) Transmitters/receivers/transceivers;

2.4.13.21(4)(v) Fixed buttons and station;

2.4.13.21(4)(w) Panels;

2.4.13.21(4)(x) Interface to other systems; and

2.4.13.21(4)(y) Signage.

2.4.13.22 The submittals will be reviewed for general compliance and not for dimensions, quantities, etc. The submittals that are returned will be used for procurement. The responsibility of correct procurement remains solely with Project Co. The submittal review will not relieve Project Co of responsibility for errors or omissions and deviations from the contract requirements.

2.4.13.23 Equipment and material substitutions are prohibited. If the submittal shows variations from the requirements of the contract documents for any reason, Project Co will provide written detail of each variation in the letter of transmittal.

2.4.13.24 Shop Drawings will be submitted in an electronic format on USB memory key to the Authority. The file format will be editable and searchable Adobe Portable Data File (.pdf) and CAD.

2.4.13.25 As-built documentation

2.4.13.25(1) At a minimum, the as-built drawing package supplied by Project Co will include all information detailed in Section 2.4.14.

2.4.13.26 Project Co will provide maintenance manual at a minimum contain the following:

2.4.13.26(1) Two (2) sets of final reviewed Shop Drawings;

2.4.13.26(2) A copy of all as-built drawings;

2.4.13.26(3) Details of wiring and sequence of operation for each electrically-connected door;

2.4.13.26(4) Digital photos of all Electronic Security System equipment installed in racks or cabinets;

2.4.13.26(5) Manufacturer warranty documents for equipment and workmanship;

2.4.13.26(6) Testing and Commissioning results;

2.4.13.26(7) Fire-stop design and records documentation as set out in FHA Communications Infrastructure Standards and Specifications; and

2.4.13.26(8) Names, addresses, phone numbers and facsimile numbers of Project Co, Subcontractors and suppliers used on the work together with a specification reference of the portion of the work they undertook.

2.4.13.27 In addition to the applicable requirements in this agreement, Project Co will submit the following:

2.4.13.27(1) Three (3) full size sets of as-built drawings, printed on minimum 24 lb acid free bond;

2.4.13.27(2) Three (3) memory keys of as-built drawings;

2.4.13.27(3) PDF (all files combined into a single document) and CAD; and

2.4.13.27(4) Three (3) maintenance manuals expandable hinge lock type binders with embossed lettering front and spine.

2.4.13.28 Maintenance manuals will be in suitably labelled, expandable hinge lock type binder with embossed lettering front and spine, 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.

2.4.13.28(1) 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 labelled "Operation and Maintenance Manual" with an associated table of contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required;

2.4.13.28(2) Soft copy of the maintenance manual in PDF and CAD format on a separate USB memory key.

2.4.14 Landscape Design and Construction Documents

| Percentage Complete at Submittal Stages | 30% | 50% | 70% | 90% | 100% | As-Built |
|---|---|---|---|---|---|---|
| *Drawing Content* | | | | | | |
| Keyplan, Showing Overall Site Design | X | X | X | X | X | X |
| Layout Plans | X | X | X | X | X | X |
| Grading Plans | X | X | X | X | X | X |
| Planting Plans | - | X | X | X | X | X |
| Planting Plans with Utility Overlay | - | X | X | X | X | X |
| Planting Plans with Sun/Shade Overlay | - | X | X | X | X | X |
| Irrigation Plans | - | X | X | X | X | X |
| Detail Enlargement Plans | - | - | X | X | X | X |
| Construction Details, Sections & Elevations | - | X | X | X | X | X |
| Site Furnishings Details, Catalog Sheets | - | X | X | X | X | X |
| *Specifications* | | | | | | |
| Landscape Table of Contents | - | X | X | X | X | - |
| Earthwork | - | X | X | X | X | - |
| Tree and Shrub Preservation | - | X | X | X | X | - |
| Landscape Site Grading | - | X | X | X | X | - |
| Granular Base Course | - | X | X | X | X | - |
| Cast Concrete Paving | - | X | X | X | X | - |
| Synthetic Resilient Surfacing | - | X | X | X | X | - |
| Hardscape, also Coordinate with other Disciplines | - | X | X | X | X | - |
| Growing Medium Preparation | - | X | X | X | X | - |
| Planting | - | X | X | X | X | - |
| Sodding | - | X | X | X | X | - |
| Seeding | - | X | X | X | X | - |
| Paint Finishes, as coordinated with other disciplines | - | X | X | X | X | - |
| Landscape Maintenance | - | X | X | X | X | - |
| *Sample Board/Presentation* | | | | | | |
| Update Conceptual Design Presentation Drawings | X | X | - | - | - | - |
| Colour Board(s) Illustrating Plant Material | - | X | - | - | X | - |
| Colour Board(s) Illustrating Hardscape and Site Furnishings | - | X | - | - | X | - |

2.4.14.1 The 30% submission will include scalable, digitally produced, colour rendered, form and character drawings complete with explanatory text how the urban design and landscape design of the Project aligns with the requirements and integrates into BH. Submission to illustrate the following:

2.4.14.1(1) Outline of the Facility showing all perimeter doors and windows;

2.4.14.1(2) Hardscape layout and surface treatment;

2.4.14.1(3) Schematic soft landscape treatment (trees, hedges, planting beds, vines, lawn etc.), including vegetation within public road right-of-way;

2.4.14.1(4) Tree retention, removal, and replacement plan if applicable, showing preliminary civil site grading design;

2.4.14.1(5) All landscape structures (fences, trellis, arbours, retaining walls, lighting etc.);

2.4.14.1(6) Location and size of all outdoor spaces and amenity areas;

2.4.14.1(7) Location of garbage enclosure and all other surface Utility structures;

2.4.14.1(8) A preliminary grading information sufficient to determine ramps, special treatment or provisions for retaining elements;

2.4.14.1(9) A sun/shade study for the courtyards and Secure Outdoor Spaces;

2.4.14.1(10) A design key plan at a 1:500 scale complete with enlargement plans of all courtyards, amenity areas and roof gardens at 1:100 scale;

2.4.14.1(11) Garden and deck enlargement plans at 1:100 scale;

2.4.14.1(12) A schematic irrigation plan with the following identified:

2.4.14.1(12)(a) At 30% submission, irrigated areas and proposed stub-outs only to be shown;

2.4.14.1(12)(b) At 30% submission, Irrigated areas will be shown with proposed irrigation stubout locations to be co-ordinated in future with Mechanical drawings;

2.4.14.1(12)(c) At 70% submission , full irrigation design components will be incorporated into plan;

2.4.14.1(12)(d) At 70% submission , full irrigation design components will be incorporated into plan; and

2.4.14.1(12)(e) At 50% submission, narrative describing how the proposed irrigation plan will meet the LEED and environmental targets as set out in Section 3.6 [Sustainability].

2.4.14.1(12)(f) At 50% submission draft schedule of sign content and working scales to determine the suitability of the sign and its message. The Authority to provide graphic standards for all signage.

2.4.14.2 The 50% drawing submittal will have resolved the layout and grading of the Site, with:

2.4.14.2(1) Layout plans with all hardscape pathway widths shown;

2.4.14.2(2) Grading plan illustrating all stairs, ramp and pathway slope information;

2.4.14.2(3) At 50% submission standard planting design details will be incorporated. Irrigation design to be resolved separately;

2.4.14.2(4) At 70% submission , full irrigation design components will be incorporated into plan;

2.4.14.2(5) A preliminary plant list of trees, shrubs, perennials and ground covers including quantities, botanical and common names, planting sizes, and on centre spacing;

2.4.14.2(6) Location and species of boulevard trees and preliminary construction drawings;

2.4.14.2(7) Location, material and preliminary construction details of all landscape elements and structures including garbage enclosure; and

2.4.14.2(8) Location, material, graphic standards and preliminary construction details of all exterior signage with revised schedule of sign content.

2.4.14.3 The 70% drawing submittal will include completed layout and grading, irrigation and planting plans. All details will be completed. Submittal will incorporate the Authority's input received at previous submissions with:

2.4.14.3(1) A complete irrigation and planting design;

2.4.14.3(2) Updated water conservation and irrigation plan prepared by a qualified professional inclusive of a hydro zone plan, landscape water conservation irrigation report (landscape water budget);

2.4.14.3(3) A finalized plant list of trees, shrubs, perennials and ground covers including quantities, botanical and common names, planting sizes, and on centre spacing;

2.4.14.3(4) Location and species of boulevard trees and preliminary construction drawings;

2.4.14.3(5) Location, material and construction details of all landscape elements and structures including garbage enclosure;

2.4.14.3(6) Location, material, graphic standards and construction details of all exterior signage with revised schedule of sign content; and

2.4.14.3(7) General specification sections included.

2.4.14.4 The 90% drawing submittal will include completed layout and grading, irrigation, planting plans, details and specifications. Submittal will incorporate the Authority's input received at previous submissions.

2.4.14.5 The 100% drawing submittal will include completed layout and grading, irrigation, planting plans, details and specifications. Submittal will incorporate the Authority's input received at previous submissions with:

2.4.14.5(1) All landscape construction plans will be sealed and signed by a Registered Landscape Architect with current membership in the British Columbia Society of Landscape Architects;

2.4.14.5(2) BCSLA landscape schedules by a Landscape Architect registered in British Columbia to be supplied as required at each stage of development;

2.4.14.5(3) All drawings and supplemental material(s) for irrigation systems will be stamped and signed by a Certified Irrigation Designer (CID) - Commercial. This certification will be issued by the IIABC. The certified designer will be in good standing with the association.

2.4.14.6 General Requirements

2.4.14.6(1) Key plan at 1:500 scale showing the overall site design plan;

2.4.14.6(2) Separate enlargement plans to be at 1:100 scale including layout plans, grading plan, planting plans, and irrigation plans illustrating all exterior spaces and referenced to the key plan;

2.4.14.6(3) North arrow will be included;

2.4.14.6(4) Plan will be oriented in same direction as key plan;

2.4.14.6(5) Include the legal description and site and property line zoning, including bearings and dimensions. If the Site has a municipal address, include it in the plan;

2.4.14.6(6) Include Utility locations, legal easements, rights-of-way, etc.;

2.4.14.6(7) Include curb lines, sidewalks, Utility poles, fences, and any other boundary conditions;

2.4.14.6(7)(a) Include all clearances for snow removal machinery equipment such as a bobcat to clear snow from walkways.

2.4.14.6(8) Include location of existing trees to remain and protect, diameter at breast height, height and identify species;

2.4.14.6(9) Layout Plan[s] to be a separate plan and include the following:

2.4.14.6(9)(a) Outline the extents of all types of hard surface treatments;

2.4.14.6(9)(b) Reference all construction details to Layout plans;

2.4.14.6(9)(c) Layout Plans to include all exterior features of other disciplines such as lighting, retaining walls, signage, architectural columns and Utility infrastructure components;

2.4.14.6(9)(d) Show the existing features to be retained if applicable;

2.4.14.6(9)(e) Show the location of proposed structures and features; and

2.4.14.6(9)(f) Dimension all hard surfacing and layout as required to facilitate construction.

2.4.14.6(10) Planting Plan[s] to be a separate plan and include the following:

2.4.14.6(10)(a) Planting Plan scale to be 1:100;

2.4.14.6(10)(b) Plans to outline all surface treatments including seed or sodded areas, groundcovers, extent and type of mulches or other surface treatments;

2.4.14.6(10)(c) Label all plants species on plan;

2.4.14.6(10)(d) Outline erosion control treatment where required;

2.4.14.6(10)(e) Show major items associated with “Layout” but not including dimensions, i.e. walkways, roads, curbs, hard surface areas, other structures, natural areas;

2.4.14.6(10)(f) Show plant material with crowns at 2/3 maximum size;

2.4.14.6(10)(g) Show the outline of planting beds;

2.4.14.6(10)(h) Show proposed contours in soft landscape areas;

2.4.14.6(10)(i) Show Utilities and rights-of-way;

2.4.14.6(10)(j) Include a plant list identifying species (botanical and common name), quantities, sizes, habit, spacing, and specific remarks as required; and

2.4.14.6(10)(k) Show all tree root barrier locations.

2.4.14.6(11) Grading Plan[s] to be a separate plan and include the following:

2.4.14.6(11)(a) A plan for each area is required to identify all gradients on pedestrian hard surface areas and landscape areas;

2.4.14.6(11)(b) All retaining walls, constructed slopes, planters and structures to be clearly identified and referenced on the landscape Grading Plan, complete with top and bottom elevations;

2.4.14.6(11)(c) Surface drainage requirements and proposed elevations to be coordinated with other disciplines;

2.4.14.6(11)(d) Show major items associated with layout but not including dimensions, i.e. walkways, roads, curbs and other structures;

2.4.14.6(11)(e) Show existing contours and proposed contours at 0.5 m contour intervals, and at 0.25 m intervals in detail areas;

2.4.14.6(11)(f) Indicate all slopes. Show top and bottom of slope spot elevations for all hard surface slopes over 2%;

2.4.14.6(11)(g) Show all grades in geodetic measure and tied to the nearest A.S.C.M. benchmark. A.S.C.M. benchmark number to be indicated on plan;

2.4.14.6(11)(h) Show elevations at each break point (top and toe of slope);

2.4.14.6(11)(i) Label property lines and show spot elevations;

2.4.14.6(11)(j) Show catch basin rim and invert elevations where required;

2.4.14.6(11)(k) Show manhole rim elevations;

2.4.14.6(11)(l) Show top of wall, top of curb, and finished floor elevations as required;

2.4.14.6(11)(m) Show surrounding grade information affecting site development;

2.4.14.6(11)(n) Label all concrete gutters and drainage structures; and

2.4.14.6(11)(o) Show all trap lows with their 1:100 inundation area, emergency spill routes and other surface drainage requirements.

2.4.14.6(12) Irrigation Plan[s] will include:

2.4.14.6(12)(a) Show major items associated with Layout Plan (but not including dimensions), such as walkways, structures, fences, play fields, roads, curbs, and natural areas;

2.4.14.6(12)(b) Show toned back major items of “Planting” and “Grading” plans;

2.4.14.6(12)(c) Show proposed contours at 0.5 m intervals;

2.4.14.6(12)(d) Show locations of all lines, sprinkler heads, valves, drains, sleeves, electrical drop-offs, 100 volt wire, 110 volt conduit, and electrical controllers, dimensional from adjacent property lines. Note: The irrigation system as shown on the plan is approximate and will be adjusted to suit site conditions;

2.4.14.6(12)(e) Ensure that the irrigation system is designed so that sprinkler heads do not spray on to hard surfacing or buildings;

2.4.14.6(12)(f) Indicate whether the system will be trenched or “plowed in” and whether the system will be gravity drained, blown out, or a combination;

2.4.14.6(12)(g) Coordinate water services with mechanical and ensure stub out is accessible to landscape areas. Lateral irrigation lines to be set back a minimum of 0.5 m from property lines;

2.4.14.6(12)(h) Include a schedule of materials/products describing sizes, manufacturers and model numbers, pipe fitting method, performance standards, and sources of said materials / products. Approval of the list of materials/ products by the Authority through the Review Procedure is required prior to the placing of formal orders for them;

2.4.14.6(12)(i) Ensure that the water window time period is justified by vandalism problems and horticultural requirements;

2.4.14.6(12)(j) Coordinate water service pipe size with mechanical and ensure it delivers sufficient service for this size site and indicate static water pressure on the plan; and

2.4.14.6(12)(k) Complete an irrigation scheduling chart to ensure that the irrigation design will function effectively within the practical water window.

2.4.14.6(13) Construction Details

2.4.14.6(13)(a) Provide construction details, sections and elevations of all exterior site design elements referenced to the appropriate enlargement plan;

2.4.14.6(13)(b) Provide sections for construction details of all planting and structures over a roof slab. Coordinate drainage with other disciplines;

2.4.14.6(13)(c) Prepare sections to illustrate the landscape integration with all exterior structures; and

2.4.14.6(13)(d) Provide model number and cut sheet for all catalog items. Provide installation details for all elements.

2.4.14.6(14) Urban Design and Landscape Drawing Coordination

2.4.14.6(14)(a) To improve and inform the Site Design; coordinate the drawings with other disciplines at all submission stages. Coordination includes:

2.4.14.6.14.(a).1 Civil: Coordination on impacts to the Site Design for rainwater management requirements. Coordinate all planting and structures with the location of deep and willow underground Utilities. Provide a separate drawing showing the overlay of all Utilities with the planting plans;

2.4.14.6.14.(a).2 Mechanical: Coordinate to ensure all landscape areas including roof areas have access to water for irrigation and maintenance. Coordinate drainage requirements for all exterior spaces including roof areas;

2.4.14.6.14.(a).3 Electrical: Coordinate all electrical requirements for all exterior spaces. Coordinate street lighting and site lighting requirements;

2.4.14.6.14.(a).4 Structural: Coordinate requirements for all structures at grade and on roof slabs; and

2.4.14.6.14.(a).5 Wayfinding: Coordinate requirements and locations for all signage and Wayfinding elements.

2.4.14.7 The submittals will be reviewed for general compliance and not for dimensions, quantities, etc. The submittals that are returned will be used for procurement. The responsibility of correct procurement remains solely with Project Co. The submittal review will not relieve Project Co of responsibility for errors or omissions and deviations from the contract requirements.

2.4.14.8 Shop Drawings will be submitted in an electronic format on USB memory key. The file format will 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.

2.4.14.9 As-built documentation

2.4.14.9(1) At a minimum, the as-built drawing package supplied by Project Co will include all information detailed in Section 2.4.14.

2.4.14.10 Project Co will provide maintenance manual at a minimum contain the following:

2.4.14.10(1) Irrigation submittals;

2.4.14.10(2) Three (3) full size copies of all as-built drawings printed on minimum 24lb acid free bond;

2.4.14.10(3) Manufacturer warranty documents for equipment and workmanship;

2.4.14.10(4) Updated Site furnishing specification listing all products and manufacturers used on site;

2.4.14.10(5) The maintenance manual to be supplied in hardcopy and digital format as follows in addition to the as-built and Submittal requirements:

2.4.14.10(5)(a) Provide 2 x 11x17 hardcopies expandable hinge lock type binders with embossed lettering front and spine;

2.4.14.10(5)(b) 2 x Digital copies in PDF and CAD formats on separate USB keys.

2.4.14.11 LEED Documentation

2.4.14.11(1) The Schematic Design - 30% submission will include an annotated Project checklist scorecard will be submitted indicating all of the credits targeted to be achieved, the responsible party who will sign

and prepare the LEED documentation for each prerequisite and targeted credit, and a high level description of the Project approach to achieve the prerequisite/credit and any risks identified. This Project checklist is to be updated and re-submitted at each following review stages:

2.4.14.11(1)(a) Design Development - 60% complete; and

2.4.14.11(1)(b) Pre-Tender - 95% complete.

2.4.14.11(2) The Issued for Construction - 100% submission will include a complete documentation package of the Design stage submission to the LEED Certifier along with an annotated Project checklist scorecard indicating all of the credits targeted to be achieved, the responsible party who will sign and prepare the LEED documentation for each targeted credit, and a high level description of the Project approach to achieve the credit and any risks identified. (Note, for credits that are included in the Design stage submission, a description is not required if nothing associated with the credit has changed from the Design stage submission); and

2.4.14.11(3) Upon Substantial Completion, Project Co will submit an electronic copy of all LEED certification submissions, including the final updated Project checklist, all supporting credit documentation, and copies of the LEED Review file.

2.4.14.12 Fire Safety Plans

2.4.14.12(1) Project Co will retain a professional fire safety consultant as part of the Project team. The professional fire safety consultant will provide fire safety plans and all related documentation as required by the relevant Governmental Authority and coordinate in further consultation with the Authority's EMS representative to ensure such documentation meets all applicable Authority standards for Fire Safety Plans and related documentation.

2.5 Mock-Up Rooms and Prototypes

2.5.1 Project Co will, at its cost and as part of the Review Process, provide and make available to the Authority for review the "mock-ups" and "prototype" rooms described in this Section.

2.5.2 The timing of the construction and review of these "mock-ups" and "prototype" rooms to be such that any adjustment to the Design can be accommodated without additional cost to the Authority or delay to the Project.

2.5.3 Project Co will include dates on the Submittal Schedule for construction of and for the Authority's review of mock-ups. The time periods for the Authority review and comments on Submittals set out in Appendix 2C [User Consultation and Review Procedure] will apply to mock-ups.

2.5.4 For Multimedia Room and Telecommunication Room mock-up requirements refer to Section 7.10.

2.5.5 By the date set out in the Submittal Schedule, Project Co will provide paper, virtual reality and fully constructed mock-ups of the following rooms:

2.5.5.1 A1 Outpatient Clinics:

2.5.5.1(1) A1.2.1 Exam Room.

2.5.5.2 B1 LDRP/NICU/Maternal:

2.5.5.2(1) B1.2.7 Patient Room – LDRP;

2.5.5.2(2) B1.3.2 Patient Room – NICU; and

2.5.5.2(3) B1.3.7 Medication Room/Feeding Prep Room.

2.5.5.3 C1 Medical/Surgical Inpatient Unit (24 Bed):

2.5.5.3(1) C1.2.1 Care Station;

2.5.5.3(2) C1.2.3 Patient Room;

2.5.5.3(3) C1.2.13 Rehab Room; and

2.5.5.3(4) C1.3.1 Medication Room.

2.5.5.4 D1 Inpatient Psychiatry Unit:

2.5.5.4(1) D1.2.5 Patient Room-MH; and

2.5.5.4(2) D1.5.1 Treatment Bay.

2.5.5.5 G1 Emergency Department:

2.5.5.5(1) G1.3.1 Trauma/Resuscitation Suite;

2.5.5.5(2) G1.3.4 Central Care Station;

2.5.5.5(3) G1.3.7 Treatment Room;

2.5.5.5(4) G1.4.9 LAB/ECG Room; and

2.5.5.5(5) G1.6 Zones 2, 3 and 5: Mental Health and Substance Use (virtual reality mock-up).

2.5.5.6 H1 Interventional – Preoperative:

2.5.5.6(1) H1.1.2 Operating Room; and

2.5.5.6(2) H1.4.5 Recovery Bay.

2.5.5.7 I1.1 Main Entrance Lobby (virtual reality mock-up).

2.5.5.8 E1 Medical Device Reprocessing Department (virtual reality mock-up).

2.5.5.9 Loading Dock (virtual reality mock-up with turning radius for 48 ft trucks in and out of Loading Dock area).

2.5.5.10 Project Co will provide 1:1 paper scale mock-ups of the rooms/areas indicating the dimensions and sizing and location of millwork, services, equipment and furniture and configuration and headwalls:

2.5.5.11 Project Co will provide fully constructed mock-ups of the rooms/areas (at a location either within the Facility as it is under construction or at another location provided by Project Co near the Facility), including all actual materials, finishes, millwork, services, equipment, IM/IT and furniture and locations of mechanical, electrical elements included in the design of the room/area so that the Authority and the User Consultation Groups can experience all features of the Design and make Design decisions.

2.5.6 Project Co will modify the mock-ups as may be required as the Design develops based on feedback from the User Consultation Groups and the Authority.

2.5.7 The purpose of the mock-up is to illustrate the Design. Neither party may rely on the mock-ups and prototypes. Project Co will update all Design documentation to reflect the mock-ups, and any input from the Authority and the User Consultation Groups and will submit all such updated Design documentation to the Authority for review under Schedule 2 [Design and Construction Protocols]. These mock-ups will remain in place for 6 months after Authority approval has been given.

2.5.8 Project Co will provide a site acceptable to the Authority for the mock-ups.

2.6 Requirements During Construction

2.6.1 Site Access During Construction

2.6.1.1 Project Co will provide security and facilities as required to protect the work from unauthorized entry, vandalism or theft.

2.6.2 Protection of Property

2.6.2.1 Project Co will comply with Section 6.15 of Schedule 2 and will:

2.6.2.1(1) Comply with Section 6.15 of Schedule 2 [Design and Construction Protocols].

2.6.2.1(2) At a minimum the Work Plan required by Section 6.16 of Schedule 2 [Design and Construction Protocols] will:

2.6.2.1(2)(a) Establish and record all speciality low vibration spaces within the existing buildings;

2.6.2.1(2)(b) Define work areas in close proximity to sensitive equipment or services and hours of vibration sensitive operations;

2.6.2.1(2)(c) Define Building and Ground Movement and Vibration limits for each work area at a minimum of three threshold levels, and outline the response procedure to be enacted in the event that movements or vibrations exceed these limits and submit both the limits and procedures to the Authority for approval through the Review Procedure prior to commencement of any Construction activities; and

2.6.2.1(2)(d) Outline measures in place for the protection of existing buildings during demolition including minimum set-backs for Construction activities, ground stabilization methods, protection methods for existing structures at the interfaces with structures to be demolished.

2.6.2.1(3) Implement the Work Plan, throughout demolition and construction and in accordance with this Schedule; and

2.6.3 Survey and Movement Monitoring

2.6.3.1 Project Co will:

2.6.3.1(1) In addition to the requirements of Schedule 2, survey and monitor the Site and neighbouring buildings for movement vertically, horizontally, and tilting in accordance with the requirements of Section 6.17 of Schedule 2 [Design and Construction Protocols].

2.6.3.1(2) In addition to the requirements of Section 2.6.1, plan the Construction to ensure ground and existing building movements do not exceed the following threshold values:

2.6.3.1(2)(a) Vertical deflection at any point: 12 mm;

2.6.3.1(2)(b) Building maximum tilting: 1:2000.

2.6.3.1(3) Conduct a post-construction condition survey including field observations, photographs and spot elevations after Substantial Completion. The condition survey, as a minimum, must include all structures, infrastructure, roadways and underground services surveyed as part of the pre-construction condition survey, and must be in a form and detail satisfactory to the Authority.

2.6.3.2 The monitoring will include monitoring of all locations to be further identified by the Authority in the process described in Schedule 2 [Design and Construction Protocols] with associated limitations on settlement.

2.6.3.3 Project Co will appoint a registered British Columbia Land Surveyor to carry out the settlement monitoring.

2.6.4 Control of Construction Noise and Vibration

2.6.4.1 Project Co will monitor and control noise and vibration transfer to the existing facilities and neighbouring properties by doing the following:

2.6.4.1(1) Retain an Acoustic and Vibration Consultant to provide the construction noise and vibration assessment and monitoring services outlined in this section of the Schedule 3[Design and Construction Specifications];

2.6.4.1(2) Meet all local bylaw requirements, requirements of the Schedule 3 [Design and Construction Specifications], and conditions set through communications and agreement between Project Co and the Authority relating to construction noise and vibration. Where there are discrepancies in criteria, the most stringent will apply;

2.6.4.1(3) The Existing Hospital operations will not be disrupted by noise and vibration without agreement between Project Co and the Authority for scheduled construction activities as part of the Work Plan;

2.6.4.1(4) Construction activity will be limited to 7 am to 7 pm on weekdays and 9 am to 5 pm on Saturdays; Construction activity will not occur on Sundays or Holidays;

2.6.4.1(5) Any significant vibration-inducing activities will be tested at a safe distance from sensitive locations to establish magnitude and dissipation rate of vibration which will be used to determine appropriate procedures or modifications of methods to perform the activity;

2.6.4.1(6) Under no circumstances will noise exceed 80 dBA LAS at neighbouring property lines or within the existing Facilities;

2.6.4.1(7) To prevent cosmetic damage, vibration will not exceed 5.0 mm/s peak particle velocity at any time of day or any day of the week when measured in the Existing Hospital or on any neighbouring building; and,

2.6.4.1(8) All reasonable efforts will be made to provide good communication with the Authority, and any other parties of interest about potential noise and vibration caused by construction activity.

2.6.4.2 A pre-construction noise and vibration survey of the Existing Hospital must be done in consultation and coordination with the Authority to establish the sensitivity of the Existing Hospital. The pre-construction noise and vibration survey will include the following:

2.6.4.2(1) Gather information on the Existing Hospital's spaces, operational requirements, and equipment with respect to noise and vibration;

2.6.4.2(2) Develop a preliminary test plan that includes date(s), types of measurements, durations, locations, and timing, for coordination with and approval by the Authority through the Review Procedure;

2.6.4.2(3) Perform noise and vibration measurements to establish normal operational levels in representative noise and vibration sensitive spaces (where spaces have similar activities/operations, building structure, or other similarities, a single location may be chosen to take representative measurements), including staged activities appropriate to each space such as movement of people and equipment, and walking at medium and fast paces as is appropriate for each space. It is expected that measurements will be taken at a minimum of 12 representative locations for each of vibration and sound for a minimum of 20 minutes each;

2.6.4.2(4) Where appropriate, measurements should be taken with increasing vibration intensity of staged activity while operational interference is identified by equipment users to identify threshold limits for various equipment, and particularly for imaging equipment;

2.6.4.2(5) Collect manufacturer's data for vibration sensitive equipment, where possible, with support from the Facility users, to use for establishing vibration sensitivities of equipment;

2.6.4.2(6) Provide a report for review and approval by the Authority through he Review Procedure at least 3 months prior to start of any construction or demolition work, summarizing:

2.6.4.2(6)(a) The measurement locations;

2.6.4.2(6)(b) The measured levels that include a minimum of:

2.6.4.2.6.(b).1 Maximum LAeq and LASmax for noise; and

2.6.4.2.6.(b).2 Maximum RMS (1 second average) and PPV for the frequency range of 1 to 100 Hz for vibration.

2.6.4.2(6)(c) Plots of the measured levels vs time and indications of activities that occurred during the measurements;

2.6.4.2(6)(d) Interpretation of vibration sensitivity of imaging and other vibration sensitive equipment based upon manufacturer's data or published generic vibration limits for similar equipment types;

2.6.4.2(6)(e) Suggested noise and vibration ‘warning’ and ‘stop work’ levels for each measured space and the locations that the measured spaces represent (e.g., those spaces not measured but expected to have similar sensitivities);

2.6.4.2(6)(f) Suggestions for noise and vibration ‘warning’ and ‘stop work’ levels should be set to limit false alarms but also to avoid disruption to the Existing Hospital and its occupants;

2.6.4.2(6)(g) Noise ‘warning’ levels should be no more than 3 dB above maximum expected daily operations levels and noise ‘stop work’ levels should be no more than 6 dB above the maximum expected daily operations levels;

2.6.4.2(6)(h) Suggestions for vibration ‘warning’ and ‘stop work’ levels should consider the measurements taken on site, generic criteria from various published sources and any specific equipment requirements;

2.6.4.2(6)(i) Some equipment with specific noise or vibration requirements (such as MRI and other imaging equipment) may require more complex monitoring systems to address frequency-based variations in sensitivity; and

2.6.4.2(6)(j) Recommended construction noise and vibration monitoring locations.

2.6.4.3 A Construction Noise and Vibration Management Plan must be provided for review and approval by the Authority through the Review Procedure that develops and outlines the following:

2.6.4.3(1) Planned construction activities along with locations and timing for the duration of Construction;

2.6.4.3(2) Estimated noise and vibration levels from construction/demolition activities and their expected impact on Existing Hospital operations based on proximity of construction activity to sensitive space locations;

2.6.4.3(3) Description of planned specific noise and vibration control measures to be taken to reduce noise and vibration levels on the Existing Hospital and surrounding properties;

2.6.4.3(4) Monitoring plan that includes number of monitors, locations of monitors and automated ‘warning; and ‘stop work’ alert settings;

2.6.4.3(5) Reporting plan which should include a weekly noise and vibration monitoring summary report and a weekly - 3 week noise and vibration outlook;

2.6.4.3(6) Response plan that includes:

2.6.4.3(6)(a) The response plan for ‘warning’ and ‘stop work’ alerts;

2.6.4.3(6)(b) The procedure, response plan, and contact information for noise and vibration complaints;

2.6.4.3(6)(c) A proposed list of individuals to be provided with automated ‘warning’ and ‘stop work’ alerts; and

2.6.4.3(6)(d) Contact names and numbers for any construction noise and vibration related issues.

2.6.4.4 Long-term noise and vibration monitoring program that includes the following:

2.6.4.4(1) Provide a system capable of continuous monitoring for the duration of Construction;

2.6.4.4(2) The monitoring system must be capable of providing alerts via SMS and email with programmable ‘warning’ and ‘stop work’ levels for each location;

2.6.4.4(3) Automated ‘warning’ and ‘stop work’ alerts must be received within 5 minutes of a noise and/or vibration exceedance via SMS and/or email to a pre-identified list of individuals that is agreed to with the Authority;

2.6.4.4(4) The monitoring system will upload data to a website/cloud-based system capable of near real-time review and assessment and will be made accessible to the Authority;

2.6.4.4(5) The monitoring system will be set up at least 1 month in advance of construction activities to assess effectiveness of monitoring locations and criteria and to allow for adjustments to ensure smooth system operation before construction begins;

2.6.4.4(6) Monitoring will be provided at a minimum of: 6 interior noise locations, 6 interior vibration locations, 1 outdoor noise monitoring location, and 1 vibration monitor at the nearest non-hospital building, unless otherwise agreed to in advance by the Authority based on the Construction Noise and Vibration Management Plan;

2.6.4.4(7) Vibration monitoring locations are expected to be located at lower levels where vibration levels are highest and/or in the most sensitive locations;

2.6.4.4(8) Noise monitoring locations are expected to be at spaces that are closest to construction noise and/or in the most noise sensitive locations unless substantial structure-borne noise is expected to be imparted on the Existing Hospital structure;

2.6.4.4(9) Monitoring locations should be at the most sensitive representative receptors that are closest to construction activity, and should consider noise and vibration transfer in all directions relative to the construction activity;

2.6.4.4(10) Adjustments to monitoring locations and to 'warning' and 'stop work' alert thresholds must be agreed to in writing by the Authority;

2.6.4.4(11) Upon receiving a 'warning' alert, Project Co will respond within 5 minutes and will identify the source of the noise or vibration causing the 'warning' and cease operations of that activity and consider alternative lower noise/vibration methods or proceed cautiously in a manner that is expected to reduce the noise or vibration output of the activity;

2.6.4.4(12) Upon receiving a 'stop work' alert, Project Co will respond within 5 minutes and cease all construction operations until the source of the exceedance is identified. Upon identification of the construction activity responsible for the 'stop work' alert, Project Co will use alternative noise/vibration methods to proceed with the activity;

2.6.4.4(13) Project Co will provide written notice to the Authority via email within 2 hours of all noise/vibration alerts providing the following:

2.6.4.4(13)(a) The location from which the alert was received;

2.6.4.4(13)(b) A description of the location and construction activity that caused the alert;

2.6.4.4(13)(c) The corrective action taken to allow the work to proceed; and

2.6.4.4(13)(d) Notes of relevance such as intent to re-schedule work.

2.6.4.4(14) If noise/vibration alerts are repeatedly determined to be caused by sources other than construction activity, a proposal to move the monitor to a new location and/or change of alert levels will be provided to the Authority for approval through the Review Procedure;

2.6.4.4(15) Noise/vibration inducing construction activities that are expected to cause 'warning' or 'stop work' alerts will be avoided as much as is practical but where high noise/vibration activities cannot be avoided, Project Co must coordinate and schedule these activities with the Authority to a mutually agreeable time. This will require careful

planning and communication on the part of Project Co, including as a minimum:

2.6.4.4(15)(a) Request to schedule high noise and/or vibration activity at least 2 weeks ahead of performing activity, and;

2.6.4.4(15)(b) Upon approval, provide reminders and notices 1 week in advance and 1 day in advance of the activity to those identified to receive construction noise and vibration communications.

2.6.4.4(16) The Authority will be provided with a weekly noise and vibration report that includes a minimum of the following:

2.6.4.4(16)(a) Summary and graphs of noise and vibration levels measured over the previous 2 weeks

2.6.4.4(16)(b) List of all ‘warning’ and ‘stop work’ alerts including the location from which the alert was received, a description of the location and construction activity that caused the alert, and the corrective action taken to allow the work to proceed, and any notes or follow-up to be done;

2.6.4.4(16)(c) Updates to the noise and vibration control efforts being made on the construction site; and

2.6.4.4(16)(d) A 3-week schedule of upcoming noise and vibration producing activities.

2.6.4.4(17) Noise and Vibration complaints will be dealt with through the appropriate channels as outlined in the Construction Noise and Vibration Management Plan and will be followed up with the following actions:

2.6.4.4(17)(a) The time and location of the event will be noted;

2.6.4.4(17)(b) The logged data from all monitors for the day of the event will be reviewed and any anomalies or deviations will be identified and compared with both the normal levels and the alert levels for the area of concern;

2.6.4.4(17)(c) The construction activities that occurred on the day of the complaint event will be reviewed to determine the potential source of complaint;

2.6.4.4(17)(d) Project Co will propose appropriate actions to address the concern and potential future issues related to the complaint; and

2.6.4.4(17)(e) The above will be summarized in a brief document and provided to the individuals identified in the Construction Noise and Vibration Management Plan.

2.6.5 Infection Control and Control of Dust and Noxious Odours

2.6.5.1 Project Co will:

2.6.5.1(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 and neighborhood;

2.6.5.1(2) Ensure all diesel equipment is located away from any building air intakes and has exhaust purifier scrubbers that comply with all regulations and the Greater Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw pertaining to concentrations of Carbon Monoxide (CO), Hydrocarbons (HC) and Particulate Matter (PM) exhaust pollutants. Project Co will include appropriate meters to test concentration levels on BH, as will be required by the Authority from time-to-time;

2.6.5.1(3) 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

2.6.5.1(4) Without limiting Project Co's obligation under the Section above:

2.6.5.1(4)(a) Comply with CSA Z317.13 Infection Control during Construction, Renovation or Maintenance of Healthcare Facilities, at all times during the Construction period;

2.6.5.1(4)(b) Implement a comprehensive infection control risk management system and develop an infection prevention and control management plan, prior to commencing any work;

2.6.5.1.4.(b).1 Submit the infection prevention and control management plan and a completed ICRA form (Infection Control Risk Assessment) to the Authority for review and approval through the Review Procedure prior to work commencement.

2.6.5.1(4)(c) Ensure every individual who performs work at the site is appropriately infection prevention and control trained by taking the CSA courses related to the CSA Z317.13 Infection Control During Construction, Renovation and Maintenance of Health Care Facilities standard. Provide proof of training to the Authority.

2.6.5.1(4)(d) Retain an Infection Control Practitioner to:

2.6.5.1.4.(d).1 Develop the infection prevention and control management plan;

2.6.5.1.4.(d).2 Perform infection prevention and control training;

2.6.5.1.4.(d).3 Assist with regular site inspections of relevant work areas;

2.6.5.1.4.(d).4 Perform regular audits on the implemented infection control risk management system and related protocols, processes and documents;

2.6.5.1.4.(d).5 Assist with monitoring compliance with relevant/applicable sections of the CSA Standard Z317.13-17;

2.6.5.1.4.(d).6 Assist with developing required infection prevention and control procedures, method statements, checklist, records etc., as required;

2.6.5.1.4.(d).7 Perform pressure air monitoring as required; and

2.6.5.1.4.(d).8 Install air pressure monitoring devices visible to hospital staff between work areas and hospital areas and keep a written daily log of air pressure levels.

2.6.5.1(4)(e) Perform and record, with internal, trained personnel, minimum daily inspections of all areas including any areas which may be occupied by the Authority prior to Substantial Completion where work is occurring, to monitor compliance with CSA Z317.13 on a daily basis during Construction and undertake prompt corrective actions where infection risks have been identified;

2.6.5.1(4)(f) Have additional work area inspections performed by Project Co's retained contractors or subcontractors;

2.6.5.1(4)(g) Submit to the Authority a monthly "Infection Prevention and Control Statistics Performance Report" on no later than the 5th business day of the following month, that:

2.6.5.1.4.(g).1 Outlines the steps undertaken by Project Co to comply with CSA Standard Z317.13;

2.6.5.1.4.(g).2 Confirms Project Co's compliance with CSA Standard Z317.13; and

2.6.5.1.4.(g).3 Briefly details non-conformances and corrective actions undertaken to rectify the issue(s).

2.6.5.1(4)(h) Perform a construction level clean and a hospital-grade terminal clean prior to the installation of medical equipment, and prior to Substantial Completion;

2.6.5.1.4.(h).1 Once completed maintain terminal clean up to Substantial Competition; and

2.6.5.1.4.(h).2 Provide a workplan that includes the qualifications of the Person completing the terminal clean, procedures and type of hospital grade disinfects to be used during terminal clean.

2.6.5.1(4)(i) Submit the inspection form(s) and a final summary report to the Authority for review, prior to Substantial Completion; and

2.6.5.1(4)(j) Chair Multidisciplinary team (MDT) monthly meetings and upon request by MDT members schedule special meetings to discuss Infection Control Risk Assessment (ICRA) and disclose any and all changes and problems with preventative measures during scope of this Project.

2.6.6 Demolition and Related Work

2.6.6.1 Project Co is responsible for the demolition and removal of all materials of the following:

2.6.6.1(1) All existing buildings, foundations, structures, roads, curbs, parking areas, walkways, landscaping and any other related services within the scope of the Project;

2.6.6.1(2) All redundant existing Building Systems, which are to be capped off at source, and all dead-legs removed;

2.6.6.1(3) Existing sub-surface elements such as foundations, slabs, pits, sumps, pipes, cables, ducts and underground tanks including related piping;

2.6.6.1(4) Interim or temporary structures;

2.6.6.1(5) Existing Utilities; and

2.6.6.1(6) All items necessary, above ground and sub surface, for the construction of the Facility.

2.6.6.2 Project Co will consult with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] regarding equipment to be disposed or retained and handed over to the Authority.

2.6.6.3 Project Co will be responsible for all costs associated with decommissioning and disposal of equipment.

2.6.6.4 Conform to applicable codes for demolition of structures including WSBC and provide for the safety of adjacent structures, the erection and maintenance of temporary barriers and security devices. Project Co will:

2.6.6.4(1) Obtain City and Authority approvals required to undertake a demolition;

2.6.6.4(2) Ensure demolition work does not interfere with, or prevent the Existing Hospital and neighbouring buildings from operating normally;

2.6.6.4(3) Ensure the weatherproofing of the existing building is maintained throughout construction and demolition;

2.6.6.4(4) Provide minimum 2.4 m high perimeter screen and safety walls to ensure safety and protection of people and objects outside of the demolition area; provide overhead protection from falling debris, and provide vision access ports in the hoarding;

2.6.6.4(5) Schedule hours of operation and plan the traffic flow required for demolition in accordance with the Phasing Plan, the Work Plan and the Demolition Plan referred to in Schedule 2 [Design and Construction Protocols];

2.6.6.4(6) Be responsible for ensuring that fire safety will be in force at all times during demolition;

2.6.6.4(7) Implement a pest control management plan for related areas before, during and post demolition;

2.6.6.4(8) Perform demolition work in accordance with all LEED prerequisite and targeted credit requirements and provide all required LEED documentation to the Authority;

2.6.6.4(9) Provide dust control at all times;

2.6.6.4(10) Spray demolition area with water once demolition of structure begins;

2.6.6.4(11) Manage water runoff through the Site;

2.6.6.4(12) Protect all storm drains that could be affected by the demolition work;

2.6.6.4(13) Perform work in accordance with Section 2.6.4 Control of Construction Noise and Vibration;

2.6.6.4(14) Secure the demolition site 24/7; obtain the Authority's approval through the Review Procedure of Project Co's security plan prior to commencing work;

2.6.6.4(15) Conform to applicable regulatory procedures, including WorkSafe BC requirements, during all phases of the demolition and when discovering hazardous or contaminated materials;

2.6.6.4(16) Accurately record actual locations of capped Utilities, subsurface obstructions and/or conditions, and include in as built documentation; and

2.6.6.4(17) Be responsible for landfill tipping fees.

2.6.6.5 Reports on the contaminants in BH have been prepared for the Authority and have been made available to Project Co.

2.6.6.6 Project Co acknowledges and agrees:

2.6.6.6(1) It has received and reviewed a copy of the following reports including all appendices:

2.6.6.6(1)(a) Burnaby Hospital Renewal Phase 1 Business Plan Geotechnical Report dated June 6, 2018 prepared by Thurber Engineering Ltd;

2.6.6.6(1)(b) Phase 1 ESA Burnaby Hospital;

2.6.6.6(1)(c) Pre-Demolition HBMA Burnaby Hospital Cascades Fraser Health dated June 4, 2018;

2.6.6.6(1)(d) Pre-Demolition HBMA Burnaby Hospital Facilities Fraser Health dated June 14, 2018;

2.6.6.6(1)(e) Pre-Demolition HBMA Burnaby Hospital West Wing Fraser Health dated June 5, 2018;

2.6.6.6(1)(f) Phase II ESA 3935 Kincaid St Burnaby BC Fraser Health dated August 3, 2018;

2.6.6.6(1)(g) Hazardous Building Material Assessment West Wing Burnaby Hospital dated February 24, 2021;

2.6.6.6(1)(h) Hazardous Building Material Assessment Cascade Building Burnaby Hospital dated February 23, 2021;

2.6.6.6(1)(i) Hazardous Building Material Assessment Cascade Building Burnaby Hospital dated December 23, 2020;

2.6.6.6(1)(j) Letter Re: Gypsum Wallboard / Drywall, dated February 23, 2021;

2.6.6.6(1)(k) Asbestos Assessment Support Facilities Burnaby Hospital dated October 15, 2021;

2.6.6.6(1)(l) Asbestos Assessment Nursing Tower Burnaby Hospital dated October 9, 2020;

2.6.6.6(1)(m) Memorandum Re: Remedial Requirements dated February 26, 2021;

2.6.6.6(1)(n) FINAL Stage 1 Preliminary Site Investigation Burnaby Hospital dated February 8, 2021;

2.6.6.6(1)(o) FINAL Supplementary Stage 2 Preliminary Site Investigation Burnaby Hospital dated February 26, 2021; and

2.6.6.6(1)(p) Burnaby Hospital Environmental Assessment March 18 2020, Updated: April 23, 2020 prepared by Diamond Head.

2.6.6.6(2) The Authority is not in any way responsible or liable for the completeness, interpretation or accuracy of reports listed in Section 2.6.6.6 and that Project Co must satisfy itself with the completeness of the information contained within.

2.6.6.6(3) Project Co is responsible for all management, removal, abatement, containment and disposal of all Hazardous Substances in or under BH and affected or impacted by the Design and Construction of the Facility;

2.6.6.6(4) If contaminants not identified in the reports listed in Section 2.6.6.6 are found during the Design and Construction, Project Co will be

responsible for completing a contaminants study, at its cost, to determine the extent of such contaminants;

2.6.6.6(5) Any remediation must comply with the Environmental Management Act and Contaminated Sites Regulation;

2.6.6.6(6) To take all precautions so that no transmission of Hazardous Substances and noxious fumes interfere or contaminate the Site, BH, the environment and surrounding neighbourhood; and

2.6.6.6(7) That it is responsible for management, removal, abatement, containment and disposal of any underground storage tanks and any underground piping and appurtenances, including any that may themselves constitute Hazardous Substances, and that it will have soils surrounding any such buried services tested for contamination;

2.6.7 Temporary Works

2.6.7.1 During the demolition and Construction Period, Project Co will:

2.6.7.1(1) Have the sole responsibility for the Design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and the Design and execution of construction methods required in their use;

2.6.7.1(2) Provide its own services necessary for Project Co's Construction use including; power, telephone, internet, wireless communications, water and sewage, and will not connect directly to the Existing Hospital or infrastructure except with the Authority's prior approval through the Review Procedure;

2.6.7.1(3) Provide scaffolding on the exterior of the Facility to eliminate the need for sub-trades using temporary measures such as boom lifts; and

2.6.7.1(4) Provide sufficient construction lighting in all areas of the construction site during all phases to eliminate the need for temporary portable lights by the sub-trades. Provide heating and ventilation of Facility spaces during construction.

2.6.7.1(5) Provide lighting for the parking area. Provide dedicated 20A, 120V circuit and weatherproof receptacle for existing Pole located at Kincaid and Ingleton crossing SW corner.

2.6.8 Waste Management – Hazardous and Non-Hazardous

2.6.8.1 Project Co will:

2.6.8.1(1) Comply with territorial and municipal standards with respect to waste management programs on construction sites;

2.6.8.1(2) Comply with requirements set out in LEED v4 Materials and Resources prerequisites Storage and Collection of Recyclables and Construction and Demolition Waste Management Planning;

2.6.8.1(3) Manage waste generated from the Site in accordance with City standards;

2.6.8.1(4) 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;

2.6.8.1(5) For the removal and disposal of special waste and hazardous waste, Project Co 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 Project Co;

2.6.8.1(6) 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;

2.6.8.1(7) Store and dispose of hazardous waste materials in a manner that is in full accordance with all applicable federal and City requirements and standards;

2.6.8.1(8) Implement waste reduction by reducing or eliminating excessive packaging practices; and

2.6.8.1(9) 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.

2.7 Adjacent Facilities Interference

2.7.1 Except to the extent expressly permitted as part of a Work Plan construction work and related equipment or machinery will not interfere with the Authority's 24/7 operations.

2.8 Systems Shut Downs and Interruptions

2.8.1 Project Co will submit for review by the Authority, at the same time as the Project Schedule is required, a schedule of all requested systems shutdowns and interruptions.

2.8.2 Project Co will use the Authority's FMO standards and regulations, such as Contractors Safety, Shut Down Request procedures, Hot Work Permits, etc., and will notify the Authority in writing of all requested systems shut downs and interruptions as part of a Work Plan as follows:

2.8.2.1 Major impacts of systems shutdowns and interruptions will be requested 60 calendar days in advance;

2.8.2.2 Medium impacts of systems shutdowns and interruptions will be requested 30 calendar days in advance; and

2.8.2.3 Minor impacts of systems shutdowns and interruptions will be requested 14 calendar days in advance.

2.8.3 The major, medium and minor impacts described above refer to the following:

2.8.3.1 Major impacts are those which impact the Authority's 24/7 operations requiring any of the following: cancellation of services, revisions to service schedule, movement or relocation of Patients and services. Significant coordination required across multiple disciplines;

2.8.3.2 Medium impacts are those which directly impact the Authority's 24/7 operations but do not require cancellation of services, relocation of Patients or services. Coordination required with only those Components directly affected; and

2.8.3.3 Minor impacts are those which have minimal impact on the Authority's 24/7 operations. Coordination required with singular service and FMO.

2.9 Move In

2.9.1 Project Co will coordinate with the Authority, the date for the move of Staff personnel and Patients to the Facility. The exact timing and sequencing of this phase will involve coordination with the Authority. Refer to Section 10.5 of Schedule 2 and Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items] for further requirements.

2.9.2 Project Co will 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.

2.9.3 The 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.

2.9.4 Project Co will be responsible for all damages to Furniture, equipment and Facility finishes incurred during the move of any items moved by Project Co.

2.9.5 Project Co will accommodate and assist the Authority to hold any open house and public announcements requested by the Ministry of Health or relevant parties that maybe required prior to Substantial Completion or move-in.

2.10 Phased Construction

2.10.1 Campus Perimeter Pathway System (CPPS) will be completed by the Target CPPS Substantial Completion Date.

2.10.2 Early access to the Campus Perimeter Pathway System (CPPS), Main Equipment Rooms (MER), Entrance Facility's (EF), Telecommunication Rooms (TR) and Communications Pathway Systems, enables the Authority to populate, activate, commission and integrate network hardware and infrastructure for the Facility.

2.10.3 Completion of the Authority's work on the CPPS, MER, EF, TR and Communications Pathway Systems and its critical adjacencies, is required to support the Commissioning activities and to integrate the Facility to the existing BH Campus and to provide the new capabilities and services required by the Facility.

2.10.4 Campus Perimeter Pathway System (CPPS)

2.10.4.1 The CPPS will be completed one 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 fibre and copper. See Section 7.10.7and Appendix 3R [Campus Perimeter Pathway System Technical Specifications] for the CPPS.

2.10.5 Communications Rooms

2.10.5.1 The following rooms will be provided to the Authority Equipment Ready in the timeframe specified, in order to allow the Authority to install, configure, Commission the network to enable the connectivity, integration and Commissioning of the Authority and Project Co systems in sufficient time to achieve Substantial Completion of the Facility. See Sections 7.10.8 and 7.10.10.

2.10.5.2 Main Equipment Room (MER)

2.10.5.2(1) The new MER's will be provided to the Authority Equipment Ready six (6) months in advance of the Substantial Completion of the Facility. This completion timeframe is needed to provide sufficient time for the Authority and third parties to install and Commission their network and systems. See Section 7.10.8 for the MER.

2.10.5.3 Entrance Facility (EF)

2.10.5.3(1) The new EF's will be provided to the Authority, Equipment Ready six (6) months in advance of the Substantial Completion of the Facility. This completion timeframe is needed to provide sufficient time for the Authority and third parties, including service providers, to install and Commission their network and systems. See Section 7.10.8 Entrance Facility Room.

2.10.5.4 Telecommunication Rooms (TR's) and Communications Pathway System

2.10.5.4(1) The TR's and the Communication Pathway System will be completed, and early access provided at least three (3) months in advance of the start of the Commissioning Phase. This completion timeframe is needed to provide sufficient time for the Authority and third parties, to install and provision the active network equipment required to support all the system Commissioning requirements in Section 5.5.3. See Section 7.10.8 Communications Rooms and Section 7.10.7 Communications Pathway System.

## PART 3. DESIGN PRINCIPLES AND OBJECTIVES

3.1 Project Design Principles and Objectives

3.1.1 Project Co will apply the Design principles described in this Part 1, the principles as set out in the Appendix 3A [Clinical Specifications and Functional Program] and the Burnaby Hospital Renewal Design Standards in undertaking the Design and Construction.

3.1.2 The Project design principles are integrated principles and Project Co will apply them throughout the Design and Construction.

3.1.3 The Authority's vision for the Facility is to:

3.1.3.1 Build Patient care through an achievable and affordable capital renewal solution that supports BH's community, the region, the province, and its role in providing primary and acute care services; and

3.1.3.2 Provide a state-of-the-art Facility with technology that improves the Patient experience, maximises health improvement within a healing environment, improves the physical working conditions for Staff, and enable achievement of clinical outcomes and workflow enhancements.

3.1.4 Guiding Principles and Critical Success Factors

3.1.4.1 The overarching principles guiding the Project are:

3.1.4.1(1) Developing spaces to maximize the long-term flexibility and adaptability of interior spaces and to maintain high level of utilization;

3.1.4.1(2) Ensure continuous operation of primary and acute care processes throughout the Project;

3.1.4.1(3) Enhance the ability to achieve the Authority's strategic priorities:

3.1.4.1(3)(a) Quality care and services, managing our financial resources, operational excellence, capacity across all sectors and supporting Staff and physicians.

3.1.4.1(4) Leverage and review the seven Lean Health Care flows of health services (information, patient, providers, medications, supplies, process engineering, equipment) through key Design and operational Cx stages of the Project;

3.1.4.1(5) Incorporate Patient and family-centred and elder friendly Design concepts to improve the Patient and family experience and enhance Patient safety;

3.1.4.1(6) Incorporate the lessons learned from other major capital health care projects wherever possible;

3.1.4.1(7) Engage Staff, Patients and families in planning and Design;

3.1.4.1(8) Reduce climate risks to the Project, increase low carbon climate resilience, and deliver on environmental sustainability stewardship through building Design and operation; and

3.1.4.1(9) Incorporate efficiencies and innovations that may be possible through integration of systems to minimize long term operation and maintenance costs for the Authority.

3.1.5 Project Objectives

3.1.5.1 The Design and Construction will support the Authority's Project vision and Guiding Principles. The Project Objectives are to:

3.1.5.1(1) Improve and modernize Existing Hospital conditions to meet current day standards to improve Patient services and safety;

3.1.5.1(2) Prepare for future phases of growth and expansion of the BH services;

3.1.5.1(3) Improve Patient and Staff access and flow within the Site, by providing a Design that allows ease of access of Patients and Staff both within the Facility, and BH, to and from the surrounding public transit, drop off and parking areas;

3.1.5.1(4) Provide separation of flows in the circulation system between public, Patient and materials distribution by providing Front of House and Back of House corridors;

3.1.5.1(5) Maintain the Authority's 24/7 operations throughout the Construction and operational transition phase for the Facility;

3.1.5.1(6) Minimize overall capital and operating costs for the Facility by designing to enable efficient operation and economical maintenance, repair and replacement of infrastructure;

3.1.5.1(7) Utilize equipment, systems and materials that are efficient and cost effective to maintain over the life of the Facility;

3.1.5.1(8) Provide clear access to all equipment maintenance requirements and ensure routines do not impact the Authority's 24/7 operations;

3.1.5.1(9) Ensure system and equipment maintenance requirements and routines do not impact the Authority's 24/7 operations;

3.1.5.1(10) Install systems such that they can be readily expanded in the future as needed to support increases in operational capacity and accommodate renovations; and

3.1.5.1(11) Minimize the need for the Authority to undertake maintenance that requires special safe work procedures and hazardous classifications.

3.1.5.1(12) Clinical Objectives

3.1.5.1(12)(a) Improve Patient outcomes by improving the quality of the health care environment by:

3.1.5.1.12.(a).1 reducing the rates of hospital acquired infections through the provision of single-occupancy rooms;

3.1.5.1.12.(a).2 separation of clean and soiled material transport routes; and

3.1.5.1.12.(a).3 modernization of HVAC Systems.

3.1.5.1(12)(b) Reduce the cost of acute care by improving access to community outpatient services for high-complexity / poly-morbid Patients;

3.1.5.1(12)(c) Improve Patient and family experience by providing care space that conforms to modern design standards:

3.1.5.1.12.(c).1 enable Patient privacy;

3.1.5.1.12.(c).2 provide greater access to daylight; and

3.1.5.1.12.(c).3 provide space for family support.

3.1.5.1(12)(d) Reduce surgical and procedural wait lists by providing increased operating room and procedure room capacity;

3.1.5.1(12)(e) Improve access to, and quality of, emergency services by providing emergency care space that supports efficient and high-quality care that reduces:

3.1.5.1.12.(e).1 time to see physician;

3.1.5.1.12.(e).2 time to discharge; and

3.1.5.1.12.(e).3 left without being seen rates.

3.1.5.1(13) Facility Objectives

3.1.5.1(13)(a) Improve safety for Staff and improve the quality of the work environment;

3.1.5.1(13)(b) Reduce Facility risk associated with aging infrastructure and deferred maintenance as measured by the Facility Condition Index (FCI);

3.1.5.1(13)(c) Build capacity for subsequent Project phases;

3.1.5.1(13)(d) Achieve post-disaster standards for new building;

3.1.5.1(13)(e) Improve campus energy efficiency and achieve LEED Gold certification for Phase 1A;

3.1.5.1(13)(f) Improve environmental conditions for critical spaces, Operating Rooms; and MDRD. This includes the proper control of relative humidity, pressure differential control, temperature, and ventilation aligned with current CSA standards (Z317.2) and BCBC requirements;

3.1.5.1(13)(g) Incorporate health and safety standards that eliminate or reduce risk of physical, biological, chemical and/or psychological harm to Staff, physicians and contractors; and

3.1.5.1(13)(h) Minimize long term operation and maintenance costs to the Authority.

3.1.5.1(14) Deliver a Facility that:

3.1.5.1(14)(a) Promotes Patient centred care and a positive experience, so that Patients feel better prepared, can access resources and have a better overall experience, in partnership with the community;

3.1.5.1(14)(b) Strengthens provider satisfaction and experience using efficient and accessible technology to communicate, integrating multidisciplinary care, promote learning and reducing time doing non-value-added tasks;

3.1.5.1(14)(c) Promotes evidence-based practice and safety that includes direct slight lines, meeting best practice standards and continuous quality improvement;

3.1.5.1(14)(d) Build flexibility of space, for future service and population changes, expansion can be related to space and/or extended times in current space so that geography does not constrain changes to space;

3.1.5.1(14)(e) Enables privacy and confidentiality for Patients and their families;

3.1.5.1(14)(f) Provides natural light for Patients and Staff; and

3.1.5.1(14)(g) Ensures operational efficiency and effectiveness, including virtual care and effective use of resources to meet the population needs.

3.2 Evidence-Based Design

3.2.1 In undertaking the Design of the Facility, Project Co will apply EBD methodologies to achieve the Project Design Objectives. EBD means that decisions about the Design of the Facility will be based on credible research, information derived from comparable North American projects, and information about the Authority's operations. The goal of EBD is to deliver measurable improvements, for example, in the Authority's associated Patient clinical outcomes, workflow outcomes, productivity, economic and sustainable performance, and Patient satisfaction.

3.2.2 Project Co will provide EBD documentation through the process described in Appendix 2C [User Consultation and Review Procedure] for the Authority's use to consider, implement, teach, and incorporate into the clinical evaluation of the Project.

3.3 Lean Health Care

3.3.1 Lean Health Care means the application of lean manufacturing principles to health care delivery to reduce the amount of time spent on unnecessary activities and reduce defects in the production of goods or provision of services and promote a framework of continuous process improvement.

3.3.2 Project Co will leverage and review the seven Lean Health Care flows of health services (information, patient, providers, medications, supplies, process engineering, equipment), through key Design and operational Cx stages of the Project.

3.3.3 Project Co will design the Facility to:

3.3.3.1 Facilitate the delivery of efficient and effective workflow and processes;

3.3.3.2 Eliminate waste during the Construction of the Facility as well as within both clinical and non-clinical service delivery processes;

3.3.3.3 Facilitate achievement of the Authority's zero waste target to increase waste diversion rates at all new health care construction projects to 90% by 2020;

3.3.3.4 Recognize the value to the Authority of Lean Health Care, 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 to support the delivery of services within the Facility;

3.3.3.5 Include safe, efficient and ergonomic design features throughout all spaces that specifically facilitate the physical activities of Staff and Patients, including appropriate Millwork, handrails, lighting, Patient ceiling lift devices, and Patient assist or equipment manoeuvring space; and

3.3.3.6 Serve as an integrated workplace by providing physical environments that:

3.3.3.6(1) Support innovative and collaborative methods of working, such as a team approach to care, family centred rounds, and team huddles and daily management systems;

3.3.3.6(2) Incorporate the Authority's new and emerging technologies;

3.3.3.6(3) Incorporate clinical research into daily methods of working; and

3.3.3.6(4) Respond to diverse work styles, such as hoteling and job-sharing, and optimize flexibility and space utilization.

3.3.4 Accordingly, Project Co will design workspaces to:

3.3.4.1 Include modular and adaptable rooms and spaces;

3.3.4.2 Include standardized and flexible spaces; co-location options, space saving strategies, and layouts, Modular Casework and Systems Furniture that facilitate change;

3.3.4.3 Provide floor layouts that accommodate teams as well as individuals, and that support mobile Staff who require flexibility and use portable technology;

3.3.4.4 Accommodate program, service and equipment changes in the future with minimized impact to Utility infrastructure and to the Facility, including downtime; and

3.3.4.5 Use digital signage to help people find and explain current events in spaces with changing purpose and function.

3.4 Healing Environment

3.4.1 Project Co will design the Facility to:

3.4.1.1 Enable the Authority to provide Person- and Family-Centred Care;

3.4.1.2 Provide a safe, healing and wellness-promoting environment for Patients and their families. The environment will be welcoming for the community of users and provide non-Clinical Spaces for relaxation and stress reduction;

3.4.1.3 Promote cultural safety, reconciliation, healing and wellness for Indigenous Patients and their families, in fulfillment of FHA's Declaration of Commitment to Cultural Safety and Humility;

3.4.1.4 Provide Patients with control over their environment by giving them access to information, navigational tools, and environmental preferences through the use of technology;

3.4.1.5 Include elements that have been proven to create a therapeutic and low-stress environment;

3.4.1.6 Create a comfortable, functional environment for Staff, Patients and visitors by including features designed to support Patients of all ages and their families;

3.4.1.7 Include design elements that create acoustical comfort, minimize annoyance from noise-producing sources, maximize natural daylight, provide high-quality lighting and lighting control, and use natural materials, colours and lighting colour ranges that are therapeutic;

3.4.1.8 Comprise healthy interiors that reduce Patient, Staff and visitor exposure to chemicals of concern, that is, those products for which there is credible evidence showing that chemicals off-gas or migrate out from the finished product and become airborne; and

3.4.1.9 Include design elements that maximize human connection to the outdoors, interaction with nature and views of the exterior environment, including:

3.4.1.9(1) utilizing view corridors;

3.4.1.9(2) situating the Facility to benefit from views of public spaces and natural and landscaped views; and

3.4.1.9(3) minimizing negative visuals such as views to parkades or parking lots, blocked views, and unwanted shadows.

3.5 Standardization

3.5.1 Project Co will apply principles of standardization in the Design and Construction of the Facility, including the following:

3.5.1.1 Room configurations will allow for flexibility in use over time;

3.5.1.2 Recurrent Rooms will feature entry points, sinks or other plumbing fixtures, medical gases, Millwork, ceiling lifts, controls, and electrical and communication services positioned similarly;

3.5.1.3 Recurrent Rooms, service spaces and pathways will be stacked vertically, including electrical rooms, mechanical shafts, Communication Rooms, soiled holding areas, and food services to achieve service core efficiencies;

3.5.1.4 Recurrent Rooms will be same-handed wherever possible;

3.5.1.5 Variations in standardization will not impact clinical operations; and

3.5.1.6 Mirrored room layouts will be considered standardized for all Patient rooms.

3.5.2 By implementing the principles of standardization, Authority will:

3.5.2.1 Promote Patient and Staff familiarity with the layout, design, and systems between areas and from floor-to-floor; and

3.5.2.2 Promote a reduction or minimization of Patient injuries and Staff errors.

3.6 Sustainability

3.6.1 In addition to obtaining LEED Gold certification for the Phase 1A, Project Co will:

3.6.1.1 Design the Facility by employing system thinking and applying design methods, building materials, operational practices, energy, climate and life cycle considerations that promote environmental quality, social and health benefits and economic vitality throughout the Construction including by minimizing the Authority's operating costs (for example, in relation to Utilities);

3.6.1.2 Implement best practices around health facilities' sustainability and resilience, which by extension impact health service delivery and ultimately human health and wellness; and

3.6.1.3 Ensure the long-term relevance and suitability of all visual and written communications encountered on the BH Campus. Do not use visual, communicative or stylistic elements including graphics or written language or other communications on signs, artworks, installations or other elements that will obviously date themselves or otherwise become irrelevant over time.

3.6.2 Project Co will design the Facility to:

3.6.2.1 Give priority to efficient use of resources, protection of health and indoor environmental quality;

3.6.2.2 Take advantage of efficiencies and innovations through integration of systems, and scheduling of climate resilience measures in accordance with Facility half-life and full-life, to minimize operational costs and staffing requirements for the Authority (for example in relation to Utilities);

3.6.2.3 Employ low exergy design such as applying a Thermal Gradient Header approach;

3.6.2.4 Take advantage of alternative sources of energy such as passive solar, and on site power generation and opportunities for recovering waste heat;

3.6.2.5 Apply a total systems approach to minimize energy consumption and incorporate energy consumption management techniques that are targeted to stabilize and optimize energy flows; and

3.6.2.6 Materials on the interior of the Facility will be vetted for human health impact and the selection of materials will be the 'best in class' based on this criteria.

3.6.3 Project Co will achieve the following mandatory LEED credits/points:

3.6.3.1 Water Metering;

3.6.3.2 Enhanced Commissioning (6 points - MBCx + Envelope Cx);

3.6.3.3 Advanced Energy Metering;

3.6.3.4 Building Life-Cycle Impact Reduction - Option 4. Whole-Building Life-Cycle Assessment (2 - 4 points);

3.6.3.5 Building Product Disclosure and Optimization - Material Ingredients (at least 1 point);

3.6.3.6 Construction and Demolition Waste Management (2 points).

3.6.3.7 Low-Emitting Materials (3 points);

3.6.3.8 Construction Indoor Air Quality Management Plan;

3.6.3.9 Pilot: IPpc98 Assessment and Planning for Resilience; and

3.6.3.10 Pilot: Designing with Nature, Biophilic Design for the Indoor Environment.

3.6.4 LEED Innovation Credit IPpc98: Assessment and Planning for Resilience, Option 1. Project Co will complete the hazard assessment, climate risk management analysis and design brief for Phase 1A the New Tower.

3.6.5 Project Co will achieve at least 15 points from at least 14 of the following LEED credits. Project Co is permitted to select a specific number of credits from the list below to achieve the minimum points. Project Co is not permitted to use extra points for Regional Priority to achieve the minimum 15 point threshold.

3.6.5.1 Rainwater Management;

3.6.5.2 Light Pollution Reduction;

3.6.5.3 Places of Respite;

3.6.5.4 Outdoor Water Use Reduction;

3.6.5.5 Cooling Tower Water Use;

3.6.5.6 Renewable Energy Production;

3.6.5.7 Building Product Disclosure and Optimization - Environmental Product Declarations;

3.6.5.8 Building Product Disclosure and Optimization - Sourcing of Raw Materials;

3.6.5.9 PBT Source Reduction Mercury;

3.6.5.10 PBT Source Reduction - Lead, Cadmium, and Copper;

3.6.5.11 Design for Flexibility;

3.6.5.12 Thermal Comfort;

3.6.5.13 Interior Lighting;

3.6.5.14 Daylight;

3.6.5.15 Enhanced Indoor Air Quality Strategies;

3.6.5.16 Indoor Air Quality Assessment;

3.6.5.17 Quality Views; and

3.6.5.18 Acoustic Performance.

3.6.6 Project Co "will not include any credits options that 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 credits options that require any action by the Authority, the Authority will take reasonable steps, consistent with the nature of the Facility, to cooperate with Project Co 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.

3.6.7 The following LEED credit points are not permitted for the Project**:**

3.6.7.1 Water Efficiency Credit – Outdoor Water Use Reduction: Option 1 is not permitted. A permanent irrigation system is required for this Project. Any approach towards achieving this credit must use Option 2, and will include a permanent irrigation system for all vegetated area;

3.6.7.2 Energy and Atmosphere Credit – Green Power and Carbon Offsets.

3.6.8 Use the standards and guidelines listed in Section 2.3 Standards as references in undertaking the sustainable Design and Construction initiatives.

3.7 Climate Resilience

3.7.1 Climate resilience guiding principles:

3.7.1.1 This section will be read in conjunction with the following sections, sub-sections and schedules: 3.7.2 Design Life Table, 3.6.4 LEED Innovation Credit IPpc98: Assessment and Planning for Resilience; Appendix 2D [Energy and Carbon Guarantees], in particular energy modeling with future weather files requirements; 7.1 Mechanical Systems Design Principles.

3.7.1.2 Data and information sources for priority climate hazards and future projections data include at minimum: Moving Toward Climate Resilient Health Facilities for Fraser Health: Technical Briefing 2019; Preliminary Climate Risk & Resilience Assessment Workshop Report for Burnaby Hospital; and, Burnaby Hospital Climate Hazard Reference Document Summary. Information sources for Climate Risk & Resilience Assessment methodology include at minimum: ICLEI BARC (Building Adaptive and Resilient Communities); Climate Lens (Infrastructure Canada); ISO 14091 Adaptation to Climate Change; and, NYC Climate Resiliency Design Guidelines 2019.

3.7.1.3 Future climate projections for priority hazards will inform the design, development and renewal strategies of the Facility, buildings (including orientation, exposure and materials selection), critical Building Systems and their associated components, through to end life.

3.7.1.4 Priority hazards will be determined through a climate hazard exposure screen analysis.

3.7.1.5 Project Co will design and carry out a Climate Risk & Resilience Assessment Workshop in collaboration with the Authority. The purpose of the workshop is to (i) better understand climate vulnerability and risks; (ii) prioritize design strategies and adaptation pathways that reduce climate risks and increase resilience to facility end life; and, (iii) inform design. The workshop will be informed by, at minimum, the results and recommendations from the Burnaby Hospital Climate hazard Reference Document Summary; Preliminary Climate Risk and Resilience Assessment Workshop report; and LEED Innovation Credit IPpc98 Assessing and Planning for Resilience design brief. Project Co will submit a workshop report with assumptions, inputs, methodology, and outputs as specified by the Authority.

3.7.1.6 A section in the design and construction package will be dedicated to climate risks and resilience. This section will (i) list the Facility's, critical Building Systems, and their associated components that require modification to account for the increased variability, extremes, frequency, duration, and unpredictability of weather events associated with a changing climate to facility end-life; and, (ii) describe the following:

3.7.1.6(1) changes in temperature, precipitation and other climate variables identified as relevant in the climate hazard exposure analysis;

3.7.1.6(2) adjustments to design criteria, parameters and / or conditions as a result of the changes in climatic variables noted above;

3.7.1.6(3) the type and extent of design modifications to account for climate change to facility end life;

3.7.1.6(4) climate-related assumptions and risk thresholds that underpin; and

3.7.1.6(5) data and information sources used for proposed designs.

3.7.1.7 Exterior and interior designs will seek to achieve health and climate co-benefits by prioritizing green design strategies described in the following publications: Greening Blocks: Practical Design Interventions to Integrate Health and Climate Resilience Co-Benefits 2019; Green Infrastructure and Health Guide 2018; Healthy Built Environment Linkages Toolkit 2018; and, Climate 2050 Health and Well-Being Roadmap (Metro Vancouver).

3.7.1.8 Green infrastructure will be prioritized in landscape and pavement design to reduce extreme heat and flood hazard risks, in alignment with the following: City of

Burnaby's Environmental Sustainability Strategy 2016; and, Metro Vancouver's Design Guidebook: Maximizing Climate Adaptation Benefits with Trees 2016.

3.7.1.9 The Design Life is 60 years starting at the date of Substantial Completion. Table 3.7.2 indicates the Design Life, in years, of major building components and systems. The indicated timeframes are to be used as a guideline for quality.

3.7.2 Design Life Table

| Design Life Table | | |
|---|---|---|
| **CATEGORY** | **Major Components/Systems** | **Design Life Years** |
| SITE | Hardscaping | 20+ |
| | Landscaping | 15+ |
| | Site lighting | 20+ |
| | Exterior IP Video Surveillance/security | 15+ |
| | Exterior signage | 10+ |
| | Site furnishings | 10+ |
| STRUCTURE | Facility structure | 50+ |
| | Underground parking | 50+ |
| | Underground ductwork (aka CPPS) | 50+ |
| EXTERIOR BUILDING | Facility façade finish | 50+ |
| | Canopies/sun shades/balconies | 20+ |
| | Glazing systems | 30+ |
| | Roof finish | 30+ |
| | Eaves, soffits, fascia | 30+ |
| | Exterior door and hardware | 15+ |
| | Chimney and flues | 30+ |
| VERTICAL MOVEMENT | Elevator cable | 25+ |
| | Elevator | 25+ |
| | Elevator finishes | 15+ |
| INTERIOR FINISHES | Floor finishes | 10+ |
| | Ceiling finishes | 15+ |
| | Wall finishes | 7+ |
| | Wall protection | 10+ |
| | Interior door and hardware | 20+ |
| | Furnishings | 5+ |
| | Signage (interior) | 10+ |
| | Millwork (Casework/counters) | 15+ |
| | Millwork (Casework/counters - stainless steel) | 20+ |
| EQUIPMENT | OR equipment | 10+ |
| | Pneumatic tube | 18+ |
| | Equipment (other) | 5+ |
| ELECTRICAL | High voltage Switchgear and Service Entrance Equipment | 40+ |
| | Emergency Generator Set | 30+ |
| | Dry type transformers | 30+ |
| | Low voltage switchgear | 40+ |
| | Automatic transfer switch | 30+ |
| | UPS System | 20+ |
| | UPS System Batteries (Lithium Ion) | 10+ |
| | Power Distribution and lighting/receptacle Panels | 30+ |
| | Light fixtures and lighting control | 20+ |
| | Fire Alarm system | 30+ |
| COMMUNICATIONS | Nurse call system | 10+ |
| | IP Video Surveillance/security | 10+ |
| | Patient wandering system | 10+ |
| | Panic Duress | 10+ |
| | Access control system | 10+ |

| Design Life Table | | |
|---|---|---|
| **CATEGORY** | **Major Components/Systems** | **Design Life Years** |
| | Intrusion detection | 10+ |
| | Structured Cabling System | 25+ |
| | Multimedia Systems | 10+ |
| | Public Address System | 15+ |
| | Intercommunications System | 15+ |
| MECHANICAL | Heating Systems | 30+ |
| | Cooling Systems | 30+ |
| | Plumbing | 30+ |
| | Plumbing fixture | 15+ |
| | Air handling units and associated equipment | 30+ |
| | Medical gas systems | 25+ |
| | Major equipment | 35+ |

3.8 Technology

3.8.1 Project Co will design the Facility:

3.8.1.1 As a state-of-the-art health care facility that utilizes technology to improve the Patient and visitor experience, increases cost effectiveness, improves the physical working conditions for Staff, enables the achievement of clinical outcomes and workflow enhancements, integrates services, and achieves better health and security outcomes; and

3.8.1.2 On a technology foundation that is designed, engineered, and implemented to enable the Authority's vision for Person- and Family-Centred Care and clinical model as described in Appendix 3A [Clinical Specifications and Functional Space Requirements]. Key attributes to be built into the solution architecture will include:

3.8.1.2(1) Resiliency, redundancy, and high availability;

3.8.1.2(2) High-performance;

3.8.1.2(3) Scalability;

3.8.1.2(4) Security;

3.8.1.2(5) Adaptability; and

3.8.1.2(6) Interoperability.

3.9 Adaptability and Flexibility

3.9.1 Design and construct the Facility in accordance with the following principles;

3.9.1.1 The Facility will accommodate the rapid cycle of innovation and change to support development and implementation of new clinical and non-clinical work processes and technological change; and

3.9.1.2 The Facility will accommodate program, service and equipment changes in the future with minimized impact to Utility infrastructure and to the Facility, including downtime, ensuring that Clinical Spaces are acuity adaptable.

3.9.2 To support Future Expansion of Components, and of capacity as a whole, Project Co will:

3.9.2.1 Plan Components for future growth by providing floor zoning that allows for expansion of programs or services by, for example, locating administrative and other non-clinical functions adjacent to Clinical Spaces;

3.9.2.2 Provide a loose-fit Design to optimize functionality within a given floor area; and

3.9.2.3 Create multi-use adaptable spaces.

3.9.3 Provide infrastructure that incorporates excess systems capacity, includes systems and components that support Future Expansion with minimized disruption to daily operation and allows for upgrades in Authority technology or technological progression.

3.9.4 Provide infrastructure that minimizes the operational and life cycle costs to the Authority over the life cycle of the Facility.

3.10 Accessible Design

3.10.1 Project Co will incorporate the following philosophies in the Design to address barriers to equitable access to health care resulting from cultural and linguistic diversity, gender and gender diversity, and cognitive, functional and physical capability:

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 cognitive abilities;

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 can be 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, functional capabilities or physical ability.

3.11 Quality of Daylight

3.11.1 Recognizing the positive health benefits to Patients and Staff, Project Co will provide Quality Daylight for all spaces that require Direct Natural Light.

3.11.2 Provide windows and glazing that take into account the shape and the use of the room or space. Window sill height, header height, width and glazing will provide Quality Daylight that supports the activities within the specific type of room.

3.11.3 Windows and glazing that are exposed to sunlight and oriented to the south, east or west direction will be provided with means to control solar heat gain and glare.

3.11.4 The Facility will include lightwells, clerestory windows, concourses or equivalent type areas and devices as strategies for bringing Quality Daylight into the Facility and circulation areas.

3.11.5 Light shelves and interior finishes/treatments such as translucent interior glazing and/or transparent interior glazing with shading devices will be provided to facilitate bringing Quality Daylight into the Facility.

3.12 Infection Prevention and Control

3.12.1 Design the Facility to minimize the transmission of micro-organisms. Provide the necessary spaces to support routine infection prevention and control practices.

3.13 Use of Wood

3.13.1 Project Co will use wood as a featured material in both the interior and exterior of the Facility.

3.13.2 As contemplated by the *Wood First Act* (British Columbia), Project Co will incorporate wood products into the Design as permitted by Appendix 3J [Wood First Appropriate Use Matrix].

3.13.3 Only ultra-low-emitting-formaldehyde (ULEF) or no-added formaldehyde (NAF) resin is allowed in the following:

3.13.3.1 Furniture;

3.13.3.2 Composite wood products, laminating adhesives and resins; and

3.13.3.3 Thermal insulation.

3.13.4 Incorporate wood into design elements such as structural columns and beams in the Main Entrance and Public Services component, including the Main Entrance Lobby, exterior canopies and waiting areas.

3.13.5 The term “Alternative Solution” used in this section and in Appendix 3J [Wood First Appropriate Use Matrix] specifically refers to this term as described in the BCBC.

3.13.6 Use wood as a featured material in both the interior and exterior of the Facility. Wood will be used where indicated as “Appropriate” in Appendix 3J [Wood First Appropriate Use Matrix]. Wood will not be used where indicated as “Inappropriate”.

3.13.7 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/Communication Rooms, copings, cant strips, finish carpentry and architectural woodwork, including exterior fascia’s, cabinets, casework, which is included in Division 6), frames, paneling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required and permitted for wood products exposed to view in finished interior and exterior installations.

3.14 Healthy Buildings

3.14.1 Environmental Quality

3.14.1.1 Design the Facility so that Patients, families, visitors and Staff will experience BH and Facility as welcoming, safe, and compassionate, including by

3.14.1.1(1) ensuring that common destinations such as the Main Entrance Lobby will be easily accessible and welcoming to visitors, as they are often the locations where first impressions are made;

3.14.1.2 Create an interior design that aligns with the Authority's clinical strategies and service models and gives priority consideration to Person- and Family-Centred design, clinical and academic research and teaching, best practice infection control standards, safety for Patients, families, the public and Staff, LEAN techniques and LEED;

3.14.1.3 Include ergonomic design features throughout all spaces in the Facility that specifically facilitate the physical activities of Staff, and Patients, and of pediatric Patients in the Emergency Department, Maternal/Child Unit and Main Entrance Lobby, including appropriate Millwork, Modular Casework, Furniture, active workstations, lighting, lift devices, and Patient assist or equipment manoeuvring space;

3.14.1.4 Support the physical, psychological, spiritual, cultural and social health and well-being of the Facility’s occupants by providing a healing environment that includes elements that have been proven to create therapeutic, low-stress and comfortable functional environments for Patients, their families, and Staff that are:

3.14.1.4(1) Safe and secure, and be a backdrop for people of varying ages, abilities and cultures;

3.14.1.4(2) Designed to encourage Patients to arrange their space to suit their individual needs;

3.14.1.4(3) Reflective of FHA's commitment to reconciliation with Indigenous Patients, families and communities; and

3.14.1.4(4) Acknowledging of ethnic diversity.

3.14.1.5 Design the Facility to include environmentally responsible and resource-efficient building concepts in addition to integrating health, wellness, and the human experience, including by;

3.14.1.5(1) Creating sufficient opportunities for human-nature interaction, producing an environment that ties the landscape and interior environments together; and

3.14.1.5(2) Using natural materials, such as wood and stone, will be used as much as possible throughout public areas.

3.14.1.5(3) All natural materials used will be indigenous to the region.

3.14.1.6 Incorporate into the Design of the Facility a comprehensive and interdisciplinary approach to address the factors of the physical environment that impact the day-to-day health and productivity of the occupants and the interactions between those environmental factors, including by:

3.14.1.6(1) Designing spaces that leverage aesthetics, technology and the environment to ensure the wellbeing and comfort of Patients, families, and Staff;

3.14.1.6(2) Designing the Site and Facility to form a gradual continuum from public to private areas; and

3.14.1.6(3) Including an easily legible configuration for Facility circulation and an indoor Wayfinding and signage system that is simple, intuitive, and fully coordinated throughout the BH and the Facility.

3.14.1.7 Design the Facility to create an atmosphere that supports a healthy mental state by employing design elements that mediate between stress and anxiety, and address mental and emotional challenges or trauma, including by:

3.14.1.7(1) Minimizing the potentially intimidating nature of the typical institutional setting for Patients and visitors entering the BH Campus who may be disoriented or anxious and for younger Patients who may be overwhelmed by the experience;

3.14.1.7(2) Designing highly technical areas to be visually and acoustically isolated; and

3.14.1.7(3) Designing the environment so that Patients, visitors and Staff will perceive it as open and accessible rather than regimented and intimidating.

3.14.1.8 Design the Facility to significantly reduce the sources of physiological disruption, distraction and irritation to prevent stress and injury and on enhancing acoustic, ergonomic, olfactory and thermal comfort to improve overall comfort, productivity and well-being, including by:

3.14.1.8(1) Providing spaces that are sufficiently adaptable to working, concentration, collaboration and respite, as needed, and that enable individuals to adjust their environments and choose their degree of engagement with others;

3.14.1.8(2) Including features such as sound and music, colour, pattern, air quality, nature and views of nature, and art and aesthetic forms as means for creating an environment that supports and engages Patients and families, but does not negatively impact Staff safety or performance; and

3.14.1.9 Encompass in the Design of the Facility a wide range of concepts and applications that promote human health, including:

3.14.1.9(1) Construction practices;

3.14.1.9(2) Design features;

3.14.1.9(3) Healthy interiors;

3.14.1.9(4) VOC reduction;

3.14.1.9(5) Occupant engagement;

3.14.1.9(6) Personal control;

3.14.1.9(7) Indoor environmental quality;

3.14.1.9(8) Limited exterior noise intrusion;

3.14.1.9(9) Reduced interior noise disruption;

3.14.1.9(10) Speech privacy;

3.14.1.9(11) Daylighting;

3.14.1.9(12) Artificial lighting with quality colour rendering abilities;

3.14.1.9(13) Biophilic design;

3.14.1.9(14) Access to potable water;

3.14.1.9(15) Healthy dining options and mindful eating;

3.14.1.9(16) Visual and physical ergonomics;

3.14.1.9(17) Exercise in the workplace; and

3.14.1.9(18) Smoking and vaping restrictions.

3.14.2 Healthy Entrances

3.14.2.1 Occupants often track harmful contaminants indoors, including bacteria, heavy metals and lawn and agricultural pesticides, among other toxins. In addition, as occupants walk through entry doors, potentially polluted air can enter the Facility. Both of these modes of introducing outdoor pollutants to the indoor environment highlight the need for measures, including the installation of appropriate materials, which minimize or prevent the introduction of potentially harmful substances into indoor spaces.

3.14.2.2 Provide permanent recessed entrance mat systems with floor drains to capture particulates from occupant shoes at all entrances and exits the Facility including at all outdoor patio spaces to minimize the introduction of pollutants into indoor air at Facility entrances.

3.14.2.3 Permanent recessed entrance mat systems with floor drains will be comprised of grilles, grates or slots, which allow for easy cleaning underneath, at least the width of the entrance.

3.14.3 Drinking Water Requirements

3.14.3.1 It is important to promote the consumption of water by making high quality drinking water easily accessible to occupants.

3.14.3.1(1) Provide filtered, chilled water bottle filler stations with integrated water collection connected to sanitary drain at minimum in the following areas:

3.14.3.1(1)(a) A minimum of three (3) per floor within regularly occupied floor space, distributed such that they are not adjacent to Nourishment Stations that have water dispensers;

3.14.3.1(1)(b) I4 - Main Entrance Lobby; and

3.14.3.1(1)(c) At the locations required in Appendix 3A [Clinical Specifications) and Functional Space Requirements] and/or Appendix 3B [Minimum Room Requirements]

3.14.4 Interior Fitness Circulation

3.14.4.1 Provide easily accessible, safe, and visually appealing stairs, entryways, and corridors to encourage intermittent bouts of physical activity and reduce sedentary behaviour.

3.14.4.2 Exit and Convenience Stair Access

3.14.4.2(1) Include a minimum of one set of stairs meeting the requirements of Section 5.1.1.1(1)(d).

3.14.4.3 Stair Location

3.14.4.3(1) Locate stairs that can be accessed by the public in an area that is equally as prominent as or more prominent than elevators.

3.14.4.3(2) Ensure stairs are clearly visible from the Main Entrance Lobby or located so as to be seen before any elevators are visible upon entry into the Main Entrance Lobby.

3.14.4.4 Stair Design

3.14.4.4(1) Implement active design strategies in the stair design such as:

3.14.4.4(1)(a) Posting motivational signs;

3.14.4.4(1)(b) Installing creative lighting;

3.14.4.4(1)(c) Installing integrated artwork;

3.14.4.4(1)(d) Painting walls with bright colours;

3.14.4.4(1)(e) Incorporating biophilic elements;

3.14.4.4(1)(f) Providing daylighting using windows; and

3.14.4.4(1)(g) Providing view windows to the outdoors or between spaces within the Facility.

3.14.4.5 Stair Signage

3.14.4.5(1) Present Wayfinding signage and point-of-decision prompts throughout the Facility to encourage stair use (at least one sign per elevator bank).

3.14.4.5(2) For enclosed stairwells, provide stairwell signage on the wall adjacent to the stairwell door on both sides, and on an overhead signage element projecting perpendicularly into the corridor.

3.14.4.5(3) Refer to Appendix 3I [Wayfinding Standards for Burnaby Hospital] for additional guidance regarding stairwell signage.

3.14.4.6 Stair Visibility for Public Use

3.14.4.6(1) Increase visibility of non-exit stairs by implementing the following strategies:

3.14.4.6(1)(a) Unenclosed stairs with full-height guardrails;

3.14.4.6(1)(b) Use of glass partitions for stair enclosure; and

3.14.4.6(1)(c) Maximized glazing in stair doors.

3.14.5 Design Aesthetic

3.14.5.1 The incorporation of aesthetically pleasing design elements and artwork into a space can bring a measure of comfort or joy to the occupants, add complexity to the visual field and create a calming environment with the potential to improve occupant mood.

3.14.5.2 To create spaces that are unique and culturally rich, Project Co must include features in the Project that are intended to foster:

3.14.5.2(1) Human delight;

3.14.5.2(2) Celebration of culture, including history and identity;

3.14.5.2(3) Celebration of spirit and humanity;

3.14.5.2(4) Celebration of place;

3.14.5.2(5) Celebration of the Authority's vision of compassion, social justice, innovation and care; and

3.14.5.2(6) Meaningful integration of public art.

3.14.5.3 Project Co will coordinate signage and Wayfinding assets, as well as all other wall devices, such as panic duress, intercoms, around artworks and ensure that they do not visually compete.

3.14.6 Connection with Natural Surroundings

3.14.6.1 Project Co will design the Facility to provide views and images of nature in support of the Authority's intention to help speed healing and recovery time, boost positive feelings and reduce negative ones.

3.14.6.2 Project Co will incorporate design elements into the Facility to nurture the innate human-nature connection with the Project, as follows:

3.14.6.2(1) Provide environmental design elements, lighting and space layouts that incorporate nature into the Project;

3.14.6.2(2) Provide design elements that create place-based relationships to uniquely connect people to the climate, culture and identity of place;

3.14.6.2(3) Incorporate minimally processed materials and elements from nature into the Project to reflect the local ecology or geology to create a distinct sense of place;

3.14.6.2(4) Provide nature-inspired design elements that enhance the experience of connection to nature through greater diversity and frequency of exposure, as follows:

3.14.6.2(4)(a) Use nature's patterns and forms to create a visually preferred environment that enhances cognitive performance while helping to reduce stress;

3.14.6.2(4)(b) Generate such forms and patterns as symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature; and

3.14.6.2(4)(c) Avoid the overuse of forms and patterns that may lead to visual toxicity.

3.14.6.2(5) Provides opportunities as part of the Design for human-nature Patient interactions within the Facility and external to the Facility within BH.

3.15 Education and Learning

3.15.1 Project Co will design the Education and Learning Component to accommodate the requirements of UBC and other learning providers as described in this Schedule and Appendix 3A [Clinical Specifications and Functional Space Requirements], Appendix 3B [Minimum Room Requirements], and Appendix 3S [UBC Requirements].

## PART 4. SITE DEVELOPMENT REQUIREMENTS

4.1 General Requirements

4.1.1 Project Co will perform an overall site planning analysis to understand the Site context and opportunity and provide a Design which is well integrated with the surrounding street and Utility network.

4.1.2 While a prototype approach to the Design for a health care facility is desirable, tailoring prototypes to the specifics of an existing site is critical for the success of the Design. Accordingly, Project Co will adapt any desirable prototypes to all existing Site constraints, infrastructure, and unique context.

4.1.3 Project Co will Design the Facility as an integrated part of BH and accordingly:

4.1.3.1 Facilitate the delivery of clinical and non-clinical support services across BH through the provision of efficient physical links to the Existing Hospital;

4.1.3.2 Provide for all occupant loading, exiting and fire separation requirements;

4.1.3.3 Integrate effectively with BH communication and Life Safety Systems;

4.1.3.4 Account for the existing topography of BH and locate entrances and access point to minimise slopes and promote accessibility;

4.1.3.5 Account for the existing public transit routes around BH and do not negatively impact existing access;

4.1.3.6 Provide a distinctive architectural character, reflecting the Authority's values and role as a regional and provincial tertiary and quaternary health care centre; and

4.1.3.7 Support community access and include a highly visible Main Entrance Area and lobby accessible from Kincaid Street designed with high profile architectural scale and features. The Main Entrance Area will be a landmark that intuitively draws visitors from a distance with architectural clues, landscaping, lighting and signage.

4.1.4 Project Co will:

4.1.4.1 Account for the existing topography of BH and locate entrances and access points to minimize slopes and promote accessibility;

4.1.4.2 Integrate the Design such that it responds to existing public transit routes around the Site and promotes access for those using public transportation systems;

4.1.4.3 Support community access and include a highly visible entry point into the Main Entrance Lobby directly accessible from Kincaid Street and the parkade and designed with high profile architectural scale and features; and

4.1.4.4 Include the needs of FMO in the Design and placement of site services including ease of access and maintenance.

4.2 Site Preparation, Pre Construction and Post Construction Demolition

4.2.1 Project Co will be responsible for contaminants disclosed in or reasonably inferred from the reports, in or under BH and affected by or impacted by the Design and Construction.

4.2.2 Project Co will be responsible for assessing and confirming the presence of any suspected contaminants on, in or under the Site prior to proceeding with any Design and Construction and any failure to do so is at Project Co's risk including: asbestos, lead paint, PCB's, silica, vermiculite and mercury.

4.2.3 Demolition includes removal of all materials, authorized by the Authority for disposal, from BH required to construct the Facility, including interim or temporary structures foundations, Utilities, Utility poles, transformers, underground tanks, slabs, pits, sumps, pipes, cables, extra-low voltage systems, conductors, concrete encasements, ducts, walls, fencing, railings, stairways, lamp standards, curbing, asphalt, sidewalks, wheel stops, vault signs, landscape, waste excavation, clearing, grubbing, pavement markings, and all other above ground or sub-surface material, prior to constructing the Facility. All redundant systems, cables, wiring, conduits and supporting systems will be removed.

4.2.4 Project Co will be responsible for ensuring the integrity of all existing systems during demolition and for existing systems to remain operational following demolition. Any physical infrastructure that will be compromised by demolition will be relocated prior to demolition.

4.2.5 Demolition includes disconnecting Utilities and removing back to source. All services will be removed back to the source or nearest junction location as determined in consultation with the Authority through the Review Procedure.

4.2.6 Demolition landfill tipping fees will be at Project Co's expense.

4.2.7 Project Co will consult with the Authority through the Review Procedure regarding equipment to be disposed or to be retained and handed over to the Authority.

4.2.8 Project Co will be responsible for all costs associated with equipment decommissioning and disposal.

4.2.9 Demolition of the Power Plant will include removal of incoming BC Hydro power supply. Project Co will coordinate the shutdown and removal of all electrical Utility services with BC Hydro.

4.2.10 Project Co will be responsible for completing the circulation path at all link connections between the Facility and Existing Hospital; including extending the link to nearest existing circulation corridor.

4.2.11 Project Co will Make Good the Existing Hospital at all link connections.

4.2.12 Project Co will not create dead-end corridor conditions or cause the Authority to incur any cost in completing functional link connections to the Existing Hospital.

4.2.13 Project Co will be responsible for any required modifications to existing exterior walls including infill of existing windows which meet all requirements of Schedule 3 [Design and Construction Specifications].

4.2.14 Project Co's demarcation walls that separate the Facility Construction Site from Existing Hospital will be designed so that the demolition and Construction activities will not interfere with the continuous operation of BH including buildings, roads and services.

4.2.15 Project Co will obtain City and other Governmental Authority approvals required to undertake any demolition.

4.2.15.1 Prior to commencing and demolition or Construction, prepare and implement in cooperation with the Authority, a construction fire safety plan, which describes emergency access routes to and from the Facility and BH during an emergency. Update the fire safety plan as required for the duration of the Project.

4.2.16 Project Co will make provisions to ensure that affected areas of the Existing Hospital are weather-proof during and after demolition and for the duration of Construction of the Facility.

4.2.17 Project Co will terminate existing surfaces at structures to be demolished along straight lines at natural divisions determined in consultation with the Authority through the Review Procedure. Cut existing surfaces so that a smooth transition with the Facility will result. Make Good all surfaces and structures, close off all underground tunnels and passageways as determined in consultation with the Authority through the Review Procedure.

4.2.18 Project Co will conform to applicable codes for demolition of structures and provide for the safety of adjacent structures, the election and maintenance of temporary barriers and security devices, dust control, runoff control and disposal of materials.

4.2.19 Relocate existing aluminum flag pole and provide new concrete base. Provide one 20A GFCI duplex receptacle with weatherproof cover and box adjacent to new flag pole location.

4.2.20 Project Co will ensure that tree and shrub preservation and protection measures are in place prior to commencement of the demolition phase.

4.2.21 Project Co will pre-locate all known utilities within the Site prior to Construction.

4.2.22 Temporary Works

4.2.22.1 During the demolition and Construction Period, Project Co will:

4.2.22.1(1) Have the sole responsibility for the Design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and the Design and execution of construction methods required in their use;

4.2.22.1(2) Provide its own services necessary for Project Co's Construction use including; power, telephone, internet, wireless communications, water and sewage, and will not connect directly to the Existing Hospital or infrastructure except with the Authority's prior approval through the Review Procedure;

4.2.22.1(3) Provide scaffolding on the exterior of the Facility to eliminate the need for sub-trades using temporary measures such as boom lifts, while maintaining privacy to the patient rooms in the Nursing Tower; and

4.2.22.1(4) Provide sufficient construction lighting in all areas of the construction site during all phases to eliminate the need for temporary portable lights by the sub-trades. Provide heating and ventilation of the Facility spaces during construction.

4.2.22.2 During the demolition and Construction Period Project Co will provide a temporary access to Level E of the existing parkade from Kincaid Street for public and Staff access.

4.2.22.2(1) Project Co will obtain City and other Governmental Authority approvals required.

4.2.22.3 Project Co will maintain a well-lit direct public access from the parkade to the registration area on Level 1 of the Support Facilities Building at all times during demolition and Construction.

4.2.22.4 Project Co will maintain staff access to level 0 of the Nursing Tower from level B of the existing parkade.

4.2.22.5 Project Co will be responsible for ensuring that fire safety will be active and in force at all times during demolition and Construction.

4.2.22.6 Project Co will engage a registered hygienist, who is experienced in industrial hygiene, to anticipate, recognize, evaluate, and monitor environmental conditions relating to the demolition, Construction and compliance to workplace safety and infection prevention and control standards that may cause injury, illness or infectious outbreak at the Site or Existing Hospital.

4.2.22.7 Project Co will have its industrial hygienist advise and report to Project Co and the Authority regarding environmental conditions, including air quality, and risks to Patients, particularly immune-compromised. Project Co will have its industrial hygienist conduct regular monitoring and make recommendations regarding risk mitigation and risk remediation, and Project Co will comply with all such recommendations.

4.2.22.8 Project Co will comply with CSA Z317.13 (Infection Control during Construction, Renovation or Maintenance of Health Care Facilities), at all times during the demolition and Construction Period. Project Co will have a trained IPC person on

staff at the Site during normal business hours. Training will include at a minimum CSA group "Fundamentals of Infection Control During Construction, Renovation and Maintenance of Health Care Facilities" and "Effective Implementation and Practical Amplifications During Construction, Renovation and Maintenance of Healthcare Facilities". Provide proof of training to the Authority.

4.2.22.9 Project Co will provide dust control at all times which includes:

4.2.22.9(1) Spraying the work area with water once demolition of structure begins and maintaining constant misting during all work periods., while ensuring misting operation does not create a legionella risk;

4.2.22.9(2) Managing water runoff through BH;

4.2.22.9(2)(a) Sumner Creek and its tributaries are considered salmon supporting habitat and may come under Department of Fisheries and Oceans jurisdiction.

4.2.22.9(2)(b) Project Co will be responsible for all costs associated with complying with all regulations of AHJ's regarding protection of the fisheries habitat.

4.2.22.9(3) Protecting all storm drains continuously throughout demolition and Construction; and

4.2.22.9(4) Installing appropriate environmental sediment control measures as approved by the City and by the Department of Fisheries and Oceans.

4.2.22.10 Project Co will provide overhead protection from falling debris as determined in consultation with the Authority through the Review Procedure.

4.2.22.11 Project Co will provide minimum 2.4m high, non-climbable perimeter hoarding and safety walls to ensure safety and protection of people and objects of the work area. Provide vision access ports in the hoarding for viewing of the Site from outside the hoarding.

4.2.22.12 Project Co will never leave demolition and demolition equipment in precarious, unsafe or hazardous condition at any time, nor leave demolition material restricting access at the end of the work day.

4.2.22.13 Project Co will coordinate the demolition schedule with the Authority's construction activities at the Existing Hospital.

4.2.22.14 Project Co will conform to applicable regulatory procedures, including WSBC requirements, during all phases of the demolition and when discovering hazardous materials or contaminants.

4.2.22.15 If any buried tanks or pipes are discovered, Project Co will have surrounding soils tested for contamination. Refer to the Stage 2 Preliminary Site Investigation Report.

4.2.22.16 Project Co will provide required LEED® documentation for all disposal and recycled content.

4.2.22.17 Project Co will accurately record actual locations of capped Utilities, subsurface obstructions and/or conditions, and indicate them on the as built drawings.

4.2.22.18 In addition to any demolition permit requirements of the City, Project Co will submit to the Authority a report by a qualified pest control company certifying that all buildings and structures to be demolished have been inspected for infestation. If any were found, demonstrate that measures have been taken and the infestations have been removed.

4.2.22.19 In accordance with the shutdown procedures in Section 2.8 Project Co will submit FMO via the Authority a shutdown form and Work Plan for approval in advance of shutting down any Utility source that may impact the Existing Hospital.

4.3 Urban Design and Site Development

4.3.1 Project Co will:

4.3.1.1 Minimize the impact the Facility has on adjacent neighbours and land uses. Preserve visual privacy and sunlight for adjacent properties and buildings and include features that will give the Facility an identity consistent with its overall urban context. Except to the extent expressly permitted as part of a Work Plan the Construction will be carried out so as to preserve the continuous uninterrupted 24 hour operation of the Burnaby Hospital;

4.3.1.2 Consider the micro-climatic effects arising from the location and configuration of parking, walkways and buildings on BH, including effects of Facility entrance orientation on Patient, Staff and visitor comfort and safety. Consider the existing slope across BH and its impact on BH circulation, Facility location and configuration;

4.3.1.3 Articulate the exterior of the Facility to create an architecturally interesting and refined structure. Consider emphasizing the modular requirements of the program in the massing and materials to achieve articulation, visual interest, and human scale;

4.3.1.4 Reinforce the physical relation of the buildings on BH and create a legible BH layout and pattern to foster a strong sense of place and identity, and to ease vehicular and pedestrian movement into the Site;

4.3.1.5 Provide site Furniture and pedestrian scale lighting to complement the surrounding urban environment;

4.3.1.6 Mitigate the nearby noise from adjacent roadways and Facility building equipment through the use of appropriate exterior glazing and other acoustic screening;

4.3.1.7 Design refuse and recycling areas so they are architecturally screened and cannot be viewed from the surrounding buildings or neighbouring areas; and

4.3.1.8 Incorporate sustainable measures such as integrated landscaping, drainage swales, and low impact development (LID) and green infrastructure strategies to decrease storm water run-off.

4.3.2 General Site Access

4.3.2.1 Project Co will

4.3.2.1(1) Provide a Design that contributes to an urban, pedestrian-orientated BH environment by creating fine-grained road/pedestrian/open space network that contributes to smaller, human-scaled spaces and increased access/permeability to the Site. Confirm and illustrate that all road and pedestrian routes are accessible to Persons with Disabilities;

4.3.2.1(2) Design the maximum access to BH. Provide separate and distinct passenger-side lay-by stall drop-off and pick-up areas. All drop-off and pick-up areas will be covered with canopies that extend a minimum 300mm beyond the curb edge to provide shelter for Staff and visitors getting in and out of vehicles, including HandyDART, Patient Transfer Network (PTN) and shuttle. Provide protection from inclement weather along the entire length of the drop-off and pick-up area. The drop-off and pick-up areas will be accessible and provide Close Access and direct adjacency to minimise the travel distance between vehicles to the Main Entrance;

4.3.2.1(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 Entrance Area of the Facility;

4.3.2.1(4) Include weather protected waiting space and benches for seated, in-wheelchair and standing users near entrances, drop-off and pick-up areas located as determined in consultation with the Authority through the Review Procedure;

4.3.2.1(5) Provide safe pedestrian refuge spaces behind sidewalk wheelchair ramps;

4.3.2.1(6) Provide vehicular site access during construction, including access to the existing parking garage structure and loading dock and delivery area;

4.3.2.1(7) Ensure that there is no reduction in the overall number of parking stalls, at any time during the construction; and

4.3.2.1(8) Provide for certified traffic control personnel and signage as may be needed from time to time during construction.

4.3.2.2 Public Realm and Open Space

4.3.2.2(1) Undertake the Design and Construction of the Facility with consideration for the legibility, quality and consistency of the overall treatment of the public realm, including public space, pedestrian corridors and streets, to achieve the urban design objective for a unified and attractive built environment. Provide a thoughtful integration with BH;

4.3.2.2(2) Create meaningful open spaces, both urban and natural, for the benefit of visitors and Staff which provide opportunities for recreation and healing and contribute to a cohesive, healthy community, capitalize on opportunities for outdoor areas of respite and repose to aid in providing a healing environment; and

4.3.2.2(3) Provide a Design that responds to CPTED principles having particular regard for theft, mischief and vandalism.

4.3.3 Pedestrian and Vehicular Connections

4.3.3.1 Project Co will:

4.3.3.1(1) Create a high-quality, vibrant, pedestrian-friendly environment, that includes connecting the pedestrian sidewalks and bicycle pathways to existing sidewalks and pathways adjacent to the Site, and use signage to help connect exterior and interior pathways;

4.3.3.1(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;

4.3.3.1(3) Integrate vehicular circulation with layout of pedestrian walkways and bicycle pathway to provide visible connections, promote safe travel, and to minimize conflict between vehicles and other modes of travel. A physically distinct bicycle pathway is not required refer clause 8.2.5.1(8);

4.3.3.1(4) Use signage to clearly distinguish between pedestrian and cycle-specific routes and lanes. Design the driveways and layby aisles to provide connections between the surrounding roads and the Facility entrances including the Main Entrance Lobby;

4.3.3.1(5) Design vehicular service entrances so that they are integrated into the Facility design with minimal visual impact;

4.3.3.1(6) 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 concrete, for example);

4.3.3.1(7) Provide safe and rolling access for the mobility impaired (including people with strollers) by providing paths of travel minimum 3.0 m wide to allow for two people walking side by side and someone passing and for wheelchairs or scooters;

4.3.3.1(8) Provide curb let-downs in appropriate locations to facilitate convenient and Direct Access for Persons with Disabilities. Align curb-let-downs to pedestrian crossings and to the Facility entrances;

4.3.3.1(9) Provide safe pedestrian refuge spaces behind all sidewalk wheelchair ramps;

4.3.3.1(10) Provide clear, direct pedestrian routes that are unimpeded by parked or moving vehicles;

4.3.3.1(11) Provide traffic calming measures including curb bulges and raised crosswalks to minimize roadway pavement width at pedestrian crosswalks; and

4.3.3.1(12) Provide roll curbs at all drop off areas. All curbs are to be highlighted with appropriate traffic rated paint.

4.3.3.2 Sidewalks and 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.

4.3.3.3 All walkways and other paved areas will have positive drainage to shed rainwater quickly to a storm drainage facility.

4.3.3.4 Flooding/ponding are not permitted onsite except in designated storm water detention facilities designed with an overflow to a storm system with adequate capacity.

4.3.4 Site Wayfinding and Exterior Signage

4.3.4.1 Overriding Principles

4.3.4.1(1) Provide Wayfinding to meet the requirements of the Authority's Wayfinding and signage standards in Appendix 3I [Wayfinding Standards for Burnaby Hospital].

4.3.4.1(2) Provide illuminated exterior signage for both Phase 1A and Phase 1B, with a minimum lettering height of 450 mm.

4.3.4.1(3) Design Wayfinding signage to direct all Facility Users by way of clearly configured and easily understood lettering, colour schemes, and/or graphic pictograms. Provide well labelled directories, digital-interactive and/or non-digital as directed by the Authority, to help identify traffic corridors, Facility and Component 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 BH components such as street names, parking lots and north arrows help to orient the user.

4.3.4.1(4) Design Wayfinding signage that is flexible and economically changeable as departments or Components will evolve and change throughout the life of the Facility. Digital wayfinding phone application are to be integrated with site navigation at locations determined by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.3.4.1(5) Provide signage that is integrated with existing signage, including updating main directories and directional signage as departments move location.

4.3.4.1(6) Provide signage Permits from the City on behalf of the Authority.

4.3.4.2 Project Co will:

4.3.4.2(1) 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 BH 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. Utilize paving patterns which can easily be differentiated from vehicle paving by pedestrians where they cross vehicular traffic;

4.3.4.2(2) Provide visually connected pathways and integrated outdoor amenity areas with required signage;

4.3.4.2(3) Provide external directional signage that:

4.3.4.2(3)(a) Clearly indicates points of access for the public, including the Main Entrance, main entrance drop-off area, parking areas and restrictions for various vehicle types and restrictions to ‘after-hours’ access;

4.3.4.2(3)(b) Is easily understandable by Patients and families using it to access BH for the first time;

4.3.4.2(3)(c) Clearly indicates the entry points to BH access points for public parking, lay-by drop-off locations, entry points to BH buildings and where there are multiple entrances, signs clearly identify which entrances are for which purpose, any restrictions for both entry and/or parking for various vehicle types and any after-hours limitations;

4.3.4.2(3)(d) Is well-illuminated, backlit, reflective and high contrast and easily visible at night;

4.3.4.2(3)(e) Minimizes light spillage;

4.3.4.2(3)(f) Uses universal symbols and standard colours for parking signage in consultation with the Authority's contracted provider;

4.3.4.2(3)(g) Uses the Authority's graphic standard for all FHA logo placement; and

4.3.4.2(3)(h) Resists wind loads as required by BCBC.

4.3.4.2(4) Provide all necessary exterior illuminated signage along Kincaid Street identifying the Facility and the Existing Hospital on BH, and access points. Signage will be legible for drivers at an adequate distance that they can safely slow down and enter BH for drop-off, pick-up and parking areas;

4.3.4.2(5) Provide all commercially made temporary Site signage required prior to and during each phase of Construction to notify public and Staff regarding the following:

4.3.4.2(5)(a) Vehicles – public, service and Staff vehicle route changes.

4.3.4.2(5)(b) Bicycles – public, service and Staff route changes and additional storage areas;

4.3.4.2(5)(c) Walkway, sidewalks – public and Staff closure, alternate route locations, access.

4.3.4.2(5)(d) Site and Facility access/egress – temporary closure of access or egress from any of the buildings on BH.

4.3.4.2(5)(e) Hours of closure – temporary hour changes.

4.3.4.2(5)(f) Relocated parking, drop-offs/pick-ups – temporary relocation of parking, drop-off pick-up stalls for public, taxi, ambulance, etc.

4.3.4.2(6) Supplement entry signs with free standing signage structures intended for pedestrian use, located to provide overall direction within the Site.

4.3.4.2(7) Overall parking signage is required to follow consistent design intent for the Site.

4.3.4.2(8) Site Access for Persons with Disabilities and Elderly Populations

4.3.4.2(8)(a) Project Co is to ensure that:

4.3.4.2.8.(a).1 The primary pedestrian systems, public open spaces, primary private walkways and principal entrances to the Facility will be accessible to Persons with Disabilities. The Design will comply with the publication Code Plus, Physical Design Components for an Elder Friendly Hospital;

4.3.4.2.8.(a).2 Drop off and pick up points will have manoeuvrability space for assistive equipment, including mobility aids;

4.3.4.2.8.(a).3 Access, egress routes, entrances and all exterior courtyards, gardens, patios or similar outdoor amenity spaces will be accessible to Persons with Disabilities and persons requiring assistive mobility equipment or using strollers; and

4.3.4.2.8.(a).4 Signage, markers, or other levels of Wayfinding will be used along access routes to indicate to Persons with Disabilities and the physically challenged the route terminus points or any required route changes to ensure Universal Design throughout BH.

4.3.4.2(9) Provide sign Permits from the City on behalf of the Authority.

4.3.5 Inpatient Psychiatry Unit Outdoor Patio

4.3.5.1 The Inpatient Psychiatry Unit Outdoor Patio will be directly accessible from the Inpatient Psychiatry Unit. Refer to Appendix 3A [Clinical Specifications and Functional Space Requirements] for adjacency requirements.

4.3.5.2 The Inpatient Psychiatry Unit Outdoor Patio will include the following requirements:

4.3.5.3 Project Co will provide a secure outdoor space for the Inpatient Psychiatry Unit that will meet the following requirements:

4.3.5.3(1) A direct dedicated and secure access;

4.3.5.3(2) An enclosed area of 100 nsm on the same level and located adjacent to the Inpatient Psychiatry Unit with Direct Access and line of sight from the Care Station. Glazing will be used to enclose the area to maximize natural light; and

4.3.5.3(3) If the Outdoor Patio is not collocated with the Inpatient Psychiatry Unit, provide an enclosed area of 225 nsm. The location is to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.3.5.3(4) The secure outdoor space will not have Direct Access to grade and will not provide views into private spaces including Patient rooms or where treatment is being administered.

4.3.5.3(5) 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.

4.3.5.3(6) Provide an aesthetically pleasing and calming space.

4.3.5.3(7) Provide external views across the City and provide connection to natural surroundings and enhance and frame views.

4.3.5.3(8) Provide circulation, gathering, soft and hard landscaping elements including:

4.3.5.3(8)(a) A minimum of two separate locations that provide Individual seating areas for groups of 2 or 3 people;

4.3.5.3(8)(b) Gathering nodes with group seating areas for 4-6 people;

4.3.5.3(8)(c) Flexible gathering /activity spaces.

4.3.5.3(9) Provide a flexible gathering area that is open and comforting. Project Co will ensure that the surface paving is designed to allow for a variety of uses.

4.3.5.3(10) Provide a multi-use active space that is a minimum 4m x 4m in size with Cast in Place Rubber Surfacing for the following activities:

4.3.5.3(10)(a) Yoga;

4.3.5.3(10)(b) Stretching;

4.3.5.3(10)(c) Other activities.

4.3.5.3(11) Project Co to ensure that all paving material selected with a sufficient weight and durability to ensure that paving cannot be tampered with or moved.

4.3.5.3(12) Paving will be of an even, slip-resistant surface such as sandblasted concrete, articulated by features such as saw cut joints and coloured concrete. Pavers or loose and hard granular materials such as pea gravel will not be permitted;

4.3.5.3(12)(a) Unit paving is not permitted for use in this area;

4.3.5.3(12)(b) Granular surfaces are not permitted for use in this area;

4.3.5.3(12)(c) Wood Decking to be fully secured with tamper proof fasteners connected to a permanent footing or roof anchor;

4.3.5.3(12)(d) Cast in place concrete to have no sharp edges or corners Edges will be rounded to minimum 6 mm radius;

4.3.5.3(12)(e) Cast in place rubber will material will conform to the following;

4.3.5.3.12.(e).1 Be robust, durable and resistant from damage by pulling or tearing at the surface.

4.3.5.3.12.(e).2 None allergenic, non toxic and environmentally sound

4.3.5.3.12.(e).3 Designed to meet traffic loads and accessibility requirements;

4.3.5.3.12.(e).4 No rubber tile is acceptable for use within this area.

4.3.5.3(13) Layout to ensure safety with clear lines of sight which are designed to eliminate any hiding spots or areas where Staff vision of the Patients is obscured.

4.3.5.3(14) No elements to have sharp edges.

4.3.5.3(15) Materials including sealants will not pose ingestion or choking hazards.

4.3.5.3(16) Ensure that all materials used cannot be thrown or wielded in a way that will cause bodily harm, damage to the Facility.

4.3.5.3(17) All removable hardware elements, including electrical receptacles, will be Tamper Resistant.

4.3.5.3(18) All overhead structures will be designed to be Ligature Resistant and non-climbable.

4.3.5.3(19) Potential head and neck entrapments will be avoided in all designed elements.

4.3.5.3(20) Planters or other structures will not be placed within 2.0 m of secure barrier walls or safety guards.

4.3.5.3(21) All hose bibs will be secured, concealed, and designed such that they can only be activated by Staff.

4.3.5.4 Project Co will provide safe and appropriate landscape plantings that support spaces for gathering, quiet contemplation, gardening, walking, exercising and other therapeutic activities.

4.3.5.4(1) Refer to Section 8.2.4 [Plant Material] for technical specifications on plant selection, growing medium and warranty information

4.3.5.4(2) Growing Medium as described in Section 8.2 [Landscape] will not have direct contact with roofing membrane or other building elements.

4.3.5.4(3) Raised garden beds to include the following:

4.3.5.4(3)(a) Allow for a minimum 600mm soil depth;

4.3.5.4(3)(b) Provide a minimum of one location at a height that is fully accessible to users in wheelchairs; and

4.3.5.4(3)(c) Ensure that the width between raised garden beds is sufficient to allow for wheelchairs to pass between beds.

4.3.5.4(4) Portable planters will be constructed of rot proof exterior grade materials appropriate for use in a mental health care environment;

4.3.5.4(5) Planting material to be vetted by the Authority prior to use:

4.3.5.4(5)(a) Ensure that planting provides seasonal interest;

4.3.5.4(5)(b) Ensure planting is non-toxic and low maintenance.

4.3.5.5 Furnishing to be integrated into the landscape and fixed in place with tamper proof hardware.

4.3.5.6 Project Co to provide a minimum of two exterior rated electrical receptacles in tamperproof lockable boxes:

4.3.5.6(1) Electrical receptacle boxes to be integrated into the landscape and secured to ensure no damage or vandalism;

4.3.5.6(2) Electrical receptacles to be connected to a timer and have a separate shut off on the interior of the building between the panel and the exterior space.

4.3.5.7 Project Co to provide a minimum of two (2) tamper proof hose bib locations.

4.3.5.7(1) Shut offs for hose bibs will be located in a service room conveniently accessible to FMO and nursing staff outside the patient area.

4.3.5.8 Plantings within all Secure Outdoor Spaces will be irrigated by a permanent, high efficiency, automatically timed, programmable and condition controlled, irrigation system.

4.3.5.8(1) Provide an irrigation system that is serviceable and programmable from outside the patient space, controls and valves will be located in a service room that is conveniently accessible to FMO and nursing staff. Irrigation system will be designed to be drainable without entering the patient space.

4.3.5.8(2) Project Co to provide an Irrigation stub-out to service the planted areas. Irrigation system to be designed to be tamper proof;

4.3.5.8(3) Refer to Section 8.2.6 [Irrigation] for additional requirements.

4.3.5.9 Provide shade in the form of a weather-proof, non-climbable and Ligature Resistant trellis-like free standing structure that gives the feeling of an outdoor room;

4.3.5.9(1) Coordinate all structures, weather proof shade elements with Project Co. Structural Engineer to ensure maximum loading requirements are not exceeded.

4.3.5.10 Provide a continuous glass security screen that will:

4.3.5.10(1) Be designed accordance with BCBC post disaster importance factor;

4.3.5.10(2) Have a design service life of thirty (30) years;

4.3.5.10(3) Be transparent with a 3mm polycarbonate layer laminated between 6mm fully tempered glass and 6mm fully tempered glass;

4.3.5.10(4) Be designed to prevent escape or unauthorized entry;

4.3.5.10(5) Be non-climbable, including restrictions at corners, junctions and interfaces with other structures;

4.3.5.10(6) Be of minimum 3.6m AFF and above adjacent structures including furniture or planters located within 2m of the security screen or full height (to underside of structure above);

4.3.5.10(7) Prevent the ability climb behind or under Security Screen and;

4.3.5.10(8) Be Ligature Resistant.

4.3.5.10(9) All fasteners will be flush to surfaces of structures. Use only stainless steel fasteners. Any exposed anchor bolt threads will be capped off with ligature resistant means.

## 4.4 Connections to Existing Hospital and Site Services

### 4.4.1 General

4.4.1.1 The Facility will not function autonomously but instead will contribute to an overall integrated BH. Accordingly, Project Co will design the Facility to maximize opportunities for connections to the existing BH buildings and enhance the ability for the other site facilities and the Facility to function in a cohesive manner. In order to achieve this, Project Co will design and construct all links identified in this Schedule and the Project Agreement.

4.4.1.2 Project Co will design the Facility to maximize opportunities for connections to all Future Expansions and enhance the ability for the Future Expansion and the Facility to function in a cohesive manner.

### 4.4.2 Connections for People and Materials

4.4.2.1 Project Co's Design will:

4.4.2.1(1) Determine where the Facility and Existing Hospital are joined as interior space;

4.4.2.1(2) Align the Facility connections and corridors with the network of Existing Hospital corridors and expand on the continuity of existing General Circulation systems;

4.4.2.1(3) Provide connections which permit safe and efficient flows of Patients, Staff, services and public;

4.4.2.1(4) Provide the ability for the Existing Hospital and the Facility to function in a cohesive manner; and

4.4.2.1(5) Provide for ease of public, Staff, Patient and material transfers between the Facility and the Existing Hospital.

4.4.2.2 At a minimum, and in addition to any other required by Project Co to comply with Code or otherwise to meet the requirements of this Schedule, provide internal horizontal connections between the Facility and the Existing Hospital with floors aligning horizontally between buildings as follows:

4.4.2.2(1) Level 0: Phase 1A

4.4.2.2(1)(a) One connection with Direct Access to the existing SFB tunnels on Level 0 of the Existing Hospital for Staff.

4.4.2.2(2) Level 1: Phase 1A

4.4.2.2(2)(a) One connection to provide the following:

4.4.2.2.2.(a).1 Line of Sight from the Main Entrance to Registration/Admitting for public and Patients;

4.4.2.2.2.(a).2 Direct Access to the SFB and the Nursing Tower for Patients, public and Staff; and

4.4.2.2.2.(a).3 Direct Access to the elevators #7 & #8 for Patients, public and Staff to access ED in the Existing Hospital.

4.4.2.2(3) Level 2: Phase 1 A

4.4.2.2(3)(a) One connection to provide the following:

4.4.2.2.3.(a).1 Direct Access to the Nursing Tower for Patients, public and Staff;

4.4.2.2.3.(a).2 Direct Access to the SFB for Staff;

4.4.2.2.3.(a).3 Direct Access from the Loading Dock, IHR, Housekeeping, Food Services, Laundry/Linen and Pharmacy to the Facility Phase 1A for Staff; and

4.4.2.2.3.(a).4 Direct Access from the Morgue to Loading Dock/Hearse Sally Port.

4.4.2.2(4) Level 2: Phase 1 B

4.4.2.2(4)(a) One connection to provide Direct Access to the MDRD and Housekeeping from SFB for Staff.

4.4.2.2(5) Level 3: Phase 1A

4.4.2.2(5)(a) One connection to provide Direct Access to SFB for Staff and the Nursing Tower for Patients, public and Staff.

4.4.2.2(6) Level 3: Phase 1B

4.4.2.2(6)(a) Two connection to provide Direct Access to ED for Patients, public and Staff; and

4.4.2.2(6)(b) One connection to provide Direct Access to Imaging for Patients and Staff.

4.4.2.2(7) Level 4: Phase 1A

4.4.2.2(7)(a) One connection to provide Direct Access to SFB and the Nursing Tower for Patients, public and Staff.

4.4.2.2(8) Level 4: Phase 1B

4.4.2.2(8)(a) Two connection to provide Direct Access to SFB for Patients and Staff.

4.4.2.3 Connections must be distinct and physically separated to provide independent continuity of public, Patient and Staff, equipment and material flows.

4.4.2.4 The connections at Level 0 to Level 4 are to align and provide an even transition between the Facility and the existing BH floor elevations. All other connections will minimize the use of ramps and where ramps are required to connect existing floor elevations to the Facility, they will be designed to minimize slopes which will not exceed 2%.

4.4.2.5 Project Co will be responsible for all work within the Existing Hospital as required to complete all connections and seamlessly integrate the Facility with the Existing Hospital. Any work required to connect to the Existing Hospital will minimize disruptions, reduce impacts to the Authority's operations and be completed in accordance with an approved, phased Work Plan consistent with the requirements of this Agreement.

4.4.2.6 Wherever possible, design and construct the connections so as to maintain existing fire exits and fire ingress/egress routes. Modify, replace and Make Good any existing fire exits, and fire ingress/egress routes affected by the Facility Construction and its connections to the Existing Hospital with equivalent exits and ingress/egress routes as approved by the Governmental Authority.

4.4.2.7 The connections to the BH Energy Centre, if designed as a standalone building, will facilitate efficient Back of House travel path from the FMO operations and the BH Energy Centre for movement of Staff and materials.

4.4.3 Existing Hospital Work

4.4.3.1 Perform all upgrades and modifications, including those related to code compliance, to the Existing Hospital as a result of the Design and Construction of the Facility.

4.4.3.2 Relocate the existing fire department response points.

4.4.3.3 Relocate and upgrade the existing fire alarm annunciator panels to reflect the Existing Hospital and Facility.

4.4.3.4 Update the Existing Hospital's operational fire safety plan to reflect the Existing Hospital and Facility.

4.4.3.5 Repair the integrity of the Existing Hospital envelopes that are impacted by the Design and Construction of the Facility.

4.4.3.6 Perform, document and demonstrate to the Authority's satisfaction any and all adjustments to Existing Hospital systems that are impacted by the Design and Construction of the Facility.

4.4.3.7 Provide sprinkler water curtains where required.

4.4.3.8 Any work required in the Existing Hospital or to connect to the Existing Hospital will be completed in accordance with a Work Plan agreed to by the Authority in accordance with the requirements of the Agreement.

4.4.3.9 Project Co will repair any damage to the Existing Hospital in accordance with the Agreement. All repair work will meet the requirements of Schedule 3 [Design and Construction Specifications].

4.4.3.10 Project Co will be responsible for patching, repairing and Making Good all exterior and interior surfaces affected by the Construction of the Facility in all areas of the Existing Hospital in which the work is taking place, to match the quality of the adjacent existing surfaces at a minimum.

4.4.3.11 Project Co will perform any remediation work or protective measures required in the Existing Hospital as a result of the Construction of the Facility, including waterproofing measures; all work will meet the requirements of Schedule 3 [Design and Construction Specifications].

4.4.4 At interfaces between the Facility and the Existing Hospital:

4.4.4.1 Erect and maintain temporary partitions in accordance with CSA Z317.13 infection control guidelines and Burnaby Noise and Sound Abatement Bylaw to prevent spread of dust, odours, and noise to permit continued occupancy and function by the Authority consistent with the Authority's infection control during construction standards.

4.4.4.2 Ensure that WSBC regulations, CSA Z317.13, Burnaby Noise and Sound Abatement Bylaw and the Authority's standards are followed to eliminate or minimize the impact of noise, odours, dust and vibration.

4.4.4.3 Project Co and its industrial hygienist, in consultation with the Authority through the Review procedure, will ensure that air intake sites are not impacted by the Construction work and if needed, Project Co will provide additional filters including carbon, hoarding, temporary redirection or re-ducting of intakes as required to control exposure to Staff and Patients.

4.4.4.3(1) Filters will be monitored and replaced when required by Project Co.

4.4.4.4 Except as otherwise permitted by section 2.6.3.1(2), prevent movement of existing structures; provide bracing and shoring.

4.4.4.5 Remove demolished material from BH except where specifically noted otherwise. Do not burn or bury materials or liquids on BH site.

4.4.4.6 Patch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections. Where new work abuts or aligns with existing, provide a smooth and even transition. Patch the work to match existing adjacent work in texture and appearance.

4.4.4.7 Extend new finishes from the Facility side of the temporary wall seamlessly into the existing corridors.

4.4.5 Service Connections

4.4.5.1 The Design will provide optimized utilization of the Site, including provision for future flexibility. Identify optimal solutions to achieve these results, as well as opportunities for innovation, in consultation with the Authority through the Review Procedure.

4.4.5.2 Relocate existing services as needed to accommodate Construction of the Facility and reconnect existing services to ensure that the Authority's 24/7 operations continue without interruption. Provide, as necessary, temporary services to ensure that the Existing Hospital remains operational at all times. Any shut down of existing services, or any work required to connect to the Existing Hospital, will be completed in accordance with an approved Work Plan consistent with the requirements of the Agreement. Provide any services that cross a building or corridor with seismic mitigation and building separation devices.

4.5 Exterior Safety and Security

4.5.1 All entrances to the Facility will be controlled by a reception point or secured by CCTV / access control. Where external spaces are accessible to the public they will be regularly patrolled and controlled using CCTV cameras that reply back to the main security station of the Facility.

4.5.2 All exterior spaces including the Secure Outdoor Spaces will be designed with clear sight lines for safety.

4.5.3 Exterior spaces will be designed to eliminate hiding places or areas of obscured vision. Provide circulation and sight lines through which are free of obstructions, clear and designed to limit confusion with direction and Wayfinding.

4.5.4 Exterior spaces will have planting, benches and other site elements which are average height of 0.5 m or below to provide clear visibility throughout and a sense of safety. Taller accent elements may be acceptable.

4.5.5 The selection and placement of outdoor planting, benches and other Furniture will be safe for Patients, Staff and visitors, and will not allow for opportunities of hiding or entrapment.

4.5.6 Landscape elements will not comprise plantings or structures that create hiding spaces, block sightlines and hide litter.

4.5.7 Design the Site to meet CPTED principles, having particular regard for discouraging theft, mischief, vandalism and reducing opportunities for hiding spaces.

4.5.8 Provide lighting to enable 24-hour public and Staff accessibility.

4.5.9 Provide lighting for roadways, walkways and parking areas within the Site to ensure safe movement of vehicle and pedestrian traffic with respect to collisions, personal safety, and building access and egress.

4.5.10 All external foliage will not interfere with exterior camera views and any required external sightlines.

4.5.11 Eliminate entrapment spots and incorporate barriers that permit visual access without loss of privacy which include providing glazing in exterior lobby doors and stairwells.

4.5.12 Promote the visual observation of the Site by the Facility occupants through placement of windows and glazed doors.

4.5.13 Protect all Facility entrances from errant vehicles through the use of decorative bollards and barricades which keep vehicles away from a Facility. Barriers will stop a 6800 kg (15,000 lbs) vehicles traveling 32 kph (20 mph) or as others determined by the Authority. Provide set back distances for all parking stalls that protect the Facility entrances. Design of bollards, barricades and set back distances will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procure] and the Facility Threat and Risk Assessment.

4.6 Accessibility Requirements

4.6.1 Project Co will design the Facility to meet the following requirements:

4.6.1.1 The primary pedestrian systems, public open spaces, primary walkways and all entrances to the Facility will be accessible for Persons with Disabilities;

4.6.1.2 Access, egress routes, entrances and all exterior courtyards, gardens, patios or similar outdoor spaces will be accessible for persons requiring assistive mobility equipment, including people with strollers;

4.6.1.3 Provide pedestrian surfaces that comply with ADA and persons with disabilities requirements and are suitable for use by wheelchairs, strollers, and small wheeled medical devices. Asphalt, wide areas of pavers or crushed rock surfaces will not be permitted for outdoor surfaces;

4.6.1.4 Provide leveling strips at the point of access to the Facility to ensure continuous smooth level surfaces for traversing entryways. The leveling strips will be designed for simple adjustment to compensate for Facility settlement if required;

4.6.1.5 Provide walkways and ramp surfaces that are slip resistant;

4.6.1.6 Provide walkways and ramps with sufficient space between handrails to allow two wheelchairs to pass, and provide landings having a minimum length of 1.625 m at the bottom and top of all ramps. Ensure corners are a minimum of 1.22 m wide to allow for turning of a wheelchair or walker;

4.6.1.7 Separate pedestrian walkways and ramps from service areas with a barrier at least 100 mm high in a colour suitable to distinguish it from paths and grass;

4.6.1.8 Construct exterior stairways and convenience stairs with a maximum of 10 risers per flight followed by a landing; and

4.6.1.9 Locate parking stalls for Persons with Disabilities directly adjacent to the Main Entrance.

4.7 Community Noise Protection

4.7.1 Acoustically shield emergency and service vehicle noise from the surrounding community by use of barriers or other design features.

4.7.2 Strategically locate and Design mechanical and electrical equipment, outside air intake and discharge openings to meet the requirements of Appendix 3C [Acoustic and Noise Control Measures].

4.7.3 Control construction noise per the limits provided in Section 2.6.4 Control of Construction Noise and Vibration.

4.7.4 Comply with requirements in the City of Burnaby Noise By-Law.

4.8 Site Lighting

4.8.1 Project Co will provide lighting to enable 24-hour-a-day public and Staff accessibility.

4.8.2 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.

4.8.3 Light fixtures within the reach of pedestrians will be vandal-proof.

4.8.4 Lighting on pedestrian walkways and bicycle paths, including those leading to transit connections, will illuminate the path and spill over to illuminate several metres adjacent to the path.

4.8.5 Lighting will be strategically placed as to not disrupt Patient sleep and will be dark-sky compliant.

4.9 Off-Site Infrastructure

4.9.1 All off-site works required for excavation, exposing, backfill and surface restoration of all proposed water mains, storm and sanitary sewers, as well as the connection of each service to the municipal systems, will be the responsibility of Project Co.

4.9.2 All off-site works required for the Design and Construction of all storm sewer, sanitary sewer, water main, and roadwork infrastructures will be the responsibility of Project Co.

4.9.3 All off-site works will be designed and constructed in accordance with the latest edition of the Master Municipal Construction Documents (MMCD), the City's Engineering Design Manual, and the City's Standard Detail Drawings.

4.9.4 Water Main

4.9.4.1 Provide two (2) water service connections, including valves, filtration system, metering and backflow prevention.

4.9.4.2 The extent to which provision for on-site pumping from the proposed 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 Phase 1 floor area and height. Project Co will provide pumping equipment as determined necessary to service the Facility and the Existing Hospital requirements.

4.9.4.3 Project Co will ensure that City access to surrounding municipal fire hydrants is not encumbered at any time. All existing hydrants will remain active during the Construction. Disruption to any existing hydrant will require written approval from the City of Burnaby and the Fire Department.

4.9.4.4 Off-site water system upgrades will be required in accordance with the requirements of the City. Project Co to provide water demands and FUS calculations to the City for analysis and confirm sizing.

4.9.4.5 All new water mains are to meet the City of Burnaby's Water System Seismic Design Requirements.

4.9.4.6 Provide connections to existing water main on Kincaid Street to complete the required looped system. These connections will satisfy the City's resilient design requirement.

4.9.4.7 Water metering is to align with the relevant LEED v4 Water Efficiency Credit Water Metering requirements.

4.9.5 Storm Sewer

4.9.5.1 Project Co will conduct water jetting and video record the existing storm pipe at or downstream of the proposed connection prior to construction and at the end of construction as per MMCD requirements. Provide video recordings to the Authority for review.

4.9.5.2 Provide new storm sewers connecting the on-site storm sewer to the existing storm sewer within Kincaid Street or as permitted by the City. Project Co will be responsible to comply with any regulations affecting environmental or fisheries habitat.

4.9.5.3 Provide a storm service connection to service both Phase 1A and IB. Location to be reviewed and confirmed with the Authority prior to installation.

4.9.5.4 All storm sewers and drains will flow by gravity and will not rely on pumps.

4.9.5.5 All joints between precast manhole riser rings or parts will be sealed with a hydrophobic polyurethane sealant such as Fernco X-seal. This applies to any manhole, sump, or similar underground facility where water ingress can be expected to be a concern.

4.9.6 Sanitary Sewer

4.9.6.1 Flush and video record the existing sanitary pipe at or downstream of the proposed connection prior to construction and at the end of construction as per MMCD requirements. Provide video recordings to The Authority for review.

4.9.6.2 All joints between precast manhole riser rings or parts will be sealed with a hydrophobic polyurethane sealant such as Fernco X-seal. This applies to any manhole, sump, or similar underground facility where ingress can be expected to be a concern.

4.9.7 Road Works

4.9.7.1 Project Co will be required to obtain City of Burnaby permits and comply with the City requirements to construct a new driveway letdown to level E of the existing parkade utilizing the existing partially completed driveway from Kincaid Street.

4.9.8 Street Lighting and Traffic Signal

4.9.8.1 Project Co will be required to review the existing street lighting and traffic/pedestrian signal at the entrance and exit to the Site along Kincaid Street. Additional street lighting and traffic/pedestrian signal may be required to meet the requirements of the City in order to provide safe vehicle and pedestrian traffic with respect to collisions, personal safety, and Facility access/egress.

4.9.8.2 Project Co will be required to review the existing street lighting at the driveway entrance to level E of the existing parkade. Additional street lighting may be required to meet the requirements of the City in order to provide safe vehicle and

pedestrian traffic with respect to collisions, personal safety, and Facility access/egress.

4.10 On-Site Infrastructure

4.10.1 All on-site works will be designed and constructed in accordance with the latest edition of the Master Municipal Construction Documents (MMCD), the BCBC, the City's Engineering Design Manual, and the City's Standard Detail Drawings.

4.10.2 Earthworks

4.10.2.1 Excavate, backfill and grade to provide levels and elevations for foundations, Facility access, exterior improvements including underground parking structure, roadways, walkways, service trenching and other required improvements. Site grading to include waste removal, stripping, clearing, grubbing, trenching, backfilling, embankment, controlled density fill, dewatering and compaction

4.10.2.2 Project Co will provide a professional engineering backfill solution to fill in and compact any excavations left over from demolition of the existing buildings, with clean structural granular fill down to undisturbed native soil. Fill up to adjacent grade, and complete with topsoil and hydroseed. Backfill material beside foundation walls will be permeable material only.

4.10.2.3 Soil remediation will meet the recommendations provided by the Stage 2 Preliminary and Detailed Site Investigation Report prepared by PGL Environmental Consultants dated April 2019.

4.10.2.4 Site grading to meet with the proposed grades of the adjacent road network and surrounding areas.

4.10.2.5 Earthwork requirements will meet the recommendations provided by Project Co's geotechnical engineer.

4.10.2.6 Earthworks are to comply with CSA Z317.13-17 Infection Control During Construction, Renovation and Maintenance of Health Care Facilities.

4.10.3 Sanitary Sewer System

4.10.3.1 Provide sanitary sewers of a diameter, grade and depth to safely convey all effluent from on-site. Effluent flow must be by gravity without the use of pumping stations.

4.10.3.2 The sanitary sewer system will include the pipes, manholes and all other required appurtenances to comply with applicable municipal and provincial standards and all other applicable codes and standards.

4.10.3.3 Project Co will conduct water jetting and video record the existing on-site sanitary pipe at or downstream of the proposed connection prior to construction and at the end of construction as per MMCD requirements. Provide video recordings to the Authority for review.

4.10.3.4 All sanitary manholes outside of the Facility will be designed to have a rim elevation at least 300mm lower than the building floor elevations.

4.10.4 Storm Sewer System

4.10.4.1 Provide storm sewers and rainwater management design for major and minor events to meet the City's bylaws and requirements.

4.10.4.2 Confirm that any new storm water flows can be directed off site without pumping stations.

4.10.4.3 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, the systems:

4.10.4.3(1) will be of a size, grade and depth to safely manage and convey all storm water on-site to the receiving off-site system;

4.10.4.3(2) will include storm water/oil and grit separation devices or other water quality treatment devices, capturing and treating runoff from all paved traffic and parking areas;

4.10.4.3(3) will 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;

4.10.4.3(4) will provide storm sewer video inspections upon installation;

4.10.4.3(5) will provide best management practices for the capture, treatment and retention of storm water runoff; and

4.10.4.3(6) will control the post-development peak flow to 50% of the pre-development level for a 2-year storm event.

4.10.4.4 Provide a rainwater management plan to comply with requirements of the City of Burnaby’s Design Criteria Manual, the City’s LEED requirements and/or the City’s SPEA Bylaw. Project Co will ensure that neighbouring properties are protected from flooding and nuisance runoff issues. The rainwater management will adhere to the following requirements:

4.10.4.4(1) Provide development plans that demonstrate compliance with the City of Burnaby’s “Groundwater management for Multi-Family & Mixed Commercial Developments”;

4.10.4.4(2) To comply with the City’s SPEA requirements, retain qualified environmental professional and surveyor to outline the top of bank for Sumner Creek;

4.10.4.4(3) Project Co to apply to the City’s ERC for a variance for any development within the SPEA.

4.10.4.5 Provide adequately sized water quality/sediment control components, before discharging to the off-site drainage system

4.10.4.6 Project Co will satisfy itself that the current conveyance of storm water to Sumner Creek and/or its tributaries can remain in place and that any new storm water flow can be directed off site without pumping stations.

4.10.4.7 Provide a backflow valve and a sump manhole as per the City's Plumbing Bylaw requirements prior to discharging into the City's storm system.

4.10.5 Water Main System and Appurtenances

4.10.5.1 Provide a redundant N+1 water main system of diameter, grade, and depth to safely meet domestic demand and fire flow requirements.

4.10.5.2 The water main systems will include the pipes, valves, hydrants, fittings, filtration system, and all other required appurtenances to comply with applicable municipal and provincial standards.

4.10.5.3 Firefighting volumetric demands are to be calculated using the Fire Underwriters Survey (FUS) method, unless alternates are otherwise approved by the applicable Governmental Authority.

4.10.5.4 If required to meet the FUS fire flow demands, Project Co will provide back-up, permanent fire-fighting equipment.

4.10.5.5 The water main system will include N+1 approved reduced-pressure backflow preventers necessary to protect the municipal system and on-site facilities from contaminants based on the hazard level of the Facility.

4.10.5.6 Provide water meters and chambers at each service connections per City's requirements. Water meters will have isolation valves and bypasses to facilitate replacement or maintenance.

4.10.6 Road Works

4.10.6.1 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.

4.10.6.2 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.

4.10.6.3 Pavement structure will meet the recommendations of Project Co's geotechnical engineer.

4.10.6.4 All roadways will accommodate fire truck access in accordance with the BCBC requirements or the requirements of the municipality‘s fire department, whichever is more stringent.

4.10.6.5 Use surfacing materials that will meet intended use and minimize the ‘heat island’ effect, where possible.

4.10.6.6 Provisions for on-site roadways will be required to account for snow removal machinery and methods in winter snowfall months.

4.10.6.7 Roadways and paved areas will have positive drainage to shed rainwater quickly to a storm drainage facility.

4.10.6.8 Access road above underground chambers will be waterproofed to prevent water seepage and flooding of the chambers

4.10.6.9 No surface ponding is permitted within on-site roadways.

4.10.7 Street Lighting

4.10.7.1 Project Co to provide lighting for on-site roadways, walkways and parking areas to ensure safe vehicle and pedestrian traffic with respect to collisions, personal safety, and Facility access/egress. All lamp posts should face towards the hospital to minimize light pollution to the neighbouring properties.

4.10.8 Third-Party Utilities

4.10.8.1 Provide new FortisBC, Telus (Telco), Cable Providers, Macro Cellular service providers, and BC Hydro services to the Facility.

4.10.8.2 Liaise with relevant Utility suppliers and Authority’s for the design and construction of the new third-party Utilities.

4.10.8.3 Resolve all conflicts between third-party Utilities and other existing and proposed municipal infrastructures with relevant suppliers and Authorities.

4.10.8.4 Ensure all necessary Permits in connection with the Utility work are obtained.

4.11 Parking Requirements

4.11.1 All parking stalls and vehicle ramps will meet the City bylaw requirements.

4.11.2 Project Co will provide a minimum of eighty-eight (88) parking stalls to be located in a Phase 1A or Phase 1B parkade.

4.11.3 Project Co will provide bicycle parking spaces to be no less than 10% of the number of net new vehicle parking spaces.

4.11.4 Layby Stalls for Pick-up and Drop-Off

4.11.4.1 Project Co will provide the following layby pick-up and drop-off layby parking stalls:

4.11.4.1(1) The design will be based on the design load for the existing parkade refer Section 5.9.2 and will make provision for the following, a minimum of eight (8) vehicles in parallel type spaces with sufficient room for elderly and Persons with Disabilities to maneuver safely, including two (2) for shuttle vehicles, two (2) for hospital transfer vehicles, two (2) for HandyDART vehicles and two (2) ride hailing located adjacent to the Main Entrance.

4.11.4.2 Provide vertical clearance over all stalls and vehicle paths in the drop-off and pick-up area to accommodate the design vehicles including ambulances and fire truck for future flexibility.

4.11.4.3 Clearance height to consistently meet the minimum building code standards throughout the entire parkade structure.

4.11.4.4 Provide weather protection to the drop-off areas as indicated in Section 4.3.2.

4.11.4.5 Provide adequate space at all layby drop-off and pick-up parking stalls for additional assistive equipment.

4.11.5 Parking Layout and Circulation

4.11.5.1 Access and site circulation

4.11.5.1(1) Design parkade access so as not to obstruct the free flow of traffic in and out of the Site and to and from adjacent streets.

4.11.5.1(2) Subject to site constraints and municipal requirements, design to the following criteria:

4.11.5.1(2)(a) Enter and exit the Site at a minimum distance of 22 metres from street intersections, preferably not less than 50 metres;

4.11.5.1(2)(b) Place parkade entries and exits at the corners of the structure to minimize Internal Circulation conflicts;

4.11.5.1(2)(c) Plan for reservoir space on site in order that vehicles queuing for entry and exit do not block the public street or impede the sidewalk;

4.11.5.1.2.(c).1 Allow for not less than 12 metres between a controlled exit gate and public sidewalk;

4.11.5.1.2.(c).2 Allow for a separate left-turn exit lane;

4.11.5.1(2)(d) Access lanes must be minimum 3.35 metres width with minimum turning radius of 9 metres;

4.11.5.1(2)(e) Where possible, use separate entry and exit points, not less than 22 metres and preferably 45 metres apart;

4.11.5.1(2)(f) At combined entry/exits plan for anti-clockwise interior circulation to prevent vehicles crossing each other.

4.11.5.1(3) Subject to consultation with the Authority allow at least one paired entry/exit point per 600 vehicles per hour.

4.11.5.1(4) Consult the Authority in order to account for employee shift timing and traffic volume.

4.11.5.2 Parking Layout and Circulation

4.11.5.2(1) Right angle or 90 degree module is the preferred layout due to efficiency, capacity for two-way circulation, visibility and room for pedestrians.

4.11.5.2(2) Provide generous turning radii at entry and exit points and at aisle ends. Aisle ends must allow two-way traffic flow with full visibility for drivers and pedestrians. Minimum inner wheel turning radius is 6 metres. Install convex mirrors in any areas where full visibility may be compromised.

4.11.5.2(3) Dimensions:

4.11.5.2(3)(a) Comply with BC Building Code and municipal bylaw or other jurisdictional requirements applicable to the location of the Project;

4.11.5.2(3)(b) Notwithstanding code and bylaw minimum dimensions the following minimum standards will apply for component spaces in 90 degree parking

| Parking spaces | Width | Length | Vertical clearance |
|---|---|---|---|
| Full size | 2.6m (8’-6”) | 5.2m (17’-0”) | 2.1m (6’-10”) |
| Small car | 2.3m (7’-6”) | 4.6m (15’-0”) | 2.1m (6’-10”) |
| Accessible | 3.7m (12’-0”) | 5.5m (18’-0”) | 2.3m (7’-6”)<br>2.5m (8’-2”) oversize/vans |
| Aisles | 6.1m (20’-0”) | | 2.3m (7’-6”) |

4.11.5.2(3)(c) Where the length of a parking space abuts a wall or fence add 0.3m (1’-0”) to the minimum width;

4.11.5.2(3)(d) For parking spaces at the end of dead-end aisles add 0.6m (2’-0”) to the minimum width.

4.11.5.2(4) Extra floor space for unloading between accessible stalls must be painted with diagonal stripes. In the case of a single accessible stall, the unloading area must be on the right or passenger side.

4.11.5.2(5) Locate accessible stalls close to stairwells and pay stations on the levels with easiest access to the hospital.

4.11.5.2(6) The path of travel from stall to entry lobby must avoid the need to pass behind parked vehicles.

4.11.5.2(7) Pedestrian routes must as far as possible be along the length of aisles. Avoid parkade entry and exit points and aisle ends. Demarcated pedestrian routes must be identified with painted floor stripes and not less than 1.5m (5'-0") wide.

4.11.5.3 Ramps and Slopes

4.11.5.3(1) Straight vehicular ramps are to have a maximum slope of 14%.

4.11.5.3(2) Any ramp with a slope greater than 9% is to have transitional ramps at top and bottom, which will be at least 2.4 metres long with a slope of not more than half that of the main ramp.

4.11.5.3(3) Exterior ramps with a slope of 10 %.

4.11.5.3(4) Allow a flat area (not more than 2% slope) of at least 6 metres inside entry and exit gates.

4.11.5.3(5) Maximum interior ramp/longitudinal aisle slope is to be 5%.

4.11.5.3(6) Maximum cross fall slope is to be 3%.

4.11.5.3(7) Accessible spaces are generally to be level, with a maximum slope of 2% in any direction, unless located on the existing parkade's top deck, where they will match the existing slope to a maximum of 3%.

4.11.5.3(8) Minimum desirable slope for the parkade in general is 2%, absolute minimum 1%.

4.11.5.3(9) The juxtaposition of end stalls with side aisles may result in an abrupt change of floor level. In these or any similar instances in which people getting in and out of vehicles may be at risk of tripping or falling provide a 75mm raised curb and fence along the edge of the higher of the adjacent levels.

4.11.5.4 Traffic Coating Membrane

4.11.5.4(1) Protect the structural concrete with a traffic coating to prevent the ingress of moisture into the slab over habitable spaces where water collection is anticipated and over mechanical room floors.

4.11.5.4(2) Protective cement/steel bollards and wheel stops installed on top of the asphalt wear layer will be fastened to the structure and will be affixed using stainless steel anchor bolts and related hardware.

4.11.5.4(3) Use traffic coating that complies with the following:

4.11.5.4(3)(a) Membrane: fluid applied aliphatic polyurethane waterproof traffic membrane (colour as selected by the Authority), liquid applied, two component 100% solids, and meeting or exceeding the following specifications:

| Property | ASTM Test | Result |
|---|---|---|
| | | |
| Tensile Strength | D638 | 9.1 MPa |
| Elongation at Break | D638 | 435% |
| Tear Strength | D624 | 38.2 KN/mm |
| Hardness | D2240 | 80 Shore A |
| Abrasion Resistance wear course (cs-17 wheel) | D4068 | Maximum Weight loss of 22 mg/1000 cycles |

4.11.5.4(3)(b) Topping: polyurethane compound wear course.

4.11.5.4(3)(c) Filler and primer: as recommended by membrane manufacturer.

4.11.5.4(3)(d) Sealant: polyurethane type, compatible with system and adjacent materials.

4.11.5.4(4) Provide fluid applied integral flashings at all locations where a horizontal surface butts a vertical surface and at all deck projections. Apply the membrane over the prepared surfaces at a minimum thickness of 500 microns thick and extend the membrane a minimum of 10 cm on vertical and horizontal surfaces.

4.11.5.5 Waterproofing

4.11.5.5(1) Provide waterproofing to prevent moisture ingress to occupied spaces below grade, including any occupied spaces in below-grade parking levels.

4.11.5.5(2) Use membrane waterproofing to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated. Provide traffic coating membrane for mechanical room floors and MDRD floors.

4.11.5.5(3) Provide waterproof membranes in exterior walls of enclosed parts of the Facility as part of the building envelope, such membranes to be integral with Rain Screen or cavity wall assemblies.

4.11.5.5(4) Provide purpose-made water stops at construction joints.

4.11.5.6 Lay out parking in an orderly and logical design to minimize confusion and excessive Internal Circulation.

4.11.5.7 Lay out parking such that it does not require a vehicle to back up for more than 10m.

4.11.5.8 The minimum vertical clearance will be a consistent 2.4 m throughout the parkade, unless required to be higher by the relevant Governmental Authority.

4.11.5.9 Maximum allowable slope or cross-fall is 5%, applicable to both the parking stalls and access aisles.

4.11.5.10 Traffic flow will be designed to reduce car speed and traffic calming measures will be provided to slow cars down to encourage safe traffic speed. Traffic calming measures include landscape features, raised crosswalks, road textures and speed humps. Speed humps will have a maximum height of 70mm.

4.11.6 Drivers' Visibility

4.11.6.1 Provide unobstructed visibility between parking areas and elevator lobbies, exit stairwells and entrance points to the Facility through glazed vestibule entrance doors, windows and door sidelights. Windows in exit stair doors are to be provided in addition to windows in demising walls and/or full height door sidelights.

4.11.6.2 Do not use interior walls that obstruct drivers' visibility to drive aisles.

4.11.6.3 Provide convex mirror where site lines are compromised and/or at convergent corners.

4.11.7 Security in Parking Areas

4.11.7.1 Minimize hiding spaces in the Design of parking areas. Design parking areas in accordance with CPTED principles.

4.11.7.2 A method will be provided for users to readily summon help if in distress or danger both in exterior parking areas and in the underground parking; refer to Section 7.11.5 Fixed Panic/Duress System.

4.11.8 Demarcations, Barriers and Painting

4.11.8.1 Number all parking stalls in a specific contiguous numbering sequence that is mutually exclusive. Parking stall numbering will be proposed by Project Co and determined in collaboration with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.11.8.2 Provide all stall lines and stall numbers. Parking stall lines and stall numbers will be painted in white. Stall numbers will be painted on the pavement and on the wall at a height visible to the driver when in the vehicle. Parking spaces will be delineated by double line paint markings.

4.11.8.3 Paint all exterior pick-up and drop-off layby parking stalls in yellow.

4.11.8.4 Painting and colours

4.11.8.4(1) Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) architectural painting specification manual.

4.11.8.4(2) Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

4.11.8.4(3) Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

4.11.8.4(4) 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.

4.11.8.4(5) Consult with the Authority through the Review Procedure for colour standards and select the appearance of finishes and colours to create and promote a safe and aesthetically pleasing environment, including colour coded parkade floor levels, finishes that prevent glare, and colours that minimize artificial lighting requirements.

4.11.8.4(6) Paint handrails, doors, and frames with a contrasting colour from walls in consideration of the visually impaired.

4.11.8.4(7) Paint traffic markings white and stall markings yellow unless otherwise instructed:

4.11.8.4(7)(a) Lines to demarcate stalls – white

4.11.8.4(7)(b) Stall numbering – white

4.11.8.4(7)(c) Directional arrows – white

4.11.8.4(7)(d) General line patterned in a diagonal cross-hatch with borders for indicating pedestrian-only or non-vehicle areas such as clear routes to exits, areas in front of doors and louvres – yellow

4.11.8.4(7)(e) Printing or lettering for words – white

4.11.8.4.7.(e).1 Stall markings, 100 mm wide;

4.11.8.4.7.(e).2 Parking stall numbers on floors;

4.11.8.4.7.(e).3 Small car parking stalls;

4.11.8.4.7.(e).4 Motorcycle parking; stall lines and lettering in white. Any cross hatched areas to be yellow

4.11.8.4.7.(e).5 Low headroom parking stalls;

4.11.8.4.7.(e).6 No parking areas

4.11.8.4.7.(e).7 Crosswalk areas;

4.11.8.4.7.(e).8 Stripping markings, 100 mm wide;

4.11.8.4.7.(e).9 Directional traffic arrows;

4.11.8.4.7.(e).10 Stop signs – lines and wording;

4.11.8.4.7.(e).11 Parking for Persons with Disabilities logo – 100 mm wide white lines on blue square background refer Appendix 3I [Wayfinding Standards for Burnaby Hospital];

4.11.8.4.7.(e).12 Pick-up/drop off stalls (max 15 minutes); paint pickup/drop off stalls in white.

4.11.8.4.7.(e).13 Passenger unloading zones at accessible parking stalls;

4.11.8.4.7.(e).14 Pedestrian zones at pay stations.

4.11.8.4(8) Paint parkade interior column and wall graphics to Authority standards. Refer to signage requirements above.

4.11.8.5 Floor finishes & numbering

4.11.8.5(1) Select floor finishes to suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated.

4.11.8.5(2) Flooring designs and patterns may comprise a component of the wayfinding system of the Facility.

4.11.8.5(3) Design and select floor finishes to comply with the following criteria:

4.11.8.5(3)(a) Ergonomic comfort, cleaning, maintenance and infection prevention and control, including the frequency and quality of joints also including ease of replacement of joint materials if and when required;

4.11.8.5(3)(b) Imperviousness to accumulations of moisture. In areas where water is anticipated to be present, allow water to collect and exit without causing damage to the finishes or substrate, or hazard to vehicular or pedestrian traffic.

4.11.8.5(3)(c) Permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;

4.11.8.5(3)(d) Low voc emissions so as to minimize adverse impact on indoor air and environmental quality;

4.11.8.5(3)(e) Compatibility of patterns and textures with the requirements for pedestrian safety and elder friendly design; and

4.11.8.5(3)(f) Incorporation of colours and graphics for way finding.

4.11.8.5(4) Consult with the Authority through the Review Procedure to determine parking space numbering system.

4.11.8.6 Provide 6mm bent steel plate protective covers painted yellow and suitably fastened to adjacent substrate at the required height to collect all vehicle bumpers at all exposed vertical rainwater leaders, other miscellaneous piping and fixtures as required to protect from any potential vehicular impact damage throughout.

4.11.8.7 Provide painted pedestrian pathways that are clearly marked.

4.11.8.8 Use lead-free paint for all demarcations on the floor such as stall stripes, numbers, and traffic markings.

4.11.8.9 Provide hot-dipped galvanized concrete-filled domed steel bollards painted yellow and suitably fastened to adjacent substrate to protect the jambs of overhead doors, glazed screens, lobbies, vestibules, service rooms, bicycle storage areas, walls, sprinkler pipes and all fixtures within vehicular access as required to protect from any potential vehicular impact damage throughout.

4.11.8.10 Provide convex safety mirrors spanning over any areas with compromised sight lines i.e. blind spots.

4.11.8.11 Provide wheel stops for all front-to-back parking stall locations.

4.11.9 Parking Wayfinding

4.11.9.1 Use Wayfinding strategies, including signage, to allow each underground parking level to be identifiable and distinct to assist in orientation and ease of finding/identifying parking stalls. Acceptable Wayfinding strategies include the use of symbols, colour accents, graphic treatments and accent lighting that make parking levels visually distinctive, and call attention to elevators and entrances. Coordinate width, height and location of stall numbers with horizontal banding.

4.11.9.2 Information and directional signage

4.11.9.2(1) Provide a comprehensive exterior and interior signage package that is designed to integrate functionally and aesthetically with the hospital development as a whole.

4.11.9.2(2) Comply with the Authority's graphic standards and coordinate design with the Authority;

4.11.9.2(3) Use a professional designer to design signage in order that the materials, colours, letter fonts, sizes and other aesthetic and functional considerations conform to the overall way finding design system;

4.11.9.2(4) Design for clear communication using simple pictograms and minimizing suspended signage so as not to interfere with sight lines, including visibility of other signs;

4.11.9.2(5) Provide signage that is clearly visible during both day and night, and that is well-differentiated from surrounding information, notices, advertising, etc.;

4.11.9.2(6) Provide signage that is resistant to graffiti and physical damage, and that is easy to replace when necessary;

4.11.9.2(7) Provide signage that directs visitors to all hospital entrances and to the emergency department;

4.11.9.2(8) Orient all important signs to be perpendicular to the line of vehicular or pedestrian travel on approach;

4.11.9.2(9) The signage package may include but not necessarily be limited to the following components:

4.11.9.2(9)(a) Primary pylon sign;

4.11.9.2(9)(b) Secondary pylon sign;

4.11.9.2(9)(c) Pole mounted directional blade sign;

4.11.9.2(9)(d) Wall mounted directional blade sign;

4.11.9.2(9)(e) Suspended parkade directional signs;

4.11.9.2(9)(f) Wall, parapet or canopy mounted parkade identification sign;

4.11.9.2(9)(g) Parking sign with cabinet and up-light letters;

4.11.9.2(9)(h) Freestanding parking sign with steel structure;

4.11.9.2(9)(i) Stair identification signs;

4.11.9.2(9)(j) Access signs – stair;

4.11.9.2(9)(k) Access signs – elevator lobby;

4.11.9.2(9)(l) “In Case of Fire” signs;

4.11.9.2(9)(m) Room identification signs;

4.11.9.2(9)(n) Access for Persons with Disabilities signs;

4.11.9.2(9)(o) Room identification signs;

4.11.9.2(9)(p) Painted column graphics;

4.11.9.2(9)(q) All other requirements listed in Appendix 3I [Wayfinding Standards for Burnaby Hospital]; and

4.11.9.2(9)(r) Painted wall graphics.

4.11.9.3 Interior signage and level marking

4.11.9.3(1) Review with, and obtain approval from, the Authority through the Review Procedure for the door and room numbering systems;

4.11.9.3(2) Review with, and obtain approval from, the Authority through the Review Procedure for the demarcation and identification of levels within a multi-level parking structure.

4.11.9.4 Exterior signage

4.11.9.4(1) Exterior signage will:

4.11.9.4(1)(a) Conform to the current version of the sign bylaw or equivalent regulation in the municipality in which the Facility is to be located;

4.11.9.4(1)(b) Clearly identify the Facility;

4.11.9.4(1)(c) Clearly indicate access for the public;

4.11.9.4(1)(d) Clearly indicate restrictions to ’after hours’ access and closest available entrance where applicable;

4.11.9.4(1)(e) Clearly indicate accesses, parking, and restrictions for various types of vehicles as required; and

4.11.9.4(1)(f) For night visibility, be well illuminated, backlit, reflective or high contrast and easily visible while minimizing light spillage.

4.11.9.5 Low clearance areas must be clearly marked.

4.11.9.5(1) Clearance bar measurements must be displayed in both metric and imperial units.

4.11.9.6 Provide a direct route for pedestrians to navigate from each parkade level to the nearest Facility entry point.

4.11.9.7 Provide a sheltered pedestrian walkway leading from exterior parking areas and layby stalls to Facility entry points.

4.11.9.8 Delineate pathways to Facility entry points with illuminated Wayfinding signage that includes the names of services reached most immediately from each entrance.

4.11.10 Vehicle Access

4.11.10.1 Project Co will determine the following with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.11.10.1(1) Location of all vehicle entry points to the Site;

4.11.10.1(2) Location of on-site roadways and access to surface parking;

4.11.10.1(3) Locations of layby stalls; and

4.11.10.1(4) Access to all departments located at grade.

4.11.10.2 Parking Requirements

4.11.10.2(1) Access to parking will be clearly marked with Wayfinding signage;

4.11.10.2(2) Project Co will provide clearly visible signage denoting the weight restrictions on the existing parkade;

4.11.10.2(3) Provide clear delineation or all entry points and exits from the parking; and

4.11.10.2(4) All floors of the parking will be contiguous. Vehicles will be able to access all floors of the parking without having to leave the underground parking and re-enter.

4.11.11 Automated Parking Payment System

4.11.11.1 The Facility will include an Automated Parking Payment System through pay-by-license plate real time PCI-compliant coin/credit card pay stations.

4.11.11.2 Pay stations will be conveniently located within the Facility including the main entrances, the emergency department, parkade lobbies and surface lots.

4.11.11.3 Deploy pay-by-plate, license plate recognition model allowing anyone to add more parking from any parking meter on site will be available.

4.11.11.4 Pay-by-phone model, which allows users to access parking through the commonly used “pay-by-phone” app; the app allows users to select the specific time they wish to stay, provides reminders when parking will be expiring soon and lets users extend their time from their phone from anywhere in the hospital.

4.11.12 Pay stations

4.11.12.1 Provide networked electronic multi-space pay stations in locations that best match pedestrian circulation routes between the parking facility and the hospital entrance or entrances that the Facility is located to serve. Pay stations will be located undercover or canopy.

4.11.12.2 The Authority will install the Automated Parking Payment System with its vendor. Project Co will be responsible for coordinating of the installation Automated Parking Payment System and the following at each location:

4.11.12.2(1) Appropriate clearances for access and servicing;

4.11.12.2(2) All infrastructure necessary to support the system, including power and data. Provide CAT-5 ethernet cabling from the system to the appropriate room in the Facility, refer to Section 7.10 Communications (Division 27);

4.11.12.2(3) IP Video surveillance camera coverage;

4.11.12.2(4) Paint striping around the area for safety;

4.11.12.2(5) Concrete filled steel bollards for safety; and

4.11.12.2(6) Securing the system with bolts to concrete. The system will not be bolted to asphalt;

4.11.12.3 The Automated Parking Payment System will meet the requirements of the Luke II Installation Guide for electrical power.

4.11.12.4 Automated Parking Payment System will be provided at the following locations in the Facility:

4.11.12.4(1) Minimum four (4) parking payment machines; two per floor in the parkade; and

4.11.12.4(2) Minimum two (2) parking payment machines in the Main Entrance Lobby.

4.11.12.5 Automated Parking Payment System will be located to facilitate efficient payment by users without requiring back-tracking and return trips.

4.11.12.6 Final locations for the Automated Parking Payment System in the areas affected by this Project will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.11.13 Contractor Parking

4.11.13.1 Project Co will not and will ensure that no Project Co Person parks on the BH Campus except in the designated parking spaces indicated in Appendix 3E [Work Area Diagrams].

4.11.14 Electric Vehicle Charging

4.11.14.1 Electric vehicle charging stations

4.11.14.1(1) Provide and commission networked electric vehicle supply equipment (EVSE) charging stations for not less than 10% of the total stall count in the Facility, or, if greater, to the minimum number required by the City. Provide infrastructure for Future Expansion to not less than 20% of total stall count.

4.11.14.1(2) Provide level 2 charging power as defined in Electric Transportation Engineering Corporation, Electric Vehicle Charging Infrastructure Deployment Guidelines, British Columbia. Version 1.0, 2009.

4.11.14.1(3) Install standardized equipment type, signage, ground markings, and network host as set by Lower Mainland Integrated Protection Services.

4.11.14.1(4) The Authority's preferred vendor is Electrum Charging Solutions, Surrey, BC.

4.11.14.1(5) Electric vehicle pavement marking

4.11.14.1(6) Ministry of Transportation 2013 July 19 EV Charge Station

4.11.14.2 Provide and commission AC Level 2 EV charging stations (208V single phase, 40A EVSE) for 10% of all parking spaces in the Facility, capable of a maximum 6.6kW continuous charge rate. EV charging stations will use load sharing capabilities at the panel, feeder, and transformer levels with a nameplate-to-peak power ratio of 3:1 (i.e. 33% demand factor) to minimize the size of the required upstream infrastructure. Branch circuit-level load sharing is not permitted.

4.11.14.3 Provide 20 electric outlets for charging electric bikes.

4.11.14.4 All EV charging stations for public/general Staff use to be equally distributed on each parking level. Locations of EV charging stations to be determined in consultation with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

4.11.14.5 Provide dedicated transformers for EV charging to be fed directly from conditional 600V CDPs. Integrate all EVSE with the Facility's central load management system to allow load shedding.

4.11.14.6 All EVSE will be networked with point-of-payment features, fault alert notifications and usage rules with complete remote management capabilities. Alerts will be integrated with the IBMP system.

## PART 5. FACILITY DESIGN REQUIREMENTS

5.1 Adaptability, Flexibility and Maintainability

5.1.1 Adaptability and Flexibility

5.1.1.1 Project Co will:

5.1.1.1(1) Provide a Design that will accommodate changes to uses and functions in the Facility with minimal impact to the Facility's structure and Building Systems, including the provisions for Future Expansion:

5.1.1.1(1)(a) Utilize Building Systems and Components that facilitate changes in the Facility configuration and changes in servicing;

5.1.1.1(1)(b) Minimize the need for the Authority to undertake maintenance that requires special safe work procedures and hazardous classifications;

5.1.1.1(1)(c) Provide a Design that accommodates program, service, work and equipment changes with minimized Utility infrastructure and impact;

5.1.1.1(1)(d) Locate permanent elements, such as stairs, elevators and duct shafts, and mechanical and electrical risers to minimize constraints on future changes to the Facility;

5.1.1.1(1)(e) Minimize interior columns for ease of planning and any future changes to the Facility;

5.1.1.1(1)(f) Ensure that columns will not impact the functionality and intended use of a room, corridor and or area;

5.1.1.1(1)(g) Provide a Design that does not use interior shear walls or interior cross-braces; locate shear walls to cores to minimize impact on Clinical Spaces;

5.1.1.1(1)(h) Provide adaptability and flexibility in highly technical areas, such as recovery areas, that contain many small rooms with stringent functional and ergonomic

requirements affecting the placement of Furniture and equipment;

5.1.1.1(1)(i) Provide additional capacity in mechanical and electrical services, including the following, as set out in Part 7:

5.1.1.1.1.(i).1 Vertical and horizontal risers;

5.1.1.1.1.(i).2 Distribution shafts; and

5.1.1.1.1.(i).3 Plenums.

5.1.1.1(1)(j) Ensure that additional capacity will accommodate service system improvements, new equipment, digitization, PACS, and current and future technologies;

5.1.1.1(1)(k) Accommodate the vertical and horizontal distribution of electrical and mechanical services to allow maintenance and changes to occur, including increasing capacity and lifecycle replacement of systems such as drains and domestic water piping, with no interruptions to BH operations, particularly where the need for service flexibility is highest;

5.1.1.1(1)(l) Provide building service systems and operations designed to minimize service disruptions to areas adjacent to Facility maintenance and renovation areas; and

5.1.1.1(1)(m) Provide a system of perimeter raceways for cable and fibre optic connections below and above each Operating Room for future equipment.

5.1.2 Maintainability

5.1.2.1 Project Co will:

5.1.2.1(1) Provide all equipment replacement, shipping and rigging routes, including strategic location of I-beams, lifting rigs and lifting eyes. Provide crane plans for equipment requiring removal / replacement by external crane;

5.1.2.1(2) Construct the Site to support the crane plus load weight as indicated by the crane lift plans;

5.1.2.1(3) Provide adequate equipment installation pathways and maintenance access clearances;

5.1.2.1(3)(a) Provide access for the replacement of equipment due to failure or life-cycle replacement without disruption to adjacent equipment and systems;

5.1.2.1(3)(b) Provide at all equipment locations front, back, and lateral clearance to comply with the manufacturers service clearance requirements or a minimum of 1500 mm floor space clearances, whichever is greater, at all locations where maintenance is to be performed;

5.1.2.1(3)(c) Ensure all equipment will be capable of being removed and replaced without the need to move other equipment. Location of mechanical services and equipment will be coordinated with other trades to ensure that access clearances are maintained; and

5.1.2.1(3)(d) Provide access from corridors only to the ceiling plenum for Building Systems maintenance. 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.

5.2 Post Disaster

5.2.1 Design all new, seismically independent structures of the Facility, including the parking and BH Energy Centre, to meet BCBC post-disaster requirements. Design the Facility, including the parking and BH Energy Centre, so that:

5.2.1.1 The need to protect the life safety of all Facility occupants and the need for continuing services following an earthquake or other disaster are considered and provided;

5.2.1.2 Except as provided for in the following clause for the event of an earthquake, the Facility remains operational and usable by the Authority for its intended functions both during and immediately after an event with no impact to Patients or ongoing critical and non-critical procedures.

5.2.1.3 Unless the design includes a seismic base isolation system approved by the Authority through the Review Procedure, the design is to be assessed in accordance with FEMA publication P-58 or an alternative assessment method approved by the Authority through the Review Procedure, the following results or equivalent or better results in such alternative assessment method are to be achieved:

5.2.1.3(1) Under the action of an earthquake having a probability of occurrence of 2% in 50 years, as defined in BCBC:

5.2.1.3(1)(a) The median repair cost, defined as the median cost to restore damaged components to their pre-earthquake condition, expressed as a percentage of the replacement value of the Facility, is no greater than 5%; and

5.2.1.3(1)(b) The median repair time, defined as the median time required to restore damaged components to their pre-earthquake condition when repair work is conducted in parallel throughout the Facility, is no greater than 30 days.

5.2.1.3(2) Under the action of an earthquake having a probability of occurrence of 40% in 50 years, as determined by Natural Resources Canada:

5.2.1.3(2)(a) The median repair cost, defined as the median cost to restore damaged components to their pre-earthquake condition, expressed as a percentage of the replacement value of the Facility, is no greater than 1%; and

5.2.1.3(2)(b) The median repair time, defined as the median time required to restore damaged components to their pre-earthquake condition when repair work is conducted in parallel throughout the Facility, is no greater than 10 days.

5.2.1.4 Essential services including all roof mounted equipment, electrical and communications systems, HVAC, steam, domestic water, fuel supply, sanitary drainage, storm systems, medical gases, fire protection and any roof mounted items will be designed and constructed to post-disaster standards as defined in BCBC. Locate and secure services in structures and enclosures that meet post-disaster standards as defined in BCBC.

5.2.2 Design the SFB, and any attached new structure, so that:

5.2.2.1 Any new structure is able to withstand post-disaster snow loads as defined in BCBC 2018;

5.2.2.2 The structure is able to withstand post-disaster wind loads as defined in BCBC 2018;

5.2.2.3 Any new concrete structure meets the concrete detailing requirements of Rd ≥ 2.0;

5.2.2.4 The combined SFB and any attached new structure have sufficient capacity to resist two-thirds (67%) of the seismic base shear associated with a Post-Disaster design level earthquake as defined in BCBC 2018, and that the SFB and new structure combined meets post-disaster interstorey drift requirements under this reduced seismic load;

5.2.2.5 A FEMA P-58 analysis, or equivalent analysis approved by the Authority through the Review Procedure, is to be carried out which includes analysis of damage to medical and non-medical equipment in the evaluation of repair cost and repair time at two design earthquake levels:

5.2.2.5(1) Under the action of an earthquake having a probability of occurrence of 2% in 50 years, as defined in BCBC; and

5.2.2.5(2) Under the action of an earthquake having a probability of occurrence of 40% in 50 years, as determined by Natural Resources Canada.

5.2.2.6 An analysis report describing the expected repair cost and time is to be provided to the Authority in order to facilitate a disaster management plan;

5.2.2.7 All new structural components, non-structural components, anchorages, and equipment are to be designed and constructed to post disaster importance standards in accordance with BCBC; and

5.2.2.8 Perform non-structural upgrading to the interiors of the building within the areas to be rennovated. Full building non-structural including exterior fall hazards as per Part L of the NBC 2015 Structural Commentary is not required.

5.2.3 Exterior Connections

5.2.3.1 Provide connections exterior to the Facility to allow delivery of the following:

5.2.3.1(1) Potable and fire water services;

5.2.3.1(2) Sanitary sewage waste pump out facility; and

5.2.3.1(3) Medical oxygen services.

5.2.3.2 Each system noted above will be provided with layby parking stall at the point of connection, each sized for HSU 11.5 m vehicles.

5.2.3.3 The design of the layby parking stalls will allow the oxygen, potable water, and sanitary sewage pump out connections to be accessed simultaneously while maintaining the Authority's 24/7 operations.

5.2.4 Catastrophic Event Management

5.2.4.1 Outbreak Control Zones

5.2.4.1(1) Provide Outbreak Control Zones as described in Section 5.10 Infection Control.

5.3 BH Energy Centre

5.3.1 Project Co will provide an BH Energy Centre to meet the following requirements:

5.3.2 The BH Energy Centre is the location where all the electrical energy required by the BH Campus and the Facility is either generated or distributed from Utilities to the buildings within the BH Campus, including the Facility.

5.3.3 The BH Energy Centre will provide energy capacity for the BH Campus and the Facility, as well as provision to easily service Future Expansion without disruption to ongoing operations;

5.3.4 Basic Requirements

5.3.4.1 The BH Energy Centre will:

5.3.4.1(1) Be designed as either a stand-alone building or integrated into Phase 1A or Phase 1B;

5.3.4.1(1)(a) If integrated into Phase 1A or Phase 1B; the BH Energy Centre will have Convenient Access to the loading dock for maintenance operations through Back-of-House circulation and a freight elevator which will serve all areas described in Appendix 3A [Clinical Specification and Functional Space Requirements].

5.3.4.1(1)(b) If designed as a standalone building, the BH Energy Centre will be designed to be consistent in form, character, materials, colours and details with those of the Facility and be contextually responsive to the adjacent neighbourhood(s);

5.3.4.1.1.(b).1 Provide oversized over head door to allow for equipment maintenance and replacement, minimum size 5500 mm wide and 7300 mm high.

5.3.4.2 Configure the BH Energy Centre to enable removal and replacement of major equipment without the need to relocate adjacent equipment or removal of any building components. Features such as, access corridors, openings, roof hatches and removable knock-out panels will be provided to allow for the replacement of major equipment through the BH Energy Centre exterior walls. The strategies, design and details for equipment removal and replacement will be reviewed and approved by the Authority through the Review Procedure.

5.3.4.3 The design of the BH Energy Centre will ensure maintenance access is provided to all equipment and eliminate or minimize confined spaces.

5.3.4.4 The BH Energy Centre will be expandable to accommodate Phase 2. The expansion must be adjacent to the existing BH Energy Centre. Incorporate a strategy to allow the access for installation and removal of major building equipment such as generators, transformers, switchgear, without disrupting the Authority's 24/7 operations.

5.3.4.5 Easy access will be provided and shown on drawings for moving any equipment in and out of the BH Energy Centre without disruption and major rework. Equipment replacement shipping and rigging routes will be defined, including strategic location of I-beams, lifting rigs and lifting eyes. Crane plans will be provided for any equipment requiring removal / replacement by external crane.

5.3.4.6 The design of the roof drainage and rainwater collection will be configured so that no piping containing rain water is routed over the switch gear.

5.3.4.7 Mechanical System Requirements

5.3.4.7(1) For mechanical system requirements, refer to following Sections 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, and 7.8.

5.3.4.8 Electrical System Requirements

5.3.4.8(1) For electrical design requirements, refer to the following Section 7.9.

5.4 Measurement and Verification

5.4.1 The Project Co will prepare and implement a Measurement and Verification Plan for both Phase 1A and Phase 1B, in order to document the measured performance of the Facility and to provide a mechanism to optimize actual energy performance and associated operating costs.

5.4.2 For Measurement and Verification requirements for Phase 1A, refer to Appendix 2D [Energy and Carbon Target]

5.4.3 For Measurement and Verification requirements for Phase 1B, Project Co will;

5.4.3.1 Prepare a Measurement and Verification Plan in its entirety;

5.4.3.1(1) The M&V Plan will be developed during design stage consistent with Option D IPMVP Volume three (3)-2003.

5.4.3.2 Establish a Measurement & Verification Design Energy Target;

5.4.3.2(1) Project Co will establish a design energy consumption target (MWh per year) for Phase 1B based on completed design stage energy model. This energy target and energy model for Phase 1B can be based on the required pre-construction stage energy model required as per BC Building Code 2018.

5.4.3.3 Measure, Record and Monitoring of Energy Consumption

5.4.3.3(1) Install equipment including metering as required to measure, record and monitor consumption of each individual energy end use that, at a minimum, represent 10% or more of the total modeled annual consumption of the Phase 1B Facility. Such equipment must be suitable and properly calibrated to enable a detailed monitoring of Energy trends and consumption to allow analysis of the data collected to enable various matters, including:

5.4.3.3(1)(a) comparisons to be made with the design energy targets (per 5.4.3.2) on an end-use basis;

5.4.3.3(1)(b) early warning of malfunctions and deviations from norms; and

5.4.3.3(1)(c) provide an Energy Dashboard to the Authority.

5.4.3.3(2) Secure all such properly recorded information so that it is not lost or degraded as a result of any equipment or service malfunctions, and will secure such information from any adjustment, modification or loss from any source.

5.4.3.4 Implement the Measurement and Verification Plan

5.4.3.4(1) Implementation of the Measurement and Verification Plan for Phase 1B will be consistent with Option D IPMVP Volume three (3)-2003 (Concepts and Options for Determining Energy Savings for new construction) as developed during the Design Phase per 5.4.3.1(1).

5.4.3.4(2) The Phase1B developed energy target should include an energy consumption allowance for Electric Vehicle charging to be recorded and monitored as part of the M&V process.

## 5.5 Commissioning (Cx)

### 5.5.1 General Requirements

5.5.1.1 The Commissioning process will be planned and executed in line with the standards and guidelines listed in Section 2.3.

5.5.1.2 Project Co will procure an independent Commissioning Authority (CxA), responsible for management and administration of the Commissioning process.

5.5.1.3 The CxA will fulfill the scope of work and documentation requirements of LEED v4 Fundamental and Enhanced Commissioning (6 Points) as applicable to Phase 1A. All other Schedule 3 [Design and Construction Specifications] Commissioning requirements outside of LEED documentation submissions will apply to both Phase 1A as well as Phase 1B scopes of work.

5.5.1.4 This section identifies and highlights key Commissioning requirements for the Project to supplement those of the referenced standards and LEED requirements.

5.5.1.5 Project Co is responsible for delivering a fully commissioned Facility to the Authority. This includes assisting the CxA in development of Commissioning Plan documentation and overall responsibility for scheduling and execution of the Commissioning work.

5.5.1.6 The Commissioning process will verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.

5.5.1.7 The CxA will provide regular reporting to the Authority throughout the Project to ensure that Project Co Commissioning activities are carried out in accordance with the Commissioning Plan.

5.5.1.8 All Project Co Commissioning documentation will be made available to the Authority throughout the Commissioning process and compiled for the Authority's records in the final Commissioning Report.

5.5.1.9 Refer to Appendix 3H [Commissioning] for additional requirements.

5.5.2 Commissioning Team Organizational Structure

5.5.2.1 The Commissioning Authority (CxA) will not be a member of a firm involved in the Design and Construction of the Facility.

5.5.2.2 The CxA will report directly to both the Authority and Project Co, and a conflict of interest declaration will need to be prepared by the CxA for Authority and Project Co review and approval for LEED compliance.

5.5.2.3 Refer to Commissioning Team Organizational Chart in Appendix 3H [Commissioning].

5.5.3 Systems to be Commissioned

5.5.3.1 The Commissioning requirements of Section 5.5, 5.6 and Appendix 3H [Commissioning] apply to all equipment or systems classified under the following list:

5.5.3.1(1) Concrete, Masonry, Metals, Wood, Plastics and Composites (Div 3-6; as applicable to building envelope)

5.5.3.1(2) Thermal and Moisture Protection (Division 7)

5.5.3.1(3) Openings (Division 8)

5.5.3.1(4) Specialties (Division 10)

5.5.3.1(5) Equipment (Division 11/12)

5.5.3.1(6) Special Construction (Division 13)

5.5.3.1(7) Conveying Equipment (Division 14)

5.5.3.1(8) Pneumatic Tube System

5.5.3.1(9) Food Services and Equipment, and Walk-In Cooler

5.5.3.1(10) Fire Suppression (Division 21)

5.5.3.1(11) Plumbing (Division 22)

5.5.3.1(12) Heating, Ventilating and Air Conditioning (Division 23)

5.5.3.1(13) Integrated Automation (Division 25)

5.5.3.1(14) Electrical (Division 26)

5.5.3.1(15) Communications (Division 27)

5.5.3.1(16) Electronic Safety and Security (Division 28)

5.5.3.1(17) Campus Perimeter Pathway System (Appendix 3R [Campus Perimeter Pathway System Technical Specifications])

5.5.4 Communication Protocols

5.5.4.1 Document Control and Submission

5.5.4.1(1) Project Co will establish and follow a document control program for Commissioning to ensure that submission of all inspection and test reports, training plans, and any other Commissioning documentation is done in a consistent and organized manner.

5.5.4.1(2) Test reports and other Commissioning documentation will be made available to the Authority in “real-time” throughout Commissioning and stored in a common location accessible to all project stakeholders, such that the appropriate documentation can be reviewed by the CxA, Authority and Compliance Team prior to proceeding with subsequent phases of the Cx process.

5.5.4.1(3) Commissioning documentation will be provided within 1-week of completion of the associated on-site inspection or testing.

5.5.4.1(4) Documentation will follow clear numbering and naming conventions and organized in such a way as to facilitate review and tracking by all project stakeholders.

5.5.4.1(5) The Cx Plan will include a list of all required documentation and its status, which will be maintained throughout the Project.

5.5.4.1(6) Document control system will be demonstrated prior to the start of any on-site Commissioning activities.

5.5.5 Process Administration

5.5.5.1 Meetings

5.5.5.1(1) Commissioning meetings will be held at the following frequency:

5.5.5.1(1)(a) Design stage – every second month

5.5.5.1(1)(b) Early Construction – monthly

5.5.5.1(1)(c) Pre-functional checkout – bi-weekly

5.5.5.1(1)(d) Functional and Integration Testing, Demonstrations, Training, Handover – weekly (6-months minimum)

5.5.5.1(1)(e) First 6 months post-Substantial Completion Date – bi-weekly

5.5.5.1(1)(f) 6-12 months post-Substantial Completion Date – every 2nd month

5.5.5.1(2) Commissioning meetings will include the following agenda items (at a minimum):

5.5.5.1(2)(a) Status of Commissioning Plan documents:

5.5.5.1.2.(a).1 Cx Checksheets, Vendor Reports

5.5.5.1.2.(a).2 Testing & Balancing (TAB) Plan(s)

5.5.5.1.2.(a).3 Functional and Integration Test Plans

5.5.5.1.2.(a).4 Demonstration to Authority Agendas

5.5.5.1.2.(a).5 Training plans

5.5.5.1(2)(b) Review of Commissioning Schedule as related to progress of install and Cx work on site

5.5.5.1(2)(c) Outstanding Cx documentation (based on completed Cx Activities to date)

5.5.5.1(2)(d) Commissioning Schedule look-ahead (activities targeted prior to next meeting)

5.5.5.1(2)(e) Review of high-priority Cx Issues Log items

5.5.5.1(2)(f) Status of systems manual and as-built drawing submissions

5.5.5.1(2)(g) Handover of spare parts and materials inventory

5.5.5.1(2)(h) Status of asset identification and labeling process, and information transfer to the Authority's Computerized Maintenance Management System (CMMS).

5.5.5.1(3) A dedicated envelope Commissioning meeting series will be held monthly throughout construction, separate from the above.

5.5.5.1(4) Discipline-specific Commissioning meeting series (e.g. Mechanical, Electrical, Communications, Electronic Safety and Security) will be established as required in order to facilitate focused review of the

above topics as applicable to each discipline during times where it is not practical or efficient to cover in a common meeting.

5.5.5.2 Progress Reporting

5.5.5.2(1) Cx progress reports will be provided at the following frequency:

5.5.5.2(1)(a) Design stage – every second month

5.5.5.2(1)(b) Early Construction – every second month

5.5.5.2(1)(c) Pre-functional checkout – monthly

5.5.5.2(1)(d) Functional Testing, Training, Handover – every two weeks

5.5.5.2(1)(e) First 6 months post-Substantial Completion Date – monthly

5.5.5.2(1)(f) 6-12 months post-Substantial Completion Date – every second month

5.5.5.2(2) Cx progress reports will provide the following information:

5.5.5.2(2)(a) Status of all Cx process deliverables

5.5.5.2(2)(b) Dashboard summary of the status of Prefunctional, Functional Test activities for all major systems

5.5.5.2(2)(c) Summary of progress since last progress report

5.5.5.2(2)(d) Commissioning Issues Log

5.5.5.3 Commissioning Schedule

5.5.5.3(1) Project Co will develop and maintain a sufficiently detailed Commissioning Schedule (Cx Schedule) to facilitate witnessing of Commissioning activities by the CxA, Authority or Compliance Team throughout all phases of the Commissioning process.

5.5.5.3(2) Cx Schedule is to be drafted during design phase and updated throughout construction.

5.5.5.3(3) Cx Schedule will include complete details of each step in the Commissioning process for every discipline/division.

5.5.5.3(4) The CxA will work with Project Co to develop a list of Commissioning events to be included in the Cx Schedule and integrated with the construction schedule.

5.5.5.3(5) Project Co and subtrades will be responsible for dates, duration and sequencing of all tasks in the Cx Schedule.

5.5.5.3(6) The Cx Schedule will be a subsection of the Construction Schedule, include clear and visible dependencies to Construction activities and highlight all critical path Commissioning activities.

5.5.5.3(7) After development of the initial Cx Schedule, the Cx team is to hold a meeting with all applicable Project Co team members and Authority representatives for detailed review of the Cx Schedule.

5.5.5.3(8) Project Co will address review comments from the Authority and Compliance Team throughout construction as required to ensure that the Cx Schedule meets all Schedule 3 [Design and Construction Specifications] requirements.

5.5.5.3(9) At a minimum, the Cx Schedule will be reviewed at every Commissioning meeting and updated version must be issued along with Commissioning meeting minutes.

5.5.5.3(10) Cx Schedule will provide line items for the following (at a minimum):

5.5.5.3(10)(a) Connection to Utilities

5.5.5.3(10)(b) Permanent power availability

5.5.5.3(10)(c) Building Systems requiring network and internet connectivity

5.5.5.3(10)(d) Building clean & readiness for ventilation activation for each air system (by zones)

5.5.5.3(10)(e) All four phases of Commissioning for all individual systems including sub-tasks detailing the Cx activities of each phase.

5.5.5.3(10)(f) Startup of all major equipment (contractor and vendor)

5.5.5.3(10)(g) Time period for submission of completed test reports

5.5.5.3(10)(h) Time period for Authority review of completed test reports

5.5.5.3(10)(i) Demonstration to consultants, demonstration to Authority and Compliance Team

5.5.5.3(10)(j) Clinical Functional Scenario Testing

5.5.5.3(10)(k) O&M Manual draft and final submissions

5.5.5.3(10)(l) Training for all equipment and systems

5.5.5.3(10)(m) Envelope Cx Activities

5.5.5.3.10.(m).1 High-level summary of each envelope subtrade's on site activities and construction checklisting period

5.5.5.3.10.(m).2 Envelope mock-ups

5.5.5.3.10.(m).3 Performance testing

5.5.5.3(10)(n) Clinical Equipment Commissioning activities

5.5.5.3(10)(o) Commissioning Report issuances

5.5.5.3(10)(p) Seasonal Testing

5.5.5.3(10)(q) Monitoring Based Commissioning (MBCx)

5.5.5.3.10.(q).1 MBCx report issuances

5.5.5.3.10.(q).2 MBCx process meetings

5.5.5.3(11) IM/IT Requirements for Cx Schedule

5.5.5.3(11)(a) Work with the Authority's IM/IT team to develop Commissioning schedule that allows sufficient time for the Authority's IM/IT team to plan, install and Commission network infrastructure supporting both Authority and Project Co Building Systems. Incorporate schedule interdependencies with IM/IT work as required.

5.5.5.3(11)(b) Related to the above, Project Co will ensure that Communications Rooms are ready for IT installations on the scheduled dates. This includes sealed floors, spaces dust free, provision of ventilation and/or temporary cooling, and other applicable requirements.

5.5.5.3(11)(c) The FMO Network is a critical component for the Commissioning of electrical and mechanical IP Building Systemss. Project Co will ensure the FMO Network is fast-tracked to support accelerated and optimized Commissioning schedules of FMO Buildings Systems.

5.5.5.3(11)(d) Cx Schedule will include at a minimum:

5.5.5.3.11.(d).1 Equipment ready schedule for Communication Rooms, EFs, MERs and associated room infrastructure to ensure that communication infrastructure is available to support Building Systems;

5.5.5.3.11.(d).2 3-month IM/IT completion and equipment ready date to all MER, TR, EF rooms prior to the start of the first Cx tests

5.5.5.3.11.(d).3 Structured Cabling testing and Commissioning;

5.5.5.3.11.(d).4 Completion schedule for the CPPS to ensure that this infrastructure is ready for the Authority and other third parties, to install the outside fibre and copper facilities into the Facility communication rooms.

5.5.5.3.11.(d).5 Communication Room readiness inspections and turnover. Prior to final signoff of the communications rooms the Authority will complete a final inspection of room readiness status; and

5.5.5.3.11.(d).6 Software Assessment Form (SAF) submission and review process.

5.5.5.4 Issues Logs

5.5.5.4(1) A Commissioning Issues Log will be maintained by the CxA throughout the Commissioning process and regularly updated and distributed to the Project team.

5.5.5.4(2) Commissioning Issues Log will include all items identified during design reviews, as well as issues noted during static inspections, start-up, functional testing, demonstration to consultant, demonstration to Authority, training or any other Commissioning activities. This includes any Authority review comments related to Commissioning or associated documentation.

5.5.5.4(3) All issues noted by the Cx Authority must be tracked in the Commissioning Issues Log for full transparency. Separate ‘internal’ deficiency lists will not be used.

5.5.5.4(4) Commissioning Issues will document how all issues were resolved and be included in the final Commissioning Report.

5.5.6 Design Stage Commissioning Requirements

5.5.6.1 Owner’s Project Requirements (OPR)

5.5.6.1(1) Schedule 3 [Design and Construction Specifications] will be considered to be the OPR for the Project as defined by LEED, CSA and other Commissioning standards.

5.5.6.1(2) CxA will review Schedule 3 [Design and Construction Specifications] for compliance with LEED requirements; and provide a summary report identifying any elements for which additional information may need to be provided by the Authority per LEED or best practice Commissioning requirements.

5.5.6.1(3) Project Co will be responsible for ensuring that all supporting OPR documentation required for the LEED Fundamental Commissioning prerequisite is compiled and submitted to the LEED certifier.

5.5.6.2 Basis of Design

5.5.6.2(1) The Basis of Design (BoD) is a written document that will provide detailed information on the design team's approach to meeting the Authority's requirements and to provide the Authority with a better understanding of design issues and secure the Authority's approval through the Review Procedure of critical design decisions. The BoD will be updated and expanded during design and construction as the Project evolves.

5.5.6.2(2) Project Co design team will submit updated an updated Basis of Design for all major systems at each design submission (30%, 50%, 70%, 90%, and 100%). Each submission must provide updated design rationale along with increasingly detailed system descriptions. Each submission will clearly identify changes and updates from previous versions to simplify the review process.

5.5.6.2(3) Basis of Design will be updated to as-built condition during the late stages of construction for incorporation into the Systems Manual.

5.5.6.3 Commissioning Design Reviews

5.5.6.3(1) The Commissioning Authority will be retained immediately upon Project Co award to facilitate review of RFP stage schematic design Technical Submission prior to the first (30%) Project Co Design stage submission.

5.5.6.3(2) CxA will review each Basis of Design submission for adequacy and completeness, and alignment with the Authority's requirements.

5.5.6.3(3) Commissioning Design Reviews will be performed at each design submission (30%, 50%, 70%, 90%, and 100%) and include detailed review of Commissioning facilitation as described in Appendix 3H [Commissioning].

5.5.6.3(4) Cx Authority design reviews will be submitted to the Authority for reference.

5.5.6.3(5) Comments requiring follow up will be documented in the Commissioning Issues Log. Project Co design team will provide responses to Cx Authority review comments prior to each subsequent design submission; responses will be incorporated into the Commissioning Issues Log.

5.5.6.3(6) Upon completion of Design stage, the Commissioning Issues Log will include a record of all Cx Authority design review comments along with a record of their resolution. Any remaining open issues will be carried on the construction stage Commissioning Issues Log to ensure they are resolved.

5.5.6.4 Collaborative Meetings

5.5.6.4(1) Project Co will organize collaborative meetings with the Authority during design stage to begin development of Clinical Functional Scenario Test Plans. Refer to Construction Stage Commissioning Requirements for details.

5.5.6.5 Commissioning Plan - Refer to Section 5.6.

5.5.7 Construction Stage Commissioning Requirements

5.5.7.1 Cx meetings – As per previous Cx Process Administration section.

5.5.7.2 Commissioning Schedule – As per previous Cx Process Administration section.

5.5.7.3 Commissioning will generally follow the phases described in this section. Each phase is applicable to each major and/or separate system.

5.5.7.4 Phase 1 – System and Equipment Readiness

5.5.7.4(1) The Commissioning team will perform and document static verification before start-up activities and functional performance testing.

5.5.7.4(2) Static completion includes verifying that the products used comply with the Shop Drawings and Performance Documents, that the name-plate data is recorded on the Data Collection Sheets, and that the installation of the equipment is in conformance with the manufacturer recommendations and industry standard trade practices.

5.5.7.4(3) CxA will review status of Project Co adherence to the Authority Software Assessment Form process for Building Systems software.

5.5.7.4(4) During this Project phase, the CxA will conduct bi-weekly site visits to review equipment and system installations, readiness for activation, and report on Serviceability of installed equipment. These will be documented in Commissioning Field Review reports.

5.5.7.5 Phase 2 – System Activation, Testing and Balancing

5.5.7.5(1) Each piece of equipment receives a documented pre-functional checkout by the installing contractor and/or equipment vendor. No sampling strategies are used. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

5.5.7.5(2) Subcontractor and vendor prefunctional checkout procedures for each system will capture the full functionality including integration with other Building Systems to ensure system readiness for successful Phase 3 Verification of System Performance by the CxA.

5.5.7.5(3) CxA will witness major equipment and system start-ups and provide field review reports summarizing each site visit. This will include at a minimum, the systems identified in the subsequent division-specific Commissioning requirements of Section 5.5.

5.5.7.5(4) Pre-functional checklists and test reports will be submitted and reviewed by the CxA, prior to proceeding with Phase 3 functional testing activities.

5.5.7.5(5) Any issues requiring follow up or that are otherwise relevant to commissioning or future operation and maintenance will be recorded in the Commissioning Issues Log.

5.5.7.5(6) Construction or installation errors, or any other issues or deficiencies impacting the ability of the equipment or systems to meet design intent, will be identified and remedied prior to proceeding to Phase 3 functional testing activities.

5.5.7.6 Phase 3 – Verification of System Performance

5.5.7.6(1) Phase 3 Activities will be sequenced as follows in the Commissioning Schedule: Functional Testing, Integration Testing, Demonstration to Consultant.

5.5.7.6(2) Scheduling of Functional and Integration Test activities will be shared with the Authority in advance, in a manner that allows for witnessing by Authority subject matter experts when the Authority has determined there is value in attending specific tests. Test dates must be provided to the Authority at least 14 days in advance.

5.5.7.6(3) Functional Testing will be completed with reports submitted by Project Co, reviewed by the Authority, and confirmed to be free of any issues impacting their ability to meet design intent prior to proceeding with Integration Testing of any associated systems.

5.5.7.6(4) Functional Testing

5.5.7.6(4)(a) Functional Testing will be performed using functional performance test plans specific to the requirements of the Project. The Commissioning Authority will determine the methods of functional performance testing for each piece of equipment or system to be tested and develop project-specific functional performance test scripts for all equipment and systems.

5.5.7.6(4)(b) Functional Test Plans will be produced to a level of rigor equivalent to the sample provided in Appendix 3H [Commissioning], including details of proposed test methodologies and expected responses.

5.5.7.6(4)(c) Functional Testing will include functional real-time tests of systems in all major modes of operation, catastrophic modes, equipment failure modes, recovery from loss of primary energy source (electricity or natural gas) and verification of spare capacity.

5.5.7.6(4)(d) CxA will coordinate, witness, document and report on functional performance tests performed by installing contractors and submit completed test reports using the approved Functional Test forms from the Cx Plan.

5.5.7.6(4)(e) Use of ‘Commissioning Agent’ subtrades by installing contractors (if applicable) does not lessen the responsibility of the Commissioning Authority in the Functional Testing or any other aspects of the Commissioning process.

5.5.7.6(4)(f) CxA sampling rates for functional testing of identical or near identical pieces of equipment will be as defined in Appendix 3H [Commissioning] at a minimum.

5.5.7.6(5) Integration Testing

5.5.7.6(5)(a) Testing of Integrations Between Building Systems

5.5.7.6.5.(a).1 Integration Testing will be completed as a discrete step following the completion of Functional Testing of individual integrated systems.

5.5.7.6.5.(a).2 Commissioning Schedule will identify dependencies between readiness of integrated systems (completed Functional Testing) required to proceed with Integration Testing.

5.5.7.6(5)(b) Integrated Life Safety Systems Testing

5.5.7.6.5.(b).1 Dry Run Testing of all Life Safety Systems integrations will be performed prior to Occupancy walkthroughs with the Governmental Authorities. Testing will be witnessed and documented by the CxA

5.5.7.6.5.(b).2 All systems interactions with Fire Alarm System will be tested including Fire Suppression, Mechanical, Access Control, Generator/ATS, nurse call, Radios, Vertical Transportation, Public Address, Lighting Controls, and Multimedia/AV systems, and pneumatic tube systems.

5.5.7.6.5.(b).3 Retesting will be completed as required for the CxA to verify that all interactions are functioning to design intent. Governmental Authority acceptance (Occupancy permit) does not resolve Project Co of this responsibility.

5.5.7.6(5)(c) Integrated System Operational Test (ISOT) - Project Co will perform and integrated test of all Building Systems on loss of normal Utility power and subsequent transfer to/from emergency/standby power sources. Testing will be witnessed and documented by the CxA and include the following items at a minimum.

5.5.7.6.5.(c).1 Emergency Lighting: Sample verification of Emergency Lighting.

5.5.7.6.5.(c).2 Lighting Control System: Verification of Digital Lighting Control System operation on transition from emergency/standby power back to Utility.

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|---|---|
| 5.5.7.6.5.(c).3 | Mechanical Systems: Verification of Mechanical Systems operation on transition to/from emergency/standby power (including any load shedding / restoration sequences) |
| 5.5.7.6.5.(c).4 | Fire Alarm and Smoke Control / Evacuation Systems: Initiate Fire Alarm under emergency/standby power and verify HVAC system response. |
| 5.5.7.6.5.(c).5 | Medical Gas Alarm Panels: Med Gas Alarm Panels operation on emergency/standby power. |
| 5.5.7.6.5.(c).6 | Pneumatic Tube Stations: Pneumatic Tube Stations operation on emergency/standby power. |
| 5.5.7.6.5.(c).7 | Critical Equipment: e.g. Medication Fridges, Omnicell, Patient Lifts, Receptacles operation on emergency/standby power. |
| 5.5.7.6.5.(c).8 | Communications Room Equipment: Data Rack Receptacles operation on emergency/standby power. |
| 5.5.7.6.5.(c).9 | Nurse call system: Nurse call system operation on emergency/standby power. |
| 5.5.7.6.5.(c).10 | Security System: Security System operation on emergency/standby power. |
| 5.5.7.6.5.(c).11 | Door Access Controls: Access Control Devices Operation on emergency/standby power. |
| 5.5.7.6.5.(c).12 | Generator: Operation under building load for not less than 2 hours (CSA C282) |
| 5.5.7.6.5.(c).13 | UPS: Verify operation of critical equipment supported on UPS Power |

5.5.7.6.5.(c).14 Elevators: Verification of all elevators' response to emergency/standby power.

5.5.7.6(5)(d) Integrated Life Safety Systems and ISOT Test Plans will include the following information:

5.5.7.6.5.(d).1 Test script detailing the specific functional requirements to be tested

5.5.7.6.5.(d).2 Where personnel will convene;

5.5.7.6.5.(d).3 Use of radios/cellular communication;

5.5.7.6.5.(d).4 Who will lead and direct each step of testing;

5.5.7.6.5.(d).5 Estimated durations of each testing step;

5.5.7.6.5.(d).6 System reset and preparation for next test condition;

5.5.7.6.5.(d).7 Which specific personnel will be tasked with verifying specific responses and from what locations;

5.5.7.6.5.(d).8 How test data will be collected from the various parties.

5.5.7.6(6) Demonstration to Consultant

5.5.7.6(6)(a) Project Co design team representative for each major system will participate in Functional and Integration Testing or arrange for a separate demonstration of system operation prior to Project Co proceeding with Phase 4 Cx activities. Results of these reviews will be documented in a field review report, and any issues or deficiencies noted will be recorded in the Commissioning Issues Log.

5.5.7.6(7) Test Report Submission and Review

5.5.7.6(7)(a) Minimum of 1-week will be provided for Authority review of completed Functional and Integration Test Report submissions prior to proceeding with subsequent testing, demonstration and/or training activities. This review period for reports related to each system will be included as line-items in the Commissioning Schedule.

5.5.7.7 Phase 4 – Demonstration and Acceptance

5.5.7.7(1) Submission of all Phase 3 Cx test documentation for any given system, review by the Authority, and confirmation that systems are free of any issues impacting their ability to meet design intent is a prerequisite to scheduling of Phase 4 activities.

5.5.7.7(2) Clinical Functional Scenarios

5.5.7.7(2)(a) Project Co will engage with all relevant Authority stakeholders such as FMO, Security / Integrated Protection Services, IM/IT, and Clinical staff to develop and participate in Clinical Response Scenario Functional Test Plans which will account for real life clinical scenarios that require integrated operation of Building Systems. This will include, at a minimum, aspects of the following systems operation:

5.5.7.7.2.(a).1 Public Address

5.5.7.7.2.(a).2 Intercom

5.5.7.7.2.(a).3 Access Controls and Door Hardware

5.5.7.7.2.(a).4 Intrusion Alarm

5.5.7.7.2.(a).5 Panic Duress

5.5.7.7.2.(a).6 Nurse Call (including site-wide integration)

5.5.7.7.2.(a).7 Vertical Transportation

5.5.7.7.2.(a).8 Fire Alarm

5.5.7.7.2.(a).9 Loss of Normal Utility Power

5.5.7.7.2.(a).10 Signage / Wayfinding

5.5.7.7(2)(b) Project Co will include placeholders for Clinical Functional Scenario Testing in the early design stage Commissioning Plan drafts, including all related documentation tracking systems and Cx Schedule.

5.5.7.7(2)(c) Project Co will engage Authority stakeholders in collaborative meetings to discuss Clinical Functional Scenario Test requirements for the Project and develop scenarios that will need to be verified based on project-specific design details. CxA, design team and construction team personnel will all participate.

5.5.7.7(2)(d) Collaborative meetings will be held at 90%-100% Design Stage and again at mid-construction stage once the related submittals are available and vendors have been selected.

5.5.7.7(2)(e) CxA will produce Clinical Functional Scenario Test Plans based on these meetings, which will be circulated for review and comment and included in the Commissioning Plan. Draft plans will be produced during design stage to provide an outline for testing program, which will be updated at mid-construction stage.

5.5.7.7(2)(f) Clinical Functional Scenario testing will only be scheduled upon completion of Phase 3 commissioning activities, including submission of all test reports associated with systems included in Clinical Functional Scenario Test Plans.

5.5.7.7(3) Demonstration to Authority

5.5.7.7(3)(a) Project Co will organize a demonstration of each system to the Authority and Compliance Team. This applies to equipment and systems belonging to all disciplines/divisions.

5.5.7.7(3)(b) Demonstration to be provided by qualified personnel with appropriate project-specific knowledge and capability. This will include installing contractor, manufacturer representative, controls contractor, balancer and Commissioning Authority, as necessary.

5.5.7.7(3)(c) Typical demonstration will include review of installation (system walk-down), demonstration of core functionality, failure modes / redundancy / back-up modes of operation, and integrations.

5.5.7.7(3)(d) Agenda for each session defined by the Authority and Compliance Team based on submitted test results, and any other relevant considerations.

5.5.7.7(3)(e) One 8-hour day will be allowed for demonstration of each system.

5.5.7.7(4) Training

5.5.7.7(4)(a) The training requirements outlined in this section will apply to equipment and systems belonging to all disciplines and divisions.

5.5.7.7(4)(b) Dedicated training plans will be produced by (or with support from) qualified manufacturer or subcontractor representatives for all equipment and systems.

5.5.7.7(4)(c) Training plans will be produced to a level of rigor equivalent to the sample provided in Appendix 3H [Commissioning].

5.5.7.7(4)(d) Training plans will include all relevant reference materials including system schematics, key sections from manufacturer's maintenance manual literature, maintenance schedules, and manufacturer/vendor training presentations.

5.5.7.7(4)(e) Project Co design team will provide design overview presentations to the Authority for each major discipline.

5.5.7.7(4)(f) Submission and Review Process

5.5.7.7.4.(f).1 Project Co will provide a summary of training plans to facilitate tracking of submission and review status. Refer to Appendix 3H [Commissioning] for a sample. This summary will be provided as part of the design stage commissioning plan submission and updated throughout construction.

5.5.7.7.4.(f).2 Training Plans will be submitted within 6-weeks of Reviewed submittals for any given equipment or system (i.e. equipment selection finalized and vendor retained).

5.5.7.7.4.(f).3 Draft training plans will be reviewed by the Commissioning Authority to ensure Schedule 3 [Design and Construction Specifications] compliance prior to submission to the Authority.

5.5.7.7.4.(f).4 Project Co will update training plans to address Authority review comments as required to obtain final approval.

5.5.7.7.4.(f).5 Approved training plans will be in place 9-months prior to Substantial Completion.

5.5.7.7(4)(g) Scheduling of Training

5.5.7.7.4.(g).1 Training sessions will be scheduled at a minimum 1-month in advance via (MS Outlook / .ics) calendar invite. Invites will include training plans and materials.

5.5.7.7.4.(g).2 Proposed training dates must be accepted by the Authority. Project Co will revise training schedule as needed to accommodate FMO availability.

5.5.7.7.4.(g).3 Training will only proceed as scheduled with approval of the Authority based on successful demonstration. Training will be re-scheduled if a system is deemed incomplete by the Authority. Rescheduling will be subject to minimum 1-month advance notice.

5.5.7.7(4)(h) FMO (O&M Personnel) Training

5.5.7.7.4.(h).1 Two (2) separate training sessions will be provided for each system, one week apart, to accommodate multiple shifts.

5.5.7.7.4.(h).2 Project Co will provide a minimum of 8 hours training on each equipment and system type if a specific duration is not specified elsewhere in Schedule 3 [Design and Construction Specifications].

5.5.7.7.4.(h).3 Provide printed and bound training materials specific to the equipment subject of the training, sufficient for each FMO staff member being trained.

5.5.7.7(4)(i) Clinical and Support Services User Group Training

5.5.7.7.4.(i).1 Dedicated training program will be provided for clinical and support services user group representatives.

5.5.7.7.4.(i).2 This training will be combined on the same dates as FMO training by

vendor representatives. A portion of the training plan will be tailored to this user group, and sessions will be organized and scheduled in a manner that facilitates clinical team attendance of only the portion relevant to them.

5.5.7.7.4.(i).3 Clinical and support services training will be the first portion of the training session when both parties will receive training. This allows for FMO to know what the users have been told as future reference and will allow the Clinical users to leave once their portion is complete.

5.5.7.7.4.(i).4 If schedule training sessions are insufficient to adequately cover all training topics to the satisfaction of the Authority for clinical, support services, and FMO personnel, then provide additional training day(s).

5.5.7.7(4)(j) Video Recording of Training

5.5.7.7.4.(j).1 Video recording will be provided by Project Co for all training sessions using a professional videographer service provider.

5.5.7.7.4.(j).2 All the trainers (and other speakers) will be mic'd and the sessions will be captured in High Definition (HD) video.

5.5.7.7.4.(j).3 Training videos will be organized, complete with titles, and placed into chapters for quick access.

5.5.7.7.4.(j).4 Training videos will be provided to the Authority no later than Substantial Completion.

5.5.7.7(5) User Acceptance Testing

5.5.7.7(5)(a) Following successful completion of the previously noted activities and handover of the Facility, Authority clinical user group personnel will perform User Acceptance Testing.

5.5.7.7(5)(b) Project Co will remain available to the Authority during this period to review any noted issues and assist with any adjustments to operation of Building Systems that may be required to meet functional requirements.

5.5.8 Commissioning Report and Systems Manual

5.5.8.1 Substantial Completion Cx Report

5.5.8.1(1) Project Co will submit a preliminary Commissioning Report within the 30-days prior to Substantial Completion for each of Phase 1A and Phase 1B.

5.5.8.1(2) The preliminary Commissioning Report will confirm that all construction phase commissioning activities have been completed and will include all associated documentation including completed test reports, and records of completed training as per the Commissioning Plan.

5.5.8.1(3) The Commissioning Report will be as defined in Appendix 3H [Commissioning].

5.5.8.1(4) The Authority will be provided with a digital version of the Commissioning Report with PDF Bookmarks to facilitate navigation of all sections and sub-sections.

5.5.8.2 Final Cx Report

5.5.8.2(1) An updated Final Commissioning Report will be submitted prior to completion of the Warranty Period for each of Phase 1A and Phase 1B.

5.5.8.2(2) The Final Commissioning Report will include all new and updated Commissioning documentation generated since the time of the preliminary Commissioning Report, including, updated Commissioning Issues Log, seasonal and deferred test reports, Monitoring Based Commissioning process reports and meeting records, and warranty review reports.

5.5.8.2(3) The Authority will be provided with a digital version of the Final Commissioning Report, as well as hard copies in accordance with Appendix 2K [Asset Management].

5.5.8.3 Systems Manual

5.5.8.3(1) Project Co will address the LEED v4 Commissioning prerequisite and credit requirements for Systems Manual, current facilities requirements, and Operations & Maintenance plan, as well a Project O&M manual requirements by incorporating these elements into a

single consolidated Systems Manual for each discipline (as applicable).

5.5.8.3(2) Systems Manual will be submitted within the 30-days prior to Substantial Completion for each of Phase 1A and Phase 1B.

5.5.8.3(3) The Authority will be provided with a digital version of the Systems Manual, as well as hard copies in accordance with Appendix 2K [Asset Management].

5.5.8.3(4) The Systems Manual will, at a minimum, contain the following:

5.5.8.3(4)(a) Operations & Maintenance Manual

5.5.8.3(4)(b) Preventative Maintenance Schedules

5.5.8.3(4)(c) Warranty information including itemized list of all extended warranties for the Project (including their start and end dates) based on the requirements identified in Schedule 3 [Design and Construction Specifications], the Project specifications, equipment submittals and manufacturer's product literature; and warranty contact information for subcontractors and vendors.

5.5.8.3(4)(d) List of ongoing maintenance services provided in contract (beyond Substantial Completion).

5.5.8.3(4)(e) List of all recommended Spare Parts

5.5.8.3(5) Suggested Systems Manual Table of Contents is provided in Appendix 3H [Commissioning] as a guideline, however Project Co will coordinate with the Authority to confirm the desired structure and organization through the submittal review process.

5.5.9 Operations / Warranty Stage

5.5.9.1 Seasonal Testing and Adjustments

5.5.9.1(1) CxA will lead Seasonal Testing of HVAC systems and provide summary reports documenting all findings.

5.5.9.1(2) Any issues identified will be including in an updated Cx Issues Log circulated with the report.

5.5.9.1(3) Seasonal Testing will be performed as three (3) discrete activities scheduled approximately 3, 6 and 9 months after the construction stage Functional Testing for associated systems.

5.5.9.1(4) Project Co will schedule testing to be conducted during shoulder season and peak heating/cooling outdoor conditions.

5.5.9.1(5) Refer to subsequent Division 23 Commissioning for detailed requirements.

5.5.10 Monitoring Based Commissioning

5.5.10.1 Monitoring Based Commissioning (MBCx) process requirements of LEED v4 will be executed in coordination with measurement and verification requirements for Project Phases 1A and 1B (Schedule 3 Part 5 Measurement and Verification, and Appendix 2D) and documented in a single Monitoring Based Commissioning Plan.

5.5.10.2 MBCx Plan will be in line with International Performance Measurement and Verification Protocol (IPMVP) requirements and capture all metering devices included in the design including electrical, gas, water, and energy (BTU) metering, and all mechanical equipment providing energy consumption data (i.e. BACnet devices with kW reporting such as VFDs, Chillers, EV chargers, etc.).

5.5.10.3 MBCx Plan will incorporate analysis and reporting from the Energy Management System defined in Part 7.9 of Schedule 3 [Design and Construction Specifications].

5.5.10.4 The MBCx Plan will include both Phase 1A and Phase 1B of the project and will include separate reporting periods related to each of these phases.

5.5.10.5 Project Co will develop the MBCx Plan in consultation with the Authority through the Review Procedure to align data collection, analysis and reporting with Authority requirements and existing energy analysis systems.

5.5.10.6 MBCx Plan will include quarterly MBCx process meetings during the Test Period (as defined in Appendix 2D Energy and Carbon Guarantees) and during the first year of operation of Phase 1B to review M&V/MBCx reports with the project team and determine an action plan for identifying and correcting operational errors and deficiencies, including review and update of the Commissioning Issues Log.

5.5.10.7 Collaborative meetings will be held between Project Co and the Authority to develop the MBCx Plan at the following milestones:

5.5.10.7(1) Design Development Phase

5.5.10.7(2) Construction Documents Phase

5.5.10.7(3) Prior to first BAS Controls Submittal

5.5.10.7(4) Prior to the start of Commissioning of BAS and metering devices

5.5.10.7(5) Substantial Completion (prior to start of monitoring period)

5.5.10.8 Updated MBCx Plan submissions will be provided by Project Co within 3-weeks of each of these meetings.

5.5.11 Warranty Review

5.5.11.1 CxA will lead a warranty review meeting and review on site 2-months prior to the end of the Warranty Period. This will include a review of the following items:

5.5.11.1(1) Authority feedback on

5.5.11.1(1)(a) Previously noted warranty issues

5.5.11.1(1)(b) Occupant comfort and indoor environmental quality

5.5.11.1(1)(c) Maintenance team observations, challenges, and issues to be considered for warranty claim

5.5.11.1(2) Status of O&M manuals and as-builts

5.5.11.1(3) Status and findings of MBCx process

5.5.11.1(4) Unresolved Commissioning Issues Log Items

5.5.11.1(5) Walkthrough for physical review of noted items

5.5.11.2 CxA will summarize results of the Warranty Review meeting and walkthrough in a summary report and updated Commissioning Issues Log.

5.5.12 Division-Specific Requirements

5.5.12.1 In addition to the Cx process requirements described elsewhere in Section 5.5, the discipline specific technical requirements of the following sections will apply.

5.5.12.2 Project Co design team Engineer of Record for each discipline will develop Commissioning specifications related to the Project-specific equipment and systems design which will also be reflected in the Commissioning Plan. Commissioning specifications will include Schedule 3 [Design and Construction Specifications] requirements as well as any other requirements applicable to their design.

5.5.13 Division 08 Openings

5.5.13.1 Doors and Door Hardware Commissioning

5.5.13.1(1) Project Co will perform and document a complete inspection of each and all interior and exterior doors and door hardware for the Facility to verify correct door type, hardware, operating devices, and electromechanical locking components are installed at the proper locations and fully functional.

5.5.13.1(2) Commissioning checklist will include the following: Smoke seals, acoustic seals, sweeps, gaskets, mutes, door protection, astragals, door bottoms, strike plates, strike plate dust box, electric strikes, automatic operator, lockset, mag lock, closer, closer adjustment for back-check and spring preload (opening effort lbs/ft) and closing

speed and latching speed, door slamming shut, wall stops, hold open device, hold open device, door to frame gaps, door to floor gaps, door to frame alignment, fire rating labels, door lites, signage affixed to door as per AAADM, remote keyed position, keypad, access card reader, coordinator and correct action of, no field modifications to the door assembly have been performed that void the label, excess holes in door or frame, missing or broken parts, door racked or warped or bent or dented, frame bent or dented, hinge bind, correct hinges installed, weather tight or airtight, caulking and sealants, auto door opening and closing speeds, body guard sensor(s), super scan sensors, correct lock function, key operation, correct keying, screws and fasteners flush to surfaces, screw heads not stripped, through bolts for operator arm, through bolts for astragal, latch protector, power transfer hinge or cable, auto door bottom and function, seals and weather-stripping and door bottom gasket not damaged or torn.

5.5.13.1(3) Completion of Door and Door hardware prefunctional checkout (along with prefunctional checkout of Div 28 Access Controls) for each opening in a given area will be a prerequisite to Functional Testing of Access Controls for that area.

5.5.13.1(4) Functional Testing of door hardware will include functional verification of all door hardware operation including all manual and automatic opening, closing, latching and locking functions as well as access control and security functions such as door contact switches, request-to-exit devices, card readers and keypads required for Division 28.

5.5.13.2 Refer to subsequent section for additional Envelope Commissioning requirements as related to Division 08 scope of work.

5.5.14 Envelope

5.5.14.1 LEED v4 Requirements

5.5.14.1(1) The complete building envelope system is required to be included in the Commissioning Plan.

5.5.14.1(2) Full compliance to LEED V4 Energy and Atmosphere Credit Enhanced Commissioning Option 2 Envelope Commissioning is required for the areas within the LEED boundary.

5.5.14.1(3) NIBS Guideline 3 (referenced in subsequent heading) will be the primary standard defining building envelope Commissioning process, however all other requirements of LEED v4 Energy and Atmosphere Credit Enhanced Commissioning Option 2 Envelope Commissioning must also be met.

5.5.14.2 National Institute of Building Sciences (NIBS) Guideline 3

5.5.14.2(1) The Envelope Commissioning process planned and executed in line with NIBS Guideline 3 Building Enclosure Commissioning Process BECx.

5.5.14.2(2) The Building Enclosure Commissioning Plan will be a sub-component of the overall Commissioning Plan and will read as a stand-alone document as well.

5.5.14.2(3) The Building Enclosure Commissioning Plan will align with NIBS Guideline 3 and define Project Co's approach to meeting its specific requirements from Schematic Design through Occupancy and Operations Phase.

5.5.14.3 Building Enclosure Specialist (BES)

5.5.14.3(1) Project Co will designate a qualified representative to act in the role of Building Enclosure Specialist (BES) and fulfill all requirements of this role defined in NIBS Guideline 3.

5.5.14.4 Building Enclosure Commissioning Authority (BECxA)

5.5.14.4(1) Project Co will designate a qualified representative to act in the role of Building Enclosure Commissioning Authority (BECxA) and fulfill all requirements of this role defined in NIBS Guideline 3.

5.5.14.4(2) The BECxA is an entity who is designated by the team to formally document the Project-specific Building Enclosure Commissioning. This entity must be trained, experienced and knowledgeable in the process of building enclosure Commissioning and possess basic architectural and building science knowledge of the design, performance, systems and construction related to the building enclosure.

5.5.14.4(3) The BECxA role may be accomplished by the BES, CxA or an additional member to the team.

5.5.14.5 Performance Testing

5.5.14.5(1) Project Co will perform the following testing (as applicable to the wall assembly types below if included in the design):

5.5.14.5(1)(a) Below Grade Waterproofing

5.5.14.5.1.(a).1 Testing will be performed at Terminations, the field of the wall, and penetrations through the waterproofing.

5.5.14.5.1.(a).2 Flood Testing of exterior walls (if practicable based upon backfill sequencing) or Hose Testing – spray and check for leakage with hose and garden nozzle.

5.5.14.5(1)(b) Air Retarders, Weather Resistive Barriers (WRB), Vapor Retarders

5.5.14.5.1.(b).1 AAMA 501.2 “Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems”.

5.5.14.5(1)(c) Masonry Wall Systems – Brick, Limestone, Granite, Concrete Block

5.5.14.5.1.(c).1 ASTM E 1601 Field Testing for Water Leakage through Masonry.

5.5.14.5.1.(c).2 ASTM E 1105 “Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference”.

5.5.14.5.1.(c).3 AAMA 501.2.03 – Quality Assurance and Diagnostic Water Leakage Field Check of installed storefronts, curtain walls, and sloped glazing systems.

5.5.14.5(1)(d) Aluminum and Glass Curtain Wall Systems

5.5.14.5.1.(d).1 ASTM E 1105 “Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, “Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference”.

5.5.14.5.1.(d).2 AAMA 501.2 “Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems”.

5.5.14.5.1.(d).3 ASTM E 783 “Standard Test Method for Field Measurement of Air Leakage

through Installed Exterior Windows and Doors".

5.5.14.5(1)(e) Metal Panels

5.5.14.5.1.(e).1 ASTM E 1105 "Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference".

5.5.14.5.1.(e).2 AAMA 501.2-03 – Hose testing of interfacing materials and metal-to-metal panel joints.

5.5.14.5(1)(f) Precast Concrete Panels/Glass Fiber Reinforced Concrete (GFRC)/Unitized Panels – Brick Clad, Panels, Limestone

5.5.14.5.1.(f).1 ASTM E 1105 "Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference".

5.5.14.5.1.(f).2 AAMA 501.2 "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems" – Hose testing of interfacing material joints.

5.5.14.5(1)(g) Sealant Joints

5.5.14.5.1.(g).1 AAMA 501.2 "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems".

5.5.14.5(1)(h) Sheet Metal, Parapet Caps, Metal Shingles, Gutters

5.5.14.5.1.(h).1 AAMA 501.2 Testing – Water Penetration hose testing of sheet metal, parapet caps, metal shingles, diverters, gutters can be performed by spraying with a hose + garden nozzle.

5.5.14.5(1)(i) Expansion Joints

5.5.14.5.1.(i).1 Testing – Air and Water Penetration, Thermal - Heat, Air and moisture (vapor + liquid) must be tested/inspected. AAMA 501.2 – Hose Testing.

5.5.14.5(1)(j) Roofing

5.5.14.5.1.(j).1 Hose Testing – Spray testing of mechanical curbs, parapets, penetrations, flashings.

5.5.14.5.1.(j).2 Flood Testing (The structural engineer must be consulted and formal permission obtained prior to any flood testing of roofing systems).

5.5.14.6 Phase 1B Envelope Commissioning Requirements – without excluding any of the other Schedule 3 [Design and Construction Specifications] envelope commissioning requirements, Project Co will perform the following as related to the Phase 1B envelope Cx process:

5.5.14.6(1) Existing Roofs

5.5.14.6(1)(a) Assist the Authority in obtaining a roof survey, which would describe the condition of the existing roof, membranes, parapets, copings, flashings and may involve on-site exploratory cuts to verify actual assemblies.

5.5.14.6(1)(b) Identify the slopes of the existing roof and secondary drainage locations (scuppers).

5.5.14.6(1)(c) Conduct water leakage and thermal tests at all junction points between new and existing roof, in particular, at expansion joints.

5.5.14.6(2) Existing Exterior Wall Assemblies

5.5.14.6(2)(a) Assist the Authority in identifying existing materials/assemblies and condition, which may include on-site exploratory cuts.

5.5.14.6(2)(b) Conduct water and air leakage and thermal tests at all junction points between new and existing walls, in particular at expansion joints.

5.5.14.6(3) Existing Curtainwall/Windows/Doors

5.5.14.6(3)(a) Assist the Authority in identifying existing materials/assemblies and condition, which may include on-site exploratory cuts.

5.5.14.6(3)(b) Conduct water and air leakage and thermal tests at all junction points between new and existing assemblies, in particular, at expansion joints.

5.5.15 Equipment

5.5.15.1 Equipment, including Category 1 to 5 and all items required under Appendix 2E, 2J, 2L and 3F, will be included in the Commissioning process and Commissioning Plan.

5.5.15.2 All Project Co and Authority supplied equipment is to be included in the Commissioning Schedule. Refer to the Clinical Equipment Logistics Plan as defined in Appendix 2E [Clinical Equipment and Furniture]. The Clinical Equipment Lead and equipment vendors will provide input into this portion of the Cx Schedule for timelines and durations.

5.5.15.3 Project Co will ensure that the Facility's services infrastructure needed for Commissioning of each piece of equipment is reviewed and coordinated for all equipment (including Authority supplied) and those requirements identified in the Cx Schedule.

5.5.15.4 Project Co will produce a list of all equipment items for tracking of the Commissioning and handover process and associated deliverables.

5.5.15.5 Commissioning Plan will include a standard equipment handover form to be completed for all Equipment items, as well equipment-specific manufacturer's Commissioning documentation as applicable. Sample provided in Appendix 3H [Commissioning]. Project Co will develop project-specific form in consultation with the Authority through the Review Procedure.

5.5.15.6 Medical Device Reprocessing Department (MDRD) Equipment

5.5.15.6(1) Commissioning Plan and Cx Schedule will include details of medical device reprocessing MDRD commissioning including steam sterilizer equipment operational qualification per CAN/CSA Z314.

5.5.16 Conveying Equipment

5.5.16.1 All emergency back-up systems will be tested prior to Commissioning of elevators to ensure generators, switchgear, controllers and transfer systems are fully operational and function as intended for the elevator to function. The tests must be documented, witnessed and signed off by the elevator consultant of record, elevator installation company, and Authority or their designates.

5.5.16.2 Safety Authority Inspections

5.5.16.2(1) An inspection for life safety and code compliance by the applicable safety authority will be provided under the base price.

5.5.16.2(2) Safety authority inspections will be submitted to the CxA and Authority for review and inclusion in the Commissioning Report.

5.5.16.3 Elevator Commissioning Checksheets

5.5.16.3(1) Detailed checksheets will be prepared by the elevator subcontractor to verify all aspects of basic elevator operation meets specified requirements, including directional lanterns, position indicators, dispatching, hall buttons, disabled persons audible/visual indications, ride quality/performance, user training, elevator management system, firefighters emergency operation, emergency/standby power operation, and medical emergency operation.

5.5.16.3(2) All the above functions will be tested and verified using the checksheets, prior to use by the public.

5.5.16.3(3) Draft elevator Commissioning checksheets will be submitted to the CxA at design stage for inclusion in the Commissioning Plan, then updated as required during construction.

5.5.16.3(4) All completed checksheets will be submitted to the CxA and Authority for review and inclusion in the Commissioning Report.

5.5.16.4 Full Load Drop Test

5.5.16.4(1) Full load drop test will be performed by Project Co with data logger reports submitted to the Authority and CxA.

5.5.16.5 Ride Quality Testing

5.5.16.5(1) Project Co elevator contractor and elevator subconsultant will provide testing of ride quality per ISO 18738 Measurement of Ride Quality. A ride quality test plan will be produced by the elevator consultant and included in the Commissioning Plan.

5.5.16.5(2) Test plans and reports will be in line with ISO 18738 and include data logger reports verifying that all ride parameters are in line with Schedule 3 [Design and Construction Specifications] requirements and the LMFM Elevator Technical Guidelines.

5.5.16.6 Pre-Test Elevators (firefighters emergency operation/emergency/standby power operation/medical emergency operation)

5.5.16.6(1) A minimum of one (1) site visit at a time acceptable to the Authority for pre-testing of the fire alarm, emergency/standby power generator, and medical emergency operation signals, as well as elevator operation under these conditions, with the electrical subcontractor.

5.5.16.6(2) This will include for activation of various fire alarm initiating devices (heat and smoke detectors) to trigger recall of the elevator(s).

5.5.16.6(3) This will include for activation of the transfer switch signal, as well as pre-transfer signal if applicable, to trigger emergency/standby power operation of the elevator(s).

5.5.16.6(4) This will occur after the elevator work on each elevator is completed and will be scheduled by the elevator subcontractor.

5.5.16.7 Final Test Elevators (firefighters emergency operation/emergency/standby power operation/medical emergency operation)

5.5.16.7(1) A minimum of two (2) site visits for final testing of the fire alarm, emergency/standby power generator, and medical emergency (e.g. Code Blue) operation signals, as well as elevator operation under these conditions: a minimum of one (1) visit with the electrical subcontractor and the relevant elevator safety authority, and a minimum of one (1) visit with the electrical subcontractor and the building code inspector from the local jurisdiction.

5.5.16.7(2) This will include for activation of various fire alarm initiating devices (heat and smoke detectors) to trigger recall of the elevator(s).

5.5.16.7(3) This will include for activation of the transfer switch signal, as well as pre-transfer signal if applicable, to trigger emergency/standby power operation of the elevator(s).

5.5.16.7(4) This will occur after the elevator work on each elevator is completed and will be scheduled by the elevator subcontractor at a time acceptable to the Authority.

5.5.16.8 Clinical Functional Scenario Testing

5.5.16.8(1) The Elevator subcontractor will also visit site for integrated systems testing with the Commissioning team, which will include operation of elevator under different clinical and failure testing scenarios. For example: Stage 2 Fire Alarm, responding to a Code Blue and activating a wireless duress device all simultaneously.

5.5.16.9 The CxA will include the above elevator testing items in the Commissioning Schedule, will witness testing, and will include testing documentation in the Commissioning Report.

5.5.17 Pneumatic Tube

5.5.17.1 Pneumatic Tube System (PTS) Commissioning will be as per the general Cx process requirements of Section 5.5 and will include the following additional activities.

5.5.17.2 Project Co's PTS vendor representative will support the Authority in planning and execution of testing to ensure that sample integrity and blood component/product integrity is maintained when transported through the Pneumatic Tube System.

5.5.17.3 CxA Functional Testing will include all aspects of PTS operation including integration with the Building Automation System.

5.5.18 Food Service Equipment

5.5.18.1 Commissioning Plan will include details of commissioning by factory trained manufacturer representatives for food service equipment where identified in Appendix 2L [Food Service Equipment]. This will include kitchen equipment pre-Cx readiness and manufacturer start-up checklists.

5.5.18.2 Kitchen equipment contractor will provide input into the Commissioning Schedule to define sequencing for Commissioning and of kitchen ventilation and fire suppression systems and manufacturer start-up of Food Service Equipment.

5.5.18.3 Fire Suppression System

5.5.18.3(1) Complete system to be tested, Commissioned and certified as required to constitute a fully approved system installed in accordance with NFPA96, 17A, ULC/ORD 1254.6 and authorities having jurisdiction.

5.5.18.4 Exhaust Hood

5.5.18.4(1) Complete system to be tested, Commissioned and certified as required to constitute a fully approved system installed in accordance with NFPA96, 17A, and authorities having jurisdiction.

5.5.19 Fire Suppression (Division 21)

5.5.19.1 Fire protection systems, along with fire safety measures, provide protection to occupants in the Facility. Commissioning process will address the verification and performance testing of the fire protections systems that detect, alarm against, and control the spread of fire and smoke.

5.5.19.2 Commissioning of fire protection systems will be completed as per:

5.5.19.2(1) NFPA 3: Standard for Commissioning of Fire Protection and Life Safety Systems.

5.5.19.2(2) CAN/ULC-S1001 Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems

5.5.19.2(3) CAN/CSA Z8001-13 Commissioning of Healthcare Facilities

5.5.19.3 Commissioning Authority (CxA) will act in the role of Fire Commissioning Agent (FCxA), as defined in NFPA 3:

5.5.19.3(1) Fire Commissioning Agent (FCxA): A Person or entity identified by the Authority who leads, plans, schedules, documents, and coordinates the fire protection and Life Safety Systems Commissioning team; and implements the fire protection and Life Safety Systems Commissioning process.

5.5.19.4 The intent of Commissioning required laid in the above noted NFPA and CSA standards is to supplement, not replace, the requirements of Governmental Authority and applicable codes.

5.5.19.5 All fire protection system elements will be commissioned. These include fire suppression services, including automatic sprinkler systems; standpipes; portable extinguishers; and special extinguishing media systems;

5.5.19.6 CxA will witness fire pump start-up and verification and provide field review report summarizing results.

5.5.19.7 Acceptance Testing

5.5.19.7(1) Acceptance testing involves a number of activities that must be performed, witnessed, and documented. These activities are as follows:

5.5.19.7(1)(a) Functional test of the system alarm device

5.5.19.7(1)(b) Trip and water transit time for dry-pipe systems

5.5.19.7(1)(c) Trip test for deluge/preaction systems

5.5.19.7(1)(d) Pressure-reducing valve test (if present)

5.5.19.7(1)(e) Hydrostatic test

5.5.19.7(1)(f) Main drain test

5.5.19.7(2) The completion of these tests can be documented on the contractor’s material and test certificate, however these activities will also be witnessed by the CxA and documented in a field review report.

5.5.19.7(3) Acceptance testing will be detailed in the Commissioning Schedule for each individual Fire Protection System.

5.5.19.8 Integrated Life Safety Systems Testing will be per CAN/ULC S1001 and as defined elsewhere in Section 5.5.

5.5.20 Plumbing (Division 22)

5.5.20.1 Commissioning related to plumbing systems will include, at a minimum, the following elements:

5.5.20.1(1) Incoming municipal water pressure.

5.5.20.1(2) Pressure reducing valve set points and downstream pressures.

5.5.20.1(3) Domestic Water Heaters

5.5.20.1(4) Central and individual tempered water mixing valve set points.

5.5.20.1(5) Balancing of the domestic hot water recirculation systems.

5.5.20.1(6) Setting of temperature limit stops on all shower valves with maximum temperatures recorded for each fixture.

5.5.20.1(7) Plumbing fixtures including adjustments of all flush valves.

5.5.20.1(8) Booster pumps

5.5.20.1(9) Set points for all control devices.

5.5.20.1(10) Testing and certification of all backflow preventers.

5.5.20.1(11) Sump pump operation and verification of all alarms.

5.5.20.1(12) Medical gas equipment start-up and certification inspections

5.5.20.2 Documentation will be provided for start-up, configuration, adjustment, functional testing, and recording of the operational data for all plumbing equipment listed above and for any other equipment applicable to the design.

5.5.20.3 Functional Test Plans will incorporate the performance criteria specified in Table 1 of CAN/CSA Z317.1

5.5.20.4 CxA will witness major equipment and system start-ups and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.20.4(1) Reverse osmosis filtration system

5.5.20.4(2) Domestic water booster pumps

5.5.20.4(3) Domestic hot water heaters

5.5.20.4(4) Medical air and vacuum equipment

5.5.21 Heating, Ventilating and Air Conditioning (Division 23)

5.5.21.1 Phase 1 – System and Equipment Readiness

5.5.21.1(1) Follow the standard Commissioning process requirements defined elsewhere in Section 5.5.

5.5.21.1(2) Pre-finishing inspection and testing of critical rooms to be completed per the recommendations of CSA Z8001 Annex J & K.

5.5.21.1(2)(a) Project Co CxA and design team will provide inspections of any ORs, ICUs, PACUs, and/or special service areas following drywall installation but prior to final finishes.

5.5.21.1(2)(b) Project Co will provide all necessary equipment such as blower door assemblies, and pressure and airflow monitoring equipment required to obtain leakage rate of the room shells prior to closing in the rooms.

5.5.21.1(2)(c) Perform remedial actions to caulking and sealing as required to ensure that architectural features of the room that affect air seals and air flow are built in accordance with the room design such that the room will meet relative pressurization requirements of the design, CAN/CSA-Z317.2, and / or other accreditation guidelines and standards for the type of area being tested.

5.5.21.2 Phase 2 – System Activation, Testing and Balancing

5.5.21.2(1) CxA will witness major equipment and system start-ups and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.21.2(1)(a) Chillers

5.5.21.2(1)(b) Heat pumps

5.5.21.2(1)(c) Heat recovery chillers

5.5.21.2(1)(d) Steam boilers

5.5.21.2(1)(e) Hot water boilers

5.5.21.2(1)(f) Cooling towers

5.5.21.2(1)(g) Room pressure monitoring and airflow controls

5.5.21.2(2) Controls – Refer to subsequent Integrated Automation section.

5.5.21.2(3) Testing and Balancing (TAB)

5.5.21.2(3)(a) At least 90-days prior to the start of TAB, Project Co TAB agent subcontractor will produce a TAB Plan, which includes the following components:

5.5.21.2.3.(a).1 A list of the test instruments that are planned to be used in the testing and

balancing process. Each instrument manufacturer, model number, and test application must be included.

5.5.21.2.3.(a).2 A description of the testing procedure for each HVAC system to be tested. List all of the equipment to be tested for each system and the techniques to be used for the testing procedure.

5.5.21.2.3.(a).3 Summary of all control setpoints required by design, along with the methodology that will be used to determine each. This will include differential pressure setpoints for hydronic systems; and static pressure setpoints and minimum outdoor air damper positions for ventilation systems.

5.5.21.2.3.(a).4 How system diversity factor will be considered in the determination of above.

5.5.21.2.3.(a).5 Procedure for verifying maximum ductwork velocity per Schedule 3 [Design and Construction Specifications] requirements.

5.5.21.2.3.(a).6 A list of the contractors that are required to assist with the testing and balancing process along with the expectations of each of the contractors to successfully complete a total system balance.

5.5.21.2.3.(a).7 Expectations of the controls contractor including required level of completion/control of automation software, automation system access, and the development of global overrides for system maximum performance testing.

5.5.21.2.3.(a).8 An outline of the required construction completeness prior to starting the testing and balancing process

5.5.21.2.3.(a).9 A realistic estimate of the time required to complete the testing and balancing process, broken out by each major system

5.5.21.2(3)(b) Project Co will organize an on-site meeting with TAB agent and the Authority prior to the start of TAB to review the TAB Plan.

5.5.21.2(3)(c) CxA will review air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.

5.5.21.2(3)(d) Air and water balancing will be completed with reports submitted prior to proceeding with Functional Testing of associated systems.

5.5.21.3 Phase 3 – Verification of System Performance

5.5.21.3(1) Functional Testing

5.5.21.3(1)(a) Functional Test Plans will incorporate the performance criteria specified in Table 1 of CAN/CSA Z317.2.

5.5.21.3(1)(b) During Functional Testing, systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with contract documents and design criteria.

5.5.21.3(1)(c) Functional Test Plans will include details of expected available load and methods for false-loading.

5.5.21.3(1)(d) Functional Test results must clearly identify any aspects of operation that could not be tested at full operating capacity. Seasonal testing will then be scheduled to complete full load testing during the first year of operation.

5.5.21.3(2) Seasonal Testing

5.5.21.3(2)(a) Regardless of the results of the initial Functional Testing completed during Construction Period, the following systems will undergo Seasonal Testing to ensure that functionality has been verified during through a complete range of operating conditions and loads:

5.5.21.3.2.(a).1 Hydronic heating system

5.5.21.3.2.(a).2 Chilled and condenser water systems

5.5.21.3.2.(a).3 Heat recovery systems

5.5.21.3.2.(a).4 Air handling units

5.5.21.3.2.(a).5 HVAC zone controls / terminal units

5.5.21.3(2)(b) Seasonal Testing will include review of the following:

5.5.21.3.2.(b).1 Discussion with building operations team to gather feedback on any known issues or challenges in operation, and occupant complaints. Any items reported will be included in scope of seasonal review.

5.5.21.3.2.(b).2 HVAC equipment start-up, failover and lead/lag switchover during peak heating/cooling conditions.

5.5.21.3.2.(b).3 Available capacity during peak heating/cooling load conditions.

5.5.21.3.2.(b).4 Equipment turndown capability, on/off cycling.

5.5.21.3.2.(b).5 Staging of heat recovery, free cooling, and boiler/chiller.

5.5.21.3.2.(b).6 Range of variable flow systems pump/fan modulation.

5.5.21.3.2.(b).7 Review of BMS trend reports and alarms.

5.5.21.3.2.(b).8 Any remaining open Commissioning Issues Log items.

5.5.22 Integrated Automation (Division 25)

5.5.22.1 Controls Integration Meetings

5.5.22.1(1) Project Co will organize a series of controls integration review meetings with design team, BMS contractor, CxA, Authority and Compliance Team to review control strategies, integration and overall design intent.

5.5.22.1(2) Meetings will be held at the following milestones

5.5.22.1(2)(a) Design Development Phase

5.5.22.1(2)(b) Construction Documents Phase

5.5.22.1(2)(c) During BMS Controls Submittal Review Process

5.5.22.1(2)(d) After finalized BMS Controls Submittal, prior to Functional Testing

5.5.22.2 Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness BMS Commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.22.2(1) Integration with equipment local controllers

5.5.22.2(2) Sensor and actuator sample calibration checks

5.5.22.2(3) BMS Graphics and Trend Log readiness for Functional Testing

5.5.22.3 BMS contractor will submit completed end-to-end point checkout report and verification of programming functionality for a given system prior to Functional Testing by the CxA.

5.5.22.4 BMS contractor will configure multi-trend reports for each system prior to Functional Testing by the CxA to support analysis of system operation.

5.5.22.5 Multi-trend log reports will include groups of dependent operating parameters such as those defined in the examples below:

5.5.22.5(1) Outdoor and return air damper positions, heating and cooling control valve positions and outdoor, return and supply air temperatures.

5.5.22.5(2) Lead/Lag pump speeds, bypass control valve positions, end of line differential pressure reading and setpoint.

5.5.22.5(3) Terminal unit damper position, control valve position, supply air temperature, and radiant panel control valve position.

5.5.22.6 Project Co will provide a BMS that is free of alarms and manual overrides, and integrated with the Authority's existing system prior to Authority final acceptance.

5.5.23 Electrical (Division 26)

5.5.23.1 Electrical Commissioning will be carried out on complete and fully integrated systems in compliance with CAN/CSA Z8001, CSA Z32, and other applicable codes and standards.

5.5.23.2 Project Co will develop the electrical sections of the Commissioning Plan as a coordinated effort between the CxA, independent testing agent (ITA), and Division 26 contractor and vendors. Commissioning Plan will include all required checksheets, forms, and reports from each of these parties.

5.5.23.3 Independent Testing Agent (ITA)

5.5.23.3(1) Project Co will engage a specialty electrical testing organization to perform the inspection and test procedures for all electrical equipment as defined in Part 7.9 (Electrical).

5.5.23.3(2) The ITA will be an independent, third party entity which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems being evaluated.

5.5.23.3(3) The ITA will provide a detailed Cx Schedule section related to their scope of work to be incorporated into the overall Cx Schedule.

5.5.23.3(4) The ITA will provide all commissioning forms, checksheets and representative sample test reports under their scope to the CxA for incorporation into the overall Commissioning Plan.

5.5.23.3(5) All ITA inspection and test reports will be submitted to the Authority per the document control protocols defined elsewhere in Schedule 3 [Design and Construction Specifications].

5.5.23.4 Electrical Commissioning Schedule will include all Division 26 Cx activities, including the following components, at a minimum:

5.5.23.4(1) Transformers (HV and LV) testing

5.5.23.4(2) Megger testing

5.5.23.4(3) Ground testing

5.5.23.4(4) Pre-energization (cold Commissioning) checkout of distribution

5.5.23.4(5) Protective device testing

5.5.23.4(6) Energization of electrical distribution

5.5.23.4(7) Activities will be detailed by equipment tag for distribution (i.e. specific switchgear)

5.5.23.4(8) Generator start-up and load testing

5.5.23.4(9) Emergency electrical power supply operational test and maximum site design load test (per CSA 282; Part 10)

5.5.23.4(10) Vendor Commissioning activities

5.5.23.4(11) Patient Care Area Testing (CSA Z32)

5.5.23.4(12) Load balance testing

5.5.23.4(13) Thermographic (infrared) surveys

5.5.23.4(14) All other inspection and testing requirements of Part 7.9 (Electrical).

5.5.23.5 CxA will witness major equipment and system start-ups and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.23.5(1) Generator and ATS

5.5.23.5(2) Emergency electrical power supply operational test and maximum site design load test (per CSA 282; Part 10)

5.5.23.5(3) Energy management system

5.5.23.5(4) Electrical sub-metering

5.5.23.5(5) UPS

5.5.23.5(6) Lighting controls

5.5.23.6 Emergency Power Supply System

5.5.23.6(1) Commissioning Plan will include details regarding:

5.5.23.6(1)(a) Site Acceptance Test Plans for Master Control System including all paralleling and load management control.

5.5.23.6(1)(b) Test script and checksheets will be provided to detail all how all sequences of operation will be tested including redundancies and failure scenarios and use of load banks to facilitate testing.

5.5.23.6(1)(c) Details will be provided on how Master Control System reporting will be used for acceptance testing and configured for ongoing maintenance and testing by the Authority. Representative sample Master Control System reports to be provided for review.

5.5.23.6(1)(d) Operational Test and Maximum Site Design Load Test (per CSA 282; Part 10).

5.5.23.6(1)(e) Narrative description describing the phased commissioning of the Emergency Power Supply and associated control systems as related to initial energization of the BH Energy Centre serving existing the Support Facilities Building and subsequent completion of downstream electrical distribution serving Phase 1A and 1B, and overall project completion. This will include discussion regarding the extent of testing and commissioning activities that will be performed at each of

these milestones and how this will ensure that a safe and reliable power supply will be maintained throughout.

5.5.23.7 Electrical Sub-Metering

5.5.23.7(1) Vendor representative will perform Commissioning of electrical sub-metering equipment.

5.5.23.7(2) Commissioning Report to be submitted including record of meter installation, complete list of all devices installed, configuration of IP addresses, labels, PT and CT ratios, and configuration of interface with BMS system (Fieldserver or similar) or outside monitoring and/or collection of metering data.

5.5.23.8 Lighting Controls

5.5.23.8(1) Pre-functional checkout for lighting control system to be performed and documented by a qualified manufacturer's representative. Test reports documentation to include:

5.5.23.8(1)(a) As-built relay and/or device schedules.

5.5.23.8(1)(b) Control narrative describing the operation of the system as programmed. Narrative must include description of control strategies used for typical zones, occupancy sensor and daylighting settings, programmed schedule groups, and details on any integration with BMS, security, fire alarm or other systems.

5.5.23.8(1)(c) List of any issues noted during Commissioning

5.5.23.8(2) Functional Testing of lighting controls to be completed and documented by the CxA following the requirements of ASHRAE 90.1 for Independent Functional Testing.

5.5.24 Communications (Division 27)

5.5.24.1 Commissioning General Requirements for Division 27

5.5.24.1(1) Follow the standard Commissioning process requirements defined elsewhere in Section 5.5 and the PHSA Communications Infrastructure Standards and Specifications.

5.5.24.1(2) Project Co will provide a detailed section of the Cx Schedule related to all Communications systems scopes of work which will be maintained during all phases of project delivery. Refer also to IM/IT Requirements for Cx Schedule, Section 5.5.5.3(11).

5.5.24.1(3) Project Co will coordinate a series of collaborative meetings with Authority stakeholders (including Clinical, IM/IT, Integrated

Protection Services / Security) and Project Co design team and vendors, at mid-construction stage to review functional requirements for Division 27 systems prior to commissioning to ensure a common understanding of design intent and test plans. Commissioning Plan documentation will be updated as required based on these meetings.

5.5.24.1(4) CxA will work with Project Co to develop prefunctional checkout documentation for each system that captures the full functionality including integration with other Building Systems to verify system readiness for functional testing with the CxA.

5.5.24.1(5) CxA will consult with the Authority (including stakeholders such as IM/IT, FMO and clinical users) through the Review Procedure for review of Functional Test Plans for all Division 27 systems to ensure that all test plans are acceptable to the Authority.

5.5.24.2 Communications Rooms

5.5.24.2(1) IM/IT will develop Communication Room Readiness Functional Checklists that will verify Communication Room construction, cleanliness and communication installation. Communication Room Readiness Checklists to be completed prior to Project Co request to turnover Communication Rooms to the Authority for deployment of IM/IT equipment. At a minimum CxA and the Authority will verify that functional requirements for the following are successfully met;

5.5.24.2(1)(a) Communication Pathways and Tray Installation

5.5.24.2(1)(b) Doors

5.5.24.2(1)(c) Security

5.5.24.2(1)(d) Flooring

5.5.24.2(1)(e) Signage

5.5.24.2(1)(f) Smoke Detector, Heat Detector, Suppression Systems

5.5.24.2(1)(g) Wall Covering

5.5.24.2(1)(h) Equipment Racks/Cabinets Installation

5.5.24.2(1)(i) IM/IT Rack Mounted UPS

5.5.24.2(1)(j) Emergency and Utility Power Outlets

5.5.24.2(1)(k) Grounding

5.5.24.2(1)(l) Cable Certification Test Results

5.5.24.2(2) IM/IT will review all Communication Cable and Fiber testing results as they are submitted and report on progress. Progress reporting documents will facilitate tracking of progressive test report submissions based on how the work will be completed. This should include at a minimum a breakdown by individual ethernet cable and fiber systems for individual areas of the Facility and/or Communications Rooms.

5.5.24.3 Intercom

5.5.24.3(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.24.3(1)(a) Clear 2-way audio from the intercom door station to master intercom station.

5.5.24.3(1)(b) Video from Intercom captures clear image of caller at master intercom station.

5.5.24.3(2) Door release is successfully without generating door forced open alarm in access control system.

5.5.24.3(3) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Intercom commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.24.3(3)(a) Intercom Door Station Installation;

5.5.24.3(3)(b) Intercom Master Station Installation;

5.5.24.3(3)(c) Intercom Headend installation;

5.5.24.3(3)(d) Intercom Cable installation and termination;

5.5.24.3(3)(e) Intercom Labelling and device identification; and

5.5.24.3(3)(f) Intercom Integration with Building Systems.

5.5.24.4 Public Address

5.5.24.4(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.24.4(1)(a) Public Address announcements are clear and free of distortion.

5.5.24.4(1)(b) Speaker decibel levels are within defined levels.

5.5.24.4(2) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Public Address commissioning

during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum

5.5.24.4(2)(a) Public Address Speaker Installation

5.5.24.4(2)(b) Public Address Headend Installation

5.5.24.4(2)(c) Public Address Cable Installation and Terminations

5.5.24.4(2)(d) Public Address Labelling and Device Identification

5.5.24.5 IPTV

5.5.24.5(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.24.5(1)(a) Available channels can be viewed with out distortion with clear and synchronized audio.

5.5.24.5(1)(b) CxA will review outlets for provision of cable types and quantity in the Facility in accordance with the Authority's requirements for all rooms designated.

5.5.24.5(2) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness IPTV commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.24.5(2)(a) Display Mounting and Installation;

5.5.24.5(2)(b) IPTV cabling installation, termination and testing; and

5.5.24.5(2)(c) IPTV cabling labelling and device identification.

5.5.24.6 Nurse Call

5.5.24.6(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.24.6(1)(a) Correct Nurse Call device are installed in correct location.

5.5.24.6(1)(b) Accurate Nurse Call label is displayed on master station when alarm is generated.

5.5.24.6(1)(c) Dome light illumination matches the type of Nurse Call alarm generated.

5.5.24.6(1)(d) Wayfinding dome light illumination matches defined response pathway for Nurse Call alarm location.

5.5.24.6(2) CxA will consult with the Authority (including stakeholders such as FMO, IM/IT, clinical staff and security) through the Review Procedure for review of nurse call Functional Plans to ensure that all test plans are acceptable to the Authority.

5.5.24.6(3) CxA will include nurse call Wayfinding verification in the nurse call Functional Test Plan.

5.5.24.6(4) CxA will coordinate with the Authority to facilitate participation by the Authority's Code Blue response team in nurse call Functional Testing.

5.5.24.6(5) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness nurse call commissioning during Prefunctional check out and provide field review reports to summarize each site visit. This will include the following items at a minimum

5.5.24.6(5)(a) Care Team Base will have clear line of sight for patient room nurse call dome lights and wayfinding dome lights.

5.5.24.6(5)(b) Patient Room and Corridor nurse call device installation.

5.5.24.6(5)(c) Care Team Base nurse call master station install.

5.5.24.6(5)(d) Nurse call cabling and termination

5.5.24.6(5)(e) Accuracy of nurse call alarm location naming

5.5.24.7 Distributed Antenna System

5.5.24.7(1) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness DAS commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.24.7(1)(a) Preparations for DAS Antenna locations.

5.5.24.7(1)(b) Cable Pathways, Installation and Terminations.

5.5.24.7(1)(c) Cable Labelling and Device Identification.

5.5.24.7(1)(d) Equipment Rack and wall space preparation for DAS equipment.

5.5.24.7(2) Project Co will perform DAS signal saturation test which CxA will review results in consultation with the Authority through the Review Procedure.

5.5.24.7(3) CxA will lead and coordinate FMO involvement in Functional Testing to ensure full radio coverage throughout the Facility.

5.5.24.8 Multimedia

5.5.24.8(1) Prefunctional Checklist will ensure the following functions are successfully tested for every device:

5.5.24.8(1)(a) Microphone levels for audio capture are appropriate for the purpose and are noise free and legible. Audio playback quality is optimized for legibility and is free of noise, echo and distortion.

5.5.24.8(1)(b) Brightness, contrast, sharpness and colour balance for all video and data displays are correctly set-up for optimal viewing results and displayed images are free from noise or interference.

5.5.24.8(1)(c) Video conferencing and multimedia sessions are free of lag and audio is synced with video. Presentation data and camera video inputs are configured correctly to auto switch and scale. Triangulation of multiple cameras and microphones in the Type 4 room is set up correctly so that camera pans to active microphones prior to switching. Cameras have clear and undistorted field of view and are not adversely affected by lighting, glare or obstructions.

5.5.24.8(1)(d) In room Crestron touch screen controls integration with AV controls for audio and video, and integration with Building Systems including lighting, HVAC, blinds and other systems and requirements is complete and fully functional in all Type 1, 2, 3 and 4 Multimedia Room.

5.5.24.8(2) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Multimedia commissioning during Prefunctional check out and provide field review reports to summarize each site visit. This will include the following items at a minimum.

5.5.24.8(2)(a) Correct Multimedia devices are being installed in the proper locations and interconnected in a suitable manner in each Multimedia Room.

5.5.24.8(2)(b) Multimedia, data and electric cables for each multimedia device have been properly run, dressed, terminated and labelled in every Multimedia Room.

5.5.24.8(2)(c) Crestron controls for multimedia and other systems are in place with room specific GUI pages, and are fully

functional in all Type 1, 2, 3, 4 and Type 6 Multimedia Rooms.

5.5.24.9 Inspection and testing activities for the Campus Perimeter Pathway System (CPPS) will be included in the Commissioning Plan and Cx Schedule.

5.5.24.10 CxA will consult with the Authority (including stakeholders such as IM/IT and clinical Staff) through the Review Procedure for review of Multimedia Functional Plans for each room type to ensure that all test plans are acceptable to the Authority.

5.5.24.11 Clinical Functional Scenario Testing for Division 27

5.5.24.11(1) Refer to Construction Phase Cx Requirements – Phase 4 Demonstration and Acceptance, Section 5.5.7.7

5.5.24.12 Multimedia Rooms

5.5.24.12(1) CxA will consult with the Authority (including stakeholders such as IM/IT and clinical Staff) through the Review Procedure for review of Multimedia Functional Plans to ensure that all test plans are acceptable to the Authority.

5.5.24.12(2) CxA will include verification of all multimedia and communications technology in all Type 1, 2, 3, 4 and Type 6 Multimedia Rooms in the multimedia functional test plan.

5.5.25 Electronic Safety (Division 28)

5.5.25.1 Commissioning General Requirements for Division 28

5.5.25.1(1) Follow the standard commissioning process requirements defined elsewhere in Section 5.5

5.5.25.1(2) Project Co will provide a detailed section of the Cx Schedule related to all Electronic Safety and Security Systems scopes of work which will be maintained during all phases of project delivery.

5.5.25.1(3) Project Co will coordinate a series of collaborative meetings with Authority stakeholders (including FMO, Clinical, IM/IT, Integrated Protection Services / Security), and Project Co design team and vendors, at mid-construction stage to review functional requirements for Division 28 systems prior to commissioning to ensure a common understanding of design intent and test plans. Commissioning Plan documentation will be updated as required based on these meetings.

5.5.25.1(4) CxA will work with Project Co to develop prefunctional checkout documentation for each system that captures the full functionality including integration with other Building Systems to verify system readiness for functional testing with the CxA.

5.5.25.1(5) CxA will consult with the Authority (including stakeholders such as IM/IT, FMO and Integrated Protection Services / security) through the Review Procedure during the development of Functional Test Plans for all Division 28 systems to ensure that all test plans are acceptable to the Authority.

5.5.25.2 Access Controls

5.5.25.2(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.25.2(1)(a) Correct Access Control devices are installed and tested per door type.

5.5.25.2(1)(b) Access Control held open and forced open alarms have been confirmed.

5.5.25.2(1)(c) Project Co to produce report which is to be reviewed by CxA for Access Control Transactions for each door.

5.5.25.2(1)(d) Door hardware has been installed and functional per door type.

5.5.25.2(1)(e) Defined functionality per door type has been captured and successfully tested.

5.5.25.2(1)(f) Integration with Building Systems have been verified during Prefunctional testing per door type.

5.5.25.2(2) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Access Control System commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.25.2(2)(a) Door Device Installation

5.5.25.2(2)(b) Cable installation and labelling

5.5.25.2(2)(c) Cabinet & Power Supply installation

5.5.25.2(2)(d) Integration with Door Hardware and Building Systems

5.5.25.3 Intrusion Detection

5.5.25.3(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.25.3(1)(a) Intrusion Detection devices have been installed and tested for each partition.

5.5.25.3(1)(b) Intrusion Detection keypad successfully arms and disarms all partitions associated with keypad.

5.5.25.3(1)(c) Intrusion delayed arming and exiting has been programmed and tested.

5.5.25.3(1)(d) Project Co to submit central monitoring report and CxA will review alarm signals received and naming.

5.5.25.3(1)(e) Integration with Building Systems have been verified during Prefunctional testing.

5.5.25.3(2) CxA will consult with the Authority (including stakeholders such as FMO and Integrated Protection Services / security) through the Review Procedure during the development of Intrusion Functional Test Plans.

5.5.25.3(3) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Intrusion commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum

5.5.25.3(3)(a) Intrusion Field Detection Device Installation

5.5.25.3(3)(b) Intrusion Panel Installation

5.5.25.3(3)(c) Intrusion Cable Installation and Termination

5.5.25.3(3)(d) Cable labelling and device identification

5.5.25.3(3)(e) Integration with Building Systems

5.5.25.4 CCTV / Video Surveillance

5.5.25.4(1) Commissioning program will include CCTV, Clinical Cameras, OR Camera, Videoconferencing Cameras and any other camera types or systems as applicable to the design.

5.5.25.4(2) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.25.4(2)(a) CxA to coordinate with Authority's Integrated Protection Services / Security team to ensure live and recorded views are available

5.5.25.4(2)(b) CxA to coordinate with Authority's Integrated Protection Services / Security team to confirm field of view and focus of cameras.

5.5.25.4(2)(c) CxA to review accuracy of camera type per installed location.

5.5.25.4(3) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Video Surveillance commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum:

5.5.25.4(3)(a) Camera Installations

5.5.25.4(3)(b) Cable labelling and camera identification

5.5.25.4(3)(c) Camera Cable Installation and Terminations

5.5.25.4(3)(d) Review of Field of Views with Security for blind spots

5.5.25.4(4) CxA will consult with the Authority (including stakeholders such as FMO and Integrated Protection Services / security) through the Review Procedure to ensure Project Co video retention calculation satisfies IPS requirements for resolution, frame rate and retention period.

5.5.25.5 Panic / Duress

5.5.25.5(1) Prefunctional checklist will ensure the following functions are successfully tested for every device:

5.5.25.5(1)(a) Project Co will submit central monitoring station report for review by CxA for accuracy of panic/duress alarm location and naming.

5.5.25.5(1)(b) Activated panic/duress alarm generates audio visual notification.

5.5.25.5(1)(c) Panic/Duress type is accurate per location.

5.5.25.5(1)(d) Integration with Building Systems have been verified during Prefunctional testing.

5.5.25.5(2) Prior to Functional Performance Testing phase, CxA will perform periodic on-site reviews to witness Panic Duress commissioning during pre-functional checkout and provide field review reports summarizing each site visit. This will include the following items at a minimum

5.5.25.5(2)(a) Panic Duress Button installation and accessibility

5.5.25.5(2)(b) Panic Duress cable installation and termination

5.5.25.5(2)(c) Panic Duress device identification

5.5.25.5(2)(d) Integration with Building Systems

5.5.25.5(3) CxA will review all Prefunctional Testing results and ULC monitoring station reports submitted by Project Co for Panic Duress.

5.5.25.6 Fire Alarm System

5.5.25.6(1) Commissioning of fire alarm system will include verification, testing and demonstration of the system in accordance with applicable portions of CAN/ULC-S537, CAN/ULC-S1001, CAN/ULC-S524CSA C282, BCBC and other recognized installation and test codes.

5.5.25.6(2) Commissioning of fire alarm system will include the integration of other systems such as elevator, code blue, access control, smoke control and smoke venting, fire suppression, emergency generators, emergency lighting, AVG system, central monitoring station, and provision of record documentation.

5.5.25.6(3) Integration matrix will be provided by Project Co design team FMO to facilitate development of Integration Test Plans by the CxA.

5.5.25.7 Clinical Functional Scenario Testing for Division 28

5.5.25.7(1) Refer to Construction Phase Cx Requirements – Phase 4 Demonstration and Acceptance, Section 5.5.7.7.

5.5.26 Acoustic Performance Testing

5.5.26.1 Post-construction sound isolation performance verification tests will be carried out on a minimum of two separate examples of each unique wall assembly having a required STC rating (Refer to Appendix 3C [Acoustic and Noise Control Measures]) of 45 or more.

5.5.26.1(1) Compliance testing will be performed by Project Co.

5.5.26.1(2) A test plan that includes the number and location of all tests must be provided to the Authority for approval through the Review Procedure before testing begins;

5.5.26.1(3) Tests will be performed at the first opportunity that rooms are enclosed and before Construction is complete so that corrective measures can be applied to spaces that are not yet complete;

5.5.26.1(4) Failure to meet the minimum performance requirements will require both re-testing and further testing of a minimum of another two (2) walls to establish the extent of the problem. Corrective measures will be taken as required and applied to all other similar details. It is the responsibility of Project Co to provide remedial work and retesting.

Further failure to meet the minimum performance requirements will require both re-testing and further testing to demonstrate compliance;

5.5.26.1(5) Compliance test reports must be provided to the Authority for review and approval through the Review Procedure;

5.5.26.1(6) ASTC tests will be done wherever the test standard can be applied;

5.5.26.1(7) NIC tests will be done only when ASTC standard test requirements cannot be met;

5.5.26.1(8) The measured ASTC or NIC performance must be within five (5) points of the STC ratings provided in Appendix 3C [Acoustic and Noise Control]; and

5.5.26.1(9) Where internal partitions include doors and/or windows, the STCC of the partition must be calculated based on the assigned STC ratings for each component as specified in Appendix 3C [Acoustic and Noise Control] and the area of each component. Compliance test reports for composite partitions must include calculations of the STCC for the partition along with the measured ASTC or NIC value. The measured ASTC or NIC value must be within 5 points of the calculated STCC value to be deemed compliant.

5.5.26.2 Post-construction performance verification tests will be carried out of HVAC noise levels (Noise Criteria (NC) in 10% of all occupied spaces as listed in Appendix 3C [Acoustic and Noise Control]:

5.5.26.2(1) Compliance testing will be performed by Project Co;

5.5.26.2(2) A test plan that includes the number and location of all tests must be provided to the Authority for approval through the Review Procedure before testing begins;

5.5.26.2(3) Testing is to occur after completion of air and water balancing;

5.5.26.2(4) The testing will be focused, but not exclusively, on those spaces located closest to the mechanical spaces serving the various portions of the Facility;

5.5.26.2(5) Where the NC requirements in Appendix 3C [Acoustic and Noise Control] are not met, measures will be taken by Project Co to reduce the HVAC noise levels to below the levels shown in Appendix 3C [Acoustic and Noise Control]; and,

5.5.26.2(6) Rooms that did not meet the NC requirements will be re-tested after noise reduction has been applied, plus an additional 5% of rooms will be tested. Further failure to meet the minimum performance

requirements will require both re-testing and further testing to demonstrate compliance.

5.5.26.3 Post-construction performance verification tests will be taken of the reverberation times to demonstrate compliance with Appendix 3C [Acoustic and Noise Control]:

5.5.26.3(1) Compliance testing will be performed by Project Co;

5.5.26.3(2) The testing will include all Meeting Rooms with a seating capacity requirement greater than 10 people, plus a minimum of 10% of spaces where maximum RT60 requirements have been specified in Appendix 3C [Acoustic and Noise Control] with an appropriate cross-section of space types;

5.5.26.3(3) A test plan that includes the number and location of all tests must be provided to the Authority for approval through the Review Procedure before testing begins;

5.5.26.3(4) Where the measured reverberation times do not meet the requirements in Appendix 3C [Acoustic and Noise Control], corrective measures will be taken to achieve the targets and similar corrective measures will then be applied to all other spaces of the same type; and

5.5.26.3(5) Rooms that did not meet the RT60 requirements will be re-tested after corrective measures have been taken and an additional 5% of rooms of that type will be tested. Further failure to meet the minimum performance requirements will require both re-testing and further testing to demonstrate compliance.

5.5.26.4 Post-construction performance verification tests will be carried out of environmental noise levels in exterior spaces associated with the Facility, and at the property lines of the Facility to demonstrate compliance with exterior noise limits listed in Appendix 3C [Acoustic and Noise Control] for both normal operations and operations with emergency power generation:

5.5.26.4(1) Compliance testing will be performed by Project Co;

5.5.26.4(2) A test plan that includes the number and location of all tests must be provided to the Authority for approval through the Review Procedure before testing begins;

5.5.26.4(3) Testing is to occur after completion of air and water balancing with all systems operating as expected under normal conditions and during emergency generator operations;

5.5.26.4(4) The testing will be focused, but not exclusively, on those spaces located closest to the noise sources and their associated intakes/exhausts or other related noise source paths;

5.5.26.4(5) Where the exterior noise limits in Appendix 3C [Acoustic and Noise Control] are not met, measures will be taken by Project Co to reduce noise levels to below those limits in Appendix 3C [Acoustic and Noise Control];

5.5.26.4(6) Outdoor spaces that did not meet the noise limit requirements will be re-tested after noise reduction has been applied. Further failure to meet the minimum performance requirements will require further noise control and re-testing to demonstrate compliance; and

5.5.26.4(7) If noise issues arise within the first year of the Warranty Period, Project Co will investigate and correct any Defects and provide demonstration of compliance after corrections are installed.

## 5.6 Commissioning Plan

### 5.6.1 General

5.6.1.1 The Commissioning Plan will detail Project Co's approach to satisfying all Commissioning requirements of Schedule 3 [Design and Construction Specifications] and all other Authority or Project Co requirements identified during design stage.

5.6.1.2 The Commissioning Plan will specify which tests are to be carried out and the timing, sequence, and approval process for the tests.

5.6.1.3 The Commissioning Plan will include blank checklists and sample forms / reports as applicable for all Commissioning process deliverables to ensure alignment of expectations by all Commissioning team stakeholders prior to Commissioning taking place.

### 5.6.2 LEED v4 Requirements

5.6.2.1 Commissioning Plan must clearly address all requirements of LEED v4 Fundamental and Enhanced Commissioning (6 points)

### 5.6.3 Submission Milestones (See also Section 2.4 Progressive Submittals)

5.6.3.1 Commissioning Plan Outline – 30% Design and Construction Documents

5.6.3.2 Commissioning Plan Draft – 50% Design and Construction Documents

5.6.3.3 Commissioning Plan Rev. 1 – 70% Design and Construction Documents

5.6.3.4 Commissioning Plan Rev. 2 – 90% Design and Construction Documents

5.6.3.5 Commissioning Plan Rev. 3 – 100% Design and Construction Documents

5.6.3.6 Commissioning Plan Rev. 4 – within 90 days of 100% CD Submission

5.6.3.6(1) Will include progressed detail in all sections. Commissioning Schedule and Process Tracking documents will be at an 95% state of development. Content of Technical Requirements (including acceptance criteria), Forms and Checklist sections will be at an 80% state of development.

5.6.3.7 Commissioning Plan Rev. 5 – within 180 days of 100% CD Submission

5.6.3.7(1) Final Commissioning Plan. All components will be 100% complete.

5.6.4 Cx Plan Contents

5.6.4.1 Refer to Appendix 3H [Commissioning].

5.7 Architecture

5.7.1 Form and Character

5.7.1.1 The architectural design of the Facility will incorporate the following requirements:

5.7.1.1(1) The Facility will be highly articulated to break down its scale, utilizing such components as glazing, canopy and shading systems, varying cladding patterns/designs, as well as exposed structural elements;

5.7.1.1(2) Maximize glazing in exit stairs for views to the exterior, safety and orientation to BH;

5.7.1.1(3) The design of the Facility exterior will be articulated to create an architecturally interesting and refined structure. Emphasize the modular, recurrent elements of Appendix 3A [Clinical Specifications and Functional Space Requirements] in the massing and materials to achieve articulation, visual interest, and human scale;

5.7.1.1(4) The Facility will be designed and orientated to maximize daylighting and views. Daylighting and views will assist with Wayfinding and promote a therapeutic environment of well-being;

5.7.1.1(5) The Facility will respond appropriately to the environmental forces of sun, wind, and precipitation;

5.7.1.1(6) The Facility will be integrated with the exterior environment to create cohesive indoor/outdoor connectivity at the public entrance areas; and

5.7.1.1(7) The exterior entry point into the Main Entrance Lobby will be clearly distinguishable as a landmark that intuitively draws visitors from a distance with architectural cues, canopies, landscaping, lighting and signage.

5.7.1.2 Design will prevent views into Patient rooms, Staff offices or similar privacy sensitive spaces from the exterior. Provision of translucent film or similar are not an acceptable means of preventing views in.

5.7.1.3 Rooftop Penthouse and Architectural Screens

5.7.1.3(1) Rooftop mechanical equipment will be housed in an enclosed penthouse unless otherwise specified. Install bird spikes on all surfaces where birds can roost.

5.7.1.3(2) Rooftop mechanical/electrical equipment will be positioned so that no worker & associated tools or ladders being used will be within the minimum 2 m clear distance from any unguarded roof edges so that it can be Serviceable without requiring fall protection, in conformance to WSBC regulations.

5.7.1.3(3) Miscellaneous roof top mounted mechanical, electrical and communications equipment will be concealed from view through architectural screens. Screens will hide mechanical, electrical and communications equipment from view by neighboring properties and/or Facility occupants. Screens will be clad with architectural materials consistent with those used in the Facility and subject to review by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

5.7.1.4 Exterior Building Materials and Colour

5.7.1.4(1) The Design will:

5.7.1.4(1)(a) Incorporate materials to create a distinct character;

5.7.1.4(1)(b) Feature a material palette that avoids a clinical aesthetic;

5.7.1.4(1)(c) Include variation and articulation of the exterior through varied use of materials;

5.7.1.4(1)(d) Minimize extensive unbroken exterior wall areas or surfaces;

5.7.1.4(1)(e) Have an animated exterior that includes materials and colours to add visual interest for the Patients, visitors and Staff;

5.7.1.4(1)(f) Include variations of glazing sizes and create patterns to reduce scale and massing of the Facility; and

5.7.1.4(1)(g) Emphasize the glazed and visually transparent major entrances with surrounding solid elements.

5.7.1.4(2) Materials will be durable and high quality. Refer to Section 3.6 Sustainability and Climate Resiliency Section 3.7.

5.7.1.4(3) Exterior materials may include the following:

5.7.1.4(3)(a) Wood;

5.7.1.4(3)(b) Stone;

5.7.1.4(3)(c) Brick masonry;

5.7.1.4(3)(d) Metal panels;

5.7.1.4(3)(e) Architectural Concrete;

5.7.1.4(3)(f) Concrete (cementitious) veneer solid Rain Screen panels;

5.7.1.4(3)(g) Aluminium windows and spandrel panels; and

5.7.1.4(3)(h) Aluminium curtain wall.

5.7.1.4(4) Unacceptable materials include stucco, vinyl siding, large expanses of non-Architectural Concrete, mirrored glass, MDF, and neon lighting.

5.7.1.4(5) Exterior wall cladding materials to be applied through the use of thermally-broken clips or brackets, using galvanized concealed fasteners.

5.7.1.4(6) Wall panels will be of sufficient thickness, complete with control and expansion joints, to mitigate material deformities due to structural and thermal movement within the wall assembly. Warping, oil-canning and/or mechanical modifications, which may alter its physical appearance and diminish its intended performance, are not permitted.

5.7.1.4(7) At all conditions where dissimilar metals are in contact, provide separators to prevent galvanic corrosion including aluminum window and curtain walls.

5.7.1.4(8) Facade transparency and views into non-clinical, public activities will be provided, especially at grade levels and large waiting areas; accordingly, use of mirrored or highly reflective glass is not permitted.

5.7.1.5 Access to Daylight and Views

5.7.1.5(1) Direct Natural Light

5.7.1.5(1)(a) A space has Direct Natural Light where the following conditions are satisfied:

5.7.1.5.1.(a).1 The space will have an exterior window;

5.7.1.5.1.(a).2 A light radius will be measured horizontally from the centreline of the exterior window;

5.7.1.5.1.(a).3 For spaces having rectangular geometry, the centre of the space will fall within an 8-metre light radius, or a 10-metre light radius if the area is over 70 square metres; and

5.7.1.5.1.(a).4 For spaces having non-rectangular geometry, half or more of the total area of the space will fall within an 8-metre light radius, or a 10-metre light radius if the area is over 70 square metres.

5.7.1.5(2) Borrowed Light from Exterior Windows

5.7.1.5(2)(a) A space has Borrowed Light from exterior windows where the following conditions are satisfied:

5.7.1.5.2.(a).1 The space will have at least one window facing in the direction of an exterior window;

5.7.1.5.2.(a).2 A light radius will be measured horizontally from the centreline of the exterior window;

5.7.1.5.2.(a).3 For spaces having rectangular geometry, the centre of the space will fall within an 8-metre light radius within a 10-metre light radius if the area is over 70 square metres;

5.7.1.5.2.(a).4 For spaces having non-rectangular geometry, half or more of the total area of the space will fall within an 8-metre light radius, or a 10-metre light radius if the area is over 70 square metres; and

5.7.1.5.2.(a).5 Window(s) in doors, or fully glazed doors, where allowable, may be

considered a window for the purposes of Borrowed Light.

5.7.1.5(3) Borrowed Light from Clerestory Windows

5.7.1.5(3)(a) A space has Borrowed Light from clerestory windows where the following conditions are satisfied:

5.7.1.5.3.(a).1 There will be a clerestory window having its sill higher than 1.5 m AFF, or a window(s) in the space facing in the direction of a clerestory window or skylight;

5.7.1.5.3.(a).2 A light limit will be measured horizontally from the perimeter of the clerestory window;

5.7.1.5.3.(a).3 For spaces having rectangular geometry, the centre of the space will fall within a 6-metre light limit;

5.7.1.5.3.(a).4 For spaces having non-rectangular geometry, half or more of the total area of the space will fall within a 6-metre light limit; and

5.7.1.5.3.(a).5 Window(s) in doors, or fully glazed doors, where allowable, may be considered a window for the purposes of Borrowed Light.

5.7.1.5(4) Project Co will apply the following principles in the Design of the Facility to address access to daylight and views:

5.7.1.5(4)(a) Arrange circulation routes and occupied spaces to maximize opportunities for windows;

5.7.1.5(4)(b) Select window size and placement consistent with the space use; and

5.7.1.5(4)(c) Include windows of the largest possible size consistent with Project sustainability and space use objectives.

5.7.1.5(5) Provide the following minimum requirements for access to daylight and views:

5.7.1.5(5)(a) All principal horizontal circulation routes, including corridors accessing Clinical Spaces, will include natural

lighting strategies and access to views in the form of windows; provide windows at the ends of long corridors;

5.7.1.5(5)(b) Glazed doors at entrances to exterior accessible roof areas;

5.7.1.5(5)(c) Exterior windows in IPU, and Maternal/Child Unit as follows:

5.7.1.5.5.(c).1 the maximum sill height to be 900 mm; and

5.7.1.5.5.(c).2 window head to extend to the underside of the ceiling.

5.7.1.5(5)(d) For IPU, the minimum width of the exterior window glazing will be:

5.7.1.5.5.(d).1 2.4 m for bariatric Patient rooms, including bariatric Airborne Isolation Rooms, and

5.7.1.5.5.(d).2 1.6 m for all other Patient rooms, including Airborne Isolation Rooms.

5.7.1.5(5)(e) For Maternal/Child Unit, the minimum width of the exterior window glazing will be:

5.7.1.5.5.(e).1 2.4 m for NICU Patient rooms, bariatric Patient rooms, and LDRP Patient rooms, and

5.7.1.5.5.(e).2 1.6 m for all other Patient rooms.

5.7.1.5(6) Refer to the list below for room types requiring Direct Natural Light and Borrowed Light:

5.7.1.5(6)(a) The following rooms in the A1 Outpatient Clinics Component require Direct Natural Light:

5.7.1.5.6.(a).1 A1.1.3 Waiting Area;

5.7.1.5.6.(a).2 A1.3.3 Waiting Area; and

5.7.1.5.6.(a).3 A1.4.3 Waiting Area.

5.7.1.5(6)(b) The following rooms in the A1 Outpatient Clinics Component require Borrowed Light:

5.7.1.5.6.(b).1 A1.2.1 Exam Room;

5.7.1.5.6.(b).2 A1.3.4 Exam Room;

5.7.1.5.6.(b).3 A1.5.1 Exam Room;

5.7.1.5.6.(b).4 A1.6.1 Exam Room-Neuro Diagnostics-Large;

5.7.1.5.6.(b).5 A1.3.5 Office-2 Shared;

5.7.1.5.6.(b).6 A1.5.3 Office;

5.7.1.5.6.(b).7 A1.5.4 Office-2 Shared;

5.7.1.5.6.(b).8 A1.5.5 Office-Multi;

5.7.1.5.6.(b).9 A1.6.3 Office;

5.7.1.5.6.(b).10 A1.6.4 Office-Multi; and

5.7.1.5.6.(b).11 A1.2.6 Meeting Room.

5.7.1.5(6)(c) The following rooms in the B1 Maternal/Child Unit Component require Direct Natural Light:

5.7.1.5.6.(c).1 B1.2.7 Patient Rooms-LDRP;

5.7.1.5.6.(c).2 B1.2.10 Patient Room-LDRP-AIR

5.7.1.5.6.(c).3 B1.2.11 Patient Room-Ante/Post Partum;

5.7.1.5.6.(c).4 B1.2.13 Patient Room-Ante/Post Partum Shared;

5.7.1.5.6.(c).5 B1.3.2 Patient Room-NICU;

5.7.1.5.6.(c).6 B1.3.3 Patient Room-NICU-AIR; and

5.7.1.5.6.(c).7 B1.5.5 Lounge-Staff.

5.7.1.5(6)(d) The following rooms in the B1 Maternal/Child Unit Component require Borrowed Light:

5.7.1.5.6.(d).1 B1.1.1 Lounge-Family;

5.7.1.5.6.(d).2 B1.5.1 Office;

5.7.1.5.6.(d).3 B1.5.2 Office-3 Shared; and

5.7.1.5.6.(d).4 B1.5.3 Office-Multi.

5.7.1.5(6)(e) The following rooms in the C1 Medical Inpatient Unit (24 beds) Component require Direct Natural Light:

5.7.1.5.6.(e).1 C1.2.3 Patient Room;

5.7.1.5.6.(e).2 C1.2.5 Patient Room-Bariatric;

5.7.1.5.6.(e).3 C1.2.7 Patient Room Bariatric/AIR;

5.7.1.5.6.(e).4 C1.2.10 Patient Room-AIR; and

5.7.1.5.6.(e).5 C1.4.4 Lounge-Staff.

5.7.1.5(6)(f) The following rooms in the C1 Medical Inpatient Unit (24 beds) Component require Borrowed Light:

5.7.1.5.6.(f).1 C1.2.15 Meeting Room;

5.7.1.5.6.(f).2 C1.4.3 Office-Multi;

5.7.1.5.6.(f).3 C1.4.1 Office;

5.7.1.5.6.(f).4 C1.4.2 Office-2 Shared; and

5.7.1.5.6.(f).5 C1.2.14 Lounge-Patient.

5.7.1.5(6)(g) The following rooms in the D1 Inpatient Psychiatry Unit Component require Direct Natural Light:

5.7.1.5.6.(g).1 D1.2.5 Patient Room-MH;

5.7.1.5.6.(g).2 D1.2.7 Patient Room-MH-Bariatric;

5.7.1.5.6.(g).3 D1.2.9 Secure Room;

5.7.1.5.6.(g).4 D1.2.14 Group Therapy Room-Large;

5.7.1.5.6.(g).5 D1.2.15 Exercise Room;

5.7.1.5.6.(g).6 D1.2.18 Dining/Lounge-Patient;

5.7.1.5.6.(g).7 D1.4.3 Lounge Staff; and

5.7.1.5.6.(g).8 D1.5.1 Treatment Bay.

5.7.1.5(6)(h) The following rooms in the D1 Inpatient Psychiatry Unit Component require Borrowed Light:

5.7.1.5.6.(h).1 D1.1.1 Waiting Area-Outside;

5.7.1.5.6.(h).2 D1.4.1 Office;

5.7.1.5.6.(h).3 D1.2.17 Meeting Room; and

5.7.1.5.6.(h).4 D1.5.5 Care Station-SSAT.

5.7.1.5(6)(i) The following rooms in the E1 Medical Device Reprocessing Unit (MDRD) Component require Direct Natural Light:

5.7.1.5.6.(i).1 E1.2.5 Packing/Assembly Area.

5.7.1.5(6)(j) The following rooms in the E1 Medical Device Reprocessing Unit (MDRD) Component require Borrowed Light:

5.7.1.5.6.(j).1 E1.4.1 Office;

5.7.1.5.6.(j).2 E1.4.2 Office-2 Shared; and

5.7.1.5.6.(j).3 E1.4.4 Lounge-Staff

5.7.1.5(6)(k) The following rooms in the G1 Emergency Department Component require Direct Natural Light:

5.7.1.5.6.(k).1 G1.6.5 Common Area;

5.7.1.5.6.(k).2 G1.6.8 Secure Room;

5.7.1.5.6.(k).3 G1.3.7 Treatment Room; and

5.7.1.5.6.(k).4 G1.3.8 Treatment Room -AIR

5.7.1.5(6)(l) The following rooms in the G1 Emergency Department Component require Borrowed Light:

5.7.1.5.6.(l).1 G1.3.3 Care Station;

5.7.1.5.6.(l).2 G1.3.4 Central Care Station; and

5.7.1.5.6.(l).3 G1.6.2 Reception/Care Station;

5.7.1.5(6)(m) The following rooms in the H1 Perioperative Services Component require Direct Natural Light:

5.7.1.5.6.(m).1 H1.2.7 Lounge-Staff.

5.7.1.5(6)(n) The following rooms in the H1 Perioperative Services Component require Borrowed Light:

5.7.1.5.6.(n).1 H1.1.2 Operating Room;

5.7.1.5.6.(n).2 H1.1.1 Office-Multi;

5.7.1.5.6.(n).3 H1.2.1 Office;

5.7.1.5.6.(n).4 H1.2.2 Office-2 Shared; and

5.7.1.5.6.(n).5 H1.2.3 Office-Multi.

5.7.1.5(6)(o) The following rooms in the J1 Hospital Lecture and Education Facilities Component require Borrowed Light:

5.7.1.5(6)(p) The following rooms in the I1 Main Entrance Component require Direct Natural Light:

5.7.1.5.6.(p).1 I1.1.4 Lobby Circulation;

5.7.1.5.6.(p).2 I1.1.7 Lounge Patient/Waiting-Entry; and

5.7.1.5.6.(p).3 I1.1.17 Lounge Patient/Waiting-Way.

5.7.1.5(6)(q) The following rooms in the I2 Retail Food Services Component require Direct Natural Light:

5.7.1.5.6.(q).1 I2.4.1 Seating Area.

5.7.1.5(6)(r) The following rooms in the J1.1 Hospital Lecture Component require Direct Natural Light:

5.7.1.5.6.(r).1 J1.1.1 Lecture Room.

5.7.1.5(6)(s) The following rooms in the K1 Facilities Maintenance and operations (FMO) Component require Borrowed Light:

5.7.1.5.6.(s).1 K1.1.3 Office-Large; and

5.7.1.5.6.(s).2 K1.4.4 Office.

5.7.1.5(6)(t) The following rooms in the L1 Hospital Administration Component require Direct Natural Light:

5.7.1.5.6.(t).1 L1.1.1 Office;

5.7.1.5.6.(t).2 L1.1.2 Office-Large;

5.7.1.5.6.(t).3 L1.1.3 Office-Multi; and

5.7.1.5.6.(t).4 L1.1.5 Meeting Room-Large-EOC.

5.7.1.5(6)(u) The following rooms in the L1 Hospital Administration Component require Borrowed Light:

5.7.1.5.6.(u).1 L1.1.4 Office-Multi-Open.

5.7.1.5(6)(v) The following rooms in the L2 Burnaby Hospital Foundation Component require Direct Natural Light:

5.7.1.5.6.(v).1 L2.1.5 Office;

5.7.1.5.6.(v).2 L2.1.6 Office-Large; and

5.7.1.5.6.(v).3 L2.1.7 Office-Multi Open

5.7.1.5(6)(w) The following rooms in the L2 Burnaby Hospital Foundation Component require Borrowed Light:

5.7.1.5.6.(w).1 L2.1.4 Meeting Room-Small.

5.7.1.6 Outdoor Spaces

5.7.1.6(1) The landscape will complement and enhance the existing surrounding landscape form, tree species, open space, and adjacent street character.

5.7.1.6(2) Provide an easily accessible, safe, and visually appealing stairs, entryways, and corridors to encourage intermittent bouts of physical activity and reduce sedentary behaviour.

5.7.1.6(3) Formal planting will define movement corridors such as streets, driveways and pedestrian walkways.

5.7.1.6(4) 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 Facility entrances.

5.7.1.6(5) Refer to Appendix 3A [Clinical Specifications and Functional Space Requirements] for clinical and additional requirements for Outdoor Spaces.

5.7.2 Building Envelope

5.7.2.1 Basic Requirements:

5.7.2.1(1) Provide a building envelope which prevents the accumulation and stagnation of rain, snow, ice and dirt on the horizontal and vertical surfaces.

5.7.2.1(2) Provide a building envelope which sheds water, snow and ice safely from exterior surfaces, so they are not trapped in the assembly where they may cause deterioration or staining or present a danger to the safety of any person.

5.7.2.1(3) Provide a building envelope in accordance with Rain Screen wall requirements with an exterior insulated wall assembly.

5.7.2.1(4) Provide a building envelope with a predicted service life that exceeds 50 years as defined in CSA S478-95.

5.7.2.1(4)(a) For components and assemblies whose categories of failure are 6, 7, or 8 in Table 3 in CSA S478-95, use a Design Life equal to the Design Life for the Facility.

5.7.2.1(4)(b) For components and assemblies whose categories of failure are 4 or 5 in Table 3 in CSA S478-95, use a Design Life equal to at least half of the Design Life of the Facility.

5.7.2.1(5) Where component and assembly Design Life are shorter than the Design Life of the Facility, Design and construct so they can be readily replaced.

5.7.2.1(6) Provide a building envelope to ensure indoor noise criteria are met as specified in Appendix 3C [Acoustic and Noise Control Measures].

5.7.2.1(7) Design of the Facility, including the structure and structural components, will minimize effects of corrosion and deterioration due to environmental impacts and use, including malicious damage by use of measures such as:

5.7.2.1(7)(a) Concrete crack control joints and expansion/contraction joints;

5.7.2.1(7)(b) High-strength concrete mixes proportioned to durability requirements for exposure and use;

5.7.2.1(7)(c) Reinforcing of concrete for crack control;

5.7.2.1(7)(d) All structural steel and steel components will be hot-dip galvanized;

5.7.2.1(7)(e) If required, a factory applied two-part epoxy paint system will be applied on hot-dip galvanized steel, powder coated finish is preferred; and

5.7.2.1(7)(f) Embedded steel protection angles and skid plates for service areas.

5.7.2.1(8) Ensure the building envelope will accommodate the high humidity service conditions inside the Facility.

5.7.2.1(9) Condensation within building envelope assemblies or on interior surfaces will not be permitted under any operational condition.

5.7.2.1(10) 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.

5.7.2.1(11) Ensure the building envelope mitigates thermal bridging. Where thermal bridging occurs, the Building Envelope Consultant shall review in accordance with clause 5.7.2.3(1).

5.7.2.1(12) Ensure continuation of the air barrier, vapour barrier, thermal barrier and moisture barrier across the entire envelope including foundations, walls and roofs. Continuity of these components will be maintained at all intersections, attachments and appendices.

5.7.2.1(13) Ensure the building envelope is insulated primarily exterior to the interior wall or back-up wall.

5.7.2.1(14) Accommodate differential movement due to temperature variations, and structural movement.

5.7.2.1(15) Back-up walls for outer cladding will consist of concrete masonry units, poured in place reinforced concrete or structural metal framing backup system. Design for deflection of interior finishes will conform to code in all conditions.

5.7.2.2 Rain Screen Requirements

5.7.2.2(1) All exterior walls will meet the following Rain Screen wall requirements:

5.7.2.2(1)(a) Drain all accumulated water to the exterior of the Facility and to provide a means for drying of any accumulated moisture within the cladding assembly;

5.7.2.2(1)(b) Materials will be installed to all shed precipitation;

5.7.2.2(1)(c) Prevent moisture penetration through the exterior of the wall assembly;

5.7.2.2(1)(d) Provide a continuous air space of minimum 25 mm clear width;

5.7.2.2(1)(e) Flashings, drips or overhangs, will be sufficient to deflect accumulated water away from the Facility face, at all:

5.7.2.2.1.(e).1 Changes in plane;

5.7.2.2.1.(e).2 Intersections of walls and roofs;

5.7.2.2.1.(e).3 Changes in cladding material; and

5.7.2.2.1.(e).4 Window and door heads or sills.

5.7.2.2(1)(f) Provide vents at top and bottom of the walls that allow any moisture to drain out and allow fresh air to pass through. Provide screens to keep insects, rodents and other pests out; and

5.7.2.2(1)(g) Silicone caulking is not permitted to be used as the primary defense against water infiltration into the exterior wall assembly.

5.7.2.3 Testing Requirements

5.7.2.3(1) Project Co will retain a Building Envelope Consultant as part of the Project team throughout the Design and Construction process. The Building Envelope Consultant will provide assistance in building envelope thermal review, testing and thermal bridging calculations.

5.7.2.3(2) Provide a building envelope report, signed by the Building Envelope Consultant, prior to Substantial Completion confirming the as-built Construction conforms to the recommendations in the building envelope report.

5.7.2.3(3) Submit building envelope test results, witnessed by the Building Envelope Consultant, to the Authority verifying that the building envelope meets all requirements.

5.7.2.3(4) The Facility will be tested, and the air leakage rate of the building envelope will not exceed 0.40 cfm/ft2 at a pressure differential of 0.3 inches water gauge (2.0 L/s.m2 at 75 Pa) at the upper 96 percent confidence interval in accordance with ASTM E 779 or an equivalent method approved by the City.

5.7.2.3(5) A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates will be submitted to the Authority and City. The following modifications will be made to ASTM E 779:

5.7.2.3(5)(a) Tests will be accomplished using either (1) both pressurization and depressurization or (2) pressurization alone, but not depressurization alone. If both pressurization and depressurization are not tested, the air leakage will be plotted against the corrected P for pressurization in accordance with section 9.4 of ASTME E 779;

5.7.2.3(5)(b) The test pressure range will be from 25 Pa to 80 Pa per Section 8.10 of ASTM E 779, but the upper limit will not

be less than 50 Pa and the difference between the upper and lower limit will not be less than 25Pa; and

5.7.2.3(5)(c) If the pressure exponent n is less than 0.45 or greater than 0.85 per Section 9.6.4 of ASTM E779, the test will be rerun with additional readings over a longer time interval.

5.7.2.3(6) If the tested rate exceeds the rate assumed as part of the energy modeling and associated Design and Construction Energy Target, a visual inspection of the air barrier will be conducted, and any leaks noted will be sealed. An additional report identifying the corrective actions taken to seal air leaks will be submitted to the relevant Governmental Authority and any further requirement to meet the leakage air rate will be waived, aside from the impact on the energy target.

5.7.2.4 Roofs

5.7.2.4(1) Provide a complete horizontal barrier to the exterior using SBS modified bitumen roofing system (multi-ply) for all roofs in accordance with the following standards:

5.7.2.4(1)(a) All roofing systems will conform to Roofing Practices Manual by the Roofing Contractors Association of British Columbia (RCABC); and

5.7.2.4(1)(b) Provide RCABC written warranty issued in the name of the Authority, signed jointly by the applicator and manufacturer, stating that the modified bituminous sheet roofing will provide a leak-free waterproofing surface for a minimum of fifteen (15) years. Warranty will cover both material and workmanship (including labour to remove / replace overburden) where repairs will be made, and roofing recovered at no cost to the Authority. Membrane manufacturer to provide minimum of ten (10) year manufacturer’s "leak-free" performance warranty, non-pro-rated.

5.7.2.4(2) Roof areas will be designed to be attractive and will avoid use of large areas of undifferentiated gravel.

5.7.2.4(3) All roofs are to have Direct Access for maintenance Staff. Ensure Design incorporates all safety requirements required by the BCBC, the Authority’s Fall Protection Program and Fall Protection Design Requirements, and follow the hierarchy of controls requirement WorkSafe BC.

5.7.2.4(4) Provide stair access to all major roof areas larger than 100 NSM. Built in ladder access will only be allowed to small roof areas.

Rappelling down from upper roofs to access lower roofs is not acceptable. Use of roof hatch accesses will be minimized.

5.7.2.4(5) Any means of access to the roofs such as doors and hatches will have hardware that is lockable and will integrate with access control and building master key systems.

5.7.2.4(6) Design out fall hazards by follow the WorkSafe BC hierarchy of control and/or 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.

5.7.2.4(7) If the requirements of clause 5.7.2.4(6) cannot be achieved consult with the Authority through the Review Procedure to determine the appropriate fall protection and fall arrest systems required to allow safe and Convenient Access to service components such as exterior glazing, cladding, exterior louvres, vents, and intakes.

5.7.2.4(8) Protect all new and existing roof membrane for the duration of construction from damage due to Construction activities performed on top of the roof. Replace or install new cap sheet on any roof deemed damaged as assessed by an independent third-party roofing inspector to the satisfaction of the Authority.

5.7.2.4(9) Provide 610 x 610mm concrete paver walkways to all equipment locations on roof from roof access points. Pavers will be elevated with 19mm thick rubber pads to allow drainage and protect roof membrane and delineate the two (2) metre zone with different material or lines.

## 5.7.3 Facility Configuration and Internal Circulation

### 5.7.3.1 Facility Entrances

5.7.3.1(1) All access and egress points from the Facility exterior will be protected from snow and rain by canopies or overhangs that extend a minimum 1200 mm beyond the face of the Facility and extend a minimum 600mm past each edge of the access/egress point. Canopies and overhangs will be designed to accept the weight of persons walking on them for repeated cleaning and maintenance. Materials will be durable and robust. Plastics, canvas or other fabrics are not permitted.

5.7.3.1(2) Public entrances will be named and have illuminated signs designating the name of the entrance on the canopy.

5.7.3.1(3) Provide visible places to sit, protected from the prevailing winds near both the interior and exterior of entrances.

5.7.3.1(4) Entrance designs will create positive and calming first impressions for Patients and families.

5.7.3.1(5) Entrance vestibules will provide complete transparency from the exterior, from the interior immediately in front of the vestibule, and from habited spaces adjacent to at least one long side of the vestibule.

5.7.3.1(6) In addition to entrance vestibules listed in Appendix 3A [Clinical Specifications and Functional Space Requirements], Project Co will provide all entrances vestibules to meet the functional needs of the Facility and this Schedule.

5.7.3.1(7) Entrance vestibules will be configured and sized such that only one set of doors will open at one time in order to preserve the airlock effect for climate control and protection from the prevailing winds. Ensure adequate distance between the sets of doors to allow stretchers and wheelchairs and attendants to fit lengthwise into the vestibule. No rotating doors are permitted.

5.7.3.1(8) Entrances serving accessible parking spaces will be accessible to bariatric Patients and visitors, and persons using wheeled mobility devices. Automatic doors must be provided at these entrances.

5.7.3.1(9) Provide a bariatric path of travel for the public from the Facility entry(s) to all rooms and spaces used by bariatric Patients. Within that path of travel, doors (including elevators) will have a minimum width of 1220 mm unless otherwise required by this Schedule.

5.7.3.1(10) Pedestrian interest and comfort at entries will be provided through specifically designed seating, signage, lighting and features that signal the Facility's use.

5.7.3.1(11) Main Entrance Area

5.7.3.1(11)(a) The Main Entrance Area will serve as the new public entry point to BH and will include the space I1 Main Entrance Lobby. Project Co will provide the Main Entrance Area with additional space and features as required by this Schedule to complete a grand and spacious experience for those entering the Facility.

5.7.3.1(11)(b) In addition to the I4 Main Entrance Lobby, Project Co will provide a contiguous Main Entrance Area on Level 1 of the Facility which includes:

5.7.3.1.11.(b).1 space which connects the I4 Main Entrance Lobby to the public

passenger elevators through Front-of-House circulation;

(b).1.1.1 waiting area;
(b).1.1.2 art wall;
(b).1.1.3 Wayfinding station;
(b).1.1.4 Wayfinding signage;
(b).1.1.5 Information Station;
(b).1.1.6 digital Patient information boards;
(b).1.1.7 directory;
(b).1.1.8 automatic banking machine;
(b).1.1.9 device charging stations;
(b).1.1.10 workstations for Patients;
(b).1.1.11 taxi phones;
(b).1.1.12 Patient information phones;
(b).1.1.13 outdoor canopy to provide protection from inclement weather over and along the pedestrian approach to the main entry doors of I4 Main Entrance Lobby;
(b).1.1.14 Covered storage for 12 Staxi wheelchairs outside the Facility in close proximity to Patient drop-off/pick up area;
(b).1.1.15 open feature stair connecting Level1 and Level 2;
(b).1.1.16 multi-storey spaces with minimum 5.0 m Ceiling Height;
(b).1.1.17 floor-to-ceiling glass with a floor level curb with a maximum height of 150 mm along the exterior for a feeling of openness, as well as to provide daylight and views of the pick-up / drop-off areas and BH;
(b).1.1.18 where possible and appropriate, views down into the area from floors above through interior windows for Borrowed

Light and visual connection;

(b).1.1.19 full access to all interior and exterior glass for ease of cleaning by the Authority;

(b).1.1.20 flooring materials, patterns and details which enrich the visitor's experience as they enter the Facility; and

(b).1.1.21 feature materials, patterns and variations in the ceiling materials included slatted-wood.

5.7.3.1(12) Design the Main Entrance Lobby to have an intimate, warm and welcoming character. The space will 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 space uncomfortable.

5.7.3.1(13) Adjacent to the Main Entrance Lobby of the Facility, provide weather protection for small group seating outside the entry in excess of the width of the opening extending out to cover the totality of the vehicle on the drop-off side in the drop-off / lay-by area.

5.7.3.1(14) Weather protection will also be implemented where Facility entrances front a sidewalk or open space such as drop-off or lay-by areas.

5.7.3.1(15) Weather protection at all other doors will have a minimum depth of 1500 mm and it will extend on both sides of the opening a minimum of 600 mm.

5.7.3.1(16) 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. Glass roof panels are only permissible for use in canopies mounted on the Facility's exterior wall.

5.7.3.1(17) Orient the Facility generally to minimize wind induced by adjacent existing buildings.

5.7.3.1(18) 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.

5.7.3.1(19) Provide Staxi wheelchair alcoves visible and accessible to the public at all public entrance vestibules.

5.7.3.1(20) Entryways and doors will be illuminated using light levels that are comfortable when entering and exiting.

5.7.3.1(21) Furniture and seating in public areas will meet the following requirements:

5.7.3.1(21)(a) At each information counter and reception area, provide pressure-reduction Furniture with lumbar support;

5.7.3.1(21)(b) Provide sturdy, 4-legged Furniture in public gathering and waiting areas. Do not use Furniture with back-tilting options or castors;

5.7.3.1(21)(c) Ensure seat cushions and pads are tilted at a slight forward angle;

5.7.3.1(21)(d) Use upholstery that are cleaned by wiping and able to withstand hospital grade cleaning products. Fabric seating is not permitted;

5.7.3.1(21)(e) Do not used patterned or flecked upholstery on Furniture;

5.7.3.1(21)(f) Ensure Furniture is in a warm colour that contrasts with floor and walls. Use contrasting colour combinations to define Furniture edges;

5.7.3.1(21)(g) Provide seating having dimensions between 450 to 475 mm high and between 450 to 500 mm deep;

5.7.3.1(21)(h) Provide seating with firm cushions and lumbar support;

5.7.3.1(21)(i) Provide diverse seating types, including some chairs without arms to facilitate wheelchair transfers; and

5.7.3.1(21)(j) Arrange Furniture to promote barrier-free access. Do not use Furniture with protruding or recessed bases.

5.7.3.1(22) Provide two (2) direct line telephones to taxi services adjacent to each regularly used exterior entrance to the Facility. Ensure at least one telephone is accessible to Persons with Disabilities.

5.7.3.1(23) Wayfinding kiosks and 2x digital signs will be located near entrances; one for listings of events, the other for general purpose messaging.

5.7.3.1(24) At each information counter and reception area, provide hearing amplifiers.

5.7.3.1(25) All regularly used exterior entrances to the Facility will have a vestibule as specified. These vestibules will:

5.7.3.1(25)(a) 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;

5.7.3.1(25)(b) 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 an air curtain system with controls over the exterior doors to regulate the temperature gain/loss appropriate for the time of the year;

5.7.3.1(25)(c) Have sliding doors with breakaway feature c/w panic hardware to the exterior, with swing doors to either side of the sliding doors to provide emergency egress and out of hours Staff access, except that where sliding doors are not feasible, use swinging doors. Use doors that will be motion-sensor activated. Provide motion-sensor activation and push-button controls located on the inside and outside of the doors easily accessible by Persons with Disabilities; and

5.7.3.1(25)(d) Have recessed entrance mats in compliance with LEED requirements.

5.7.3.1(26) Provide recessed entrance mats in compliance with LEED requirements.

5.7.3.1(26)(a) A permanent entryway system will be used, measuring minimum 3000 mm in length in the primary direction of travel at regularly used exterior entrances of the Facility and 1220 mm permanent entrance mats at other specified entrances; and

5.7.3.1(26)(b) Acceptable entryway systems include permanently installed grates, grills and slotted systems that allow cleaning underneath the system, complete with drains connected to the Facility storm water system.

5.7.3.1(27) Provide exterior entrance vestibules for the following areas which will be considered as regularly used exterior entrances to the Facility. At these locations, provide 3.0 m minimum length (in the direction of

travel) permanent recessed entrance mats conforming to LEED requirements:

5.7.3.1(27)(a) All Entrance Lobbies on Level 1 Phase 1A;

5.7.3.1(27)(b) Entrance from the Inpatient Psychiatry Unit Outdoor Patio Area;

5.7.3.1(28) Provide a 1220 mm in length (in the direction of travel) recessed permanent entrance mat from the Inpatient Psychiatry Unit Outdoor Patio Area;

5.7.3.2 Stairs

5.7.3.2(1) Exit Stairs

5.7.3.2(1)(a) Locate exit stairs strategically for the convenience of Staff to promote the use of stairs over elevators and serve as an alternate route for each elevator bank.

5.7.3.2(1)(b) Locate exit stairs with Convenient Access from circulation routes and in accordance with section 5.1.1.1(1)(d).

5.7.3.2(1)(c) Avoid stair locations that negatively impact planning flexibility or constrain desirable views from Clinical Spaces and Staff work areas.

5.7.3.2(1)(d) Provide windows for daylight and views from exterior walls of stairwells for orientation, amenity and safety by deterring undesirable and criminal activity or behaviour. Provide adequate lighting into stairwells for security at night but do not permit direct views into neighbours' back windows and yards.

5.7.3.2(1)(e) Provide stairwell Design that facilitates the use of evacuation sleds, excluding exit stairwells from the parking levels.

5.7.3.2(1)(f) Provide stair design in compliance with BC Building Code.

5.7.3.2(2) Convenience Stairs

5.7.3.2(2)(a) Provide convenience stairs that can be accessed by Patients, families, visitors and Staff throughout regular hours of operation and located strategically to reduce elevator use by Staff, visitors and Patients. Use open stairs where possible unless otherwise required by this Schedule.

5.7.3.2(2)(b) Convenience stairs will have finishes similar to the floor levels they serve and, in all cases, will have a finished floor.

5.7.3.2(3) Safety of Stairs and Areas Open to Below

5.7.3.2(3)(a) Where horizontal gaps at the switchback between flights of stairs in a stairwell exceeds 400mm, provide steel, (powder coated finish or stainless steel), or glass (with sandblasted finish) guardrails extending full height from the landing or stairs to the underside of the one above to prevent public, Patients or Staff from using them for self-harm.

5.7.3.2(3)(b) Stairwells will not allow for individuals to hide in the landing areas and solid walls will not be used to divide flights of stairs.

5.7.3.2(3)(c) Where floor areas are open to the floor area below, provide full height floor to ceiling glazing to prevent public, Patients or Staff from self-harm.

5.7.3.2(3)(d) Provide guards in stairwells as required by BCBC at window openings.

5.7.3.2(3)(e) 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.

5.7.3.3 Corridors

5.7.3.3(1) Provide clear width for movement of Staff, visitors, Patients including clear space at all Public elevator lobbies so as not to reduce the required clear corridor width.

5.7.3.3(2) Provide clear width for movement of equipment, stretchers, beds, pallets and carts servicing the Facility.

5.7.3.3(3) Where possible, design corridors to have chamfered corners to allow ease of movement for stretchers, beds and accompanying medical Staff and equipment.

5.7.3.3(4) In Clinical Spaces, provide alcoves in corridors for storage of equipment. The alcoves will be dispersed in the Clinical Spaces allowing corridors to be kept clear of all equipment and supplies. Where possible, corridors will have rest areas for Patients to promote mobility and activity. Alcoves will not reduce required corridor width.

5.7.3.3(5) Doors will not swing into corridors and reduce the required minimum width. Provide sliding doors for alcoves in corridors which are required to have doors.

5.7.3.3(6) Corridors in the Facility will meet the following minimum requirements:

5.7.3.3(6)(a) 1.8 m wide where serving only administrative functions or similar areas where beds, stretchers and pallets are not being transported;

5.7.3.3(6)(b) 2.6 m wide for beds, and stretcher;

5.7.3.3(6)(c) 3.1 m deep by 3.4 m long in front of each Public/ Staff/ Services Elevator; and

5.7.3.3(6)(d) 3.0 m wide for the Back of House clean core to be provided connecting all Operating Rooms (H1.1.2) and connecting the Operating Rooms to the existing Procedure Rooms. Corridor width will be clear and uninterrupted by any structure, walls, handrails, wall bumpers or door swings, for Staff and service access.

5.7.3.3(6)(e) 2.45 m wide for the Inpatient Psychiatry Unit.

5.7.3.4 EMI Requirements

5.7.3.4(1) Project Co will locate spaces with sensitive equipment, such as EEG and EMG rooms, at sufficient distance from EMI and radio frequency interference-producing equipment and vibrating equipment such as elevators.

5.7.3.5 Equipment Manoeuvrability

5.7.3.5(1) Project Co will design and construct the Facility so that all equipment such as stretchers, wheelchairs, food carts, linen carts, tow motors, CT scanner, etc. will satisfactorily manoeuvre in the areas, particularly vestibules and corridors, where such equipment is expected to be circulating through, arriving at, or parked in. Project Co 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.

5.7.4 Interior Walls and Partitions

5.7.4.1 General Requirements

5.7.4.1(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 3C [Acoustic and Noise Control Measures].

5.7.4.1(2) Seismic resistance capabilities will conform to the requirements of CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings.

5.7.4.1(3) Ensure proper sealing of all walls above and below the ceiling to maintain relative pressurization requirements of the HVAC system requirements in accordance with CAN/CSA-Z317.2.

5.7.4.1(4) Recesses and gaps created by tiles, metal framing, wall, partition and furring are to be avoided. Where this is not possible their design will allow for ease and proper repeated cleaning, those that do not will not exist;

5.7.4.1(5) The completion of Void Spaces will not be deemed a cost to the Authority;

5.7.4.1(6) Wall finishes will be smooth, water-resistant and washable using hospital grade disinfectant that includes a high concentration of bleach. In the vicinity of plumbing fixtures, provide a seamless wet wall panel system, that extends 600 mm to either side of the fixture, and overlaps the cove flashing;

5.7.4.1(7) Limit the passage of particles from both above the ceiling plane and adjacent non-clinical areas into the clinical environment;

5.7.4.1(8) Have a smooth and non-abrasive finish behind handrails attached to walls;

5.7.4.1(9) Be of a colour that contrasts with handrails and floors;

5.7.4.1(10) Washable painted surfaces will consist of a water-borne epoxy paint;

5.7.4.1(11) Design and select interior prefabricated modular wall assembly systems with interior finishes to comply with the following criteria:

5.7.4.1(11)(a) Withstand repeated cleaning and maintenance and support infection prevention and control as relevant for the particular or specific function;

5.7.4.1(11)(b) Wall finishes will be smooth, water-resistant and washable using hospital grade disinfectant that includes a high concentration of bleach.

5.7.4.1(11)(c) Some micro-perforated materials may be acceptable for use in infection control sensitive areas and may also provide useful sound absorption to control noise, consult

through the Review Procedure with the Authority's Infection Control;

5.7.4.1(11)(d) Ensure proper sealing of all walls, partitions and partition systems below the ceiling plane;

5.7.4.1(11)(e) Resist damage due to normal wear and resist damage due to collision in high traffic areas; permanence and durability, including impact resistance;

5.7.4.1(11)(f) Be non-toxic/ non-allergenic;

5.7.4.1(11)(g) Have low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

5.7.4.1(11)(h) Have flexibility to permit adaptability of interior spaces, if required, to suit future process revisions;

5.7.4.1(11)(i) Have a matte, non-glare finish;

5.7.4.1(11)(j) Seismic resistance capabilities will conform to the requirements of CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings;

5.7.4.1(11)(k) Power and utility services will be concealed within the assembly and will be easily serviceable for maintenance; and

5.7.4.1(11)(l) Prefabricated interior wall assemblies will be installed in conformance to room requirements for its intended function, security, fire separation, and sound isolation. These wall assemblies will be used in non clinical, administrative, and office areas, where conversational privacy and security concerns are not an issue. Locations, accessories and finishes of prefabricated interior wall assemblies will be determined through consultation with the Authority in the process described in Appendix 2C [User Consultation and Design Review].

5.7.4.1(12) Permanent wall identification marks will be stenciled on fire-rated and smoke separation wall assemblies conforming to the following:

5.7.4.1(12)(a) Located in accessible concealed floor and floor/ceiling spaces;

5.7.4.1(12)(b) Placed above finished ceiling level, at intervals not more than 4500mm O.C. measured horizontally; and

5.7.4.1(12)(c) Identify the wall type and its fire resistance/smoke separation rating.

5.7.4.2 Special Requirements

5.7.4.2(1) In all Operating Rooms, Airborne Isolation Rooms and MDRD with the exception of Administration Areas, wall finishes will be free of fissures, open joints, or crevices that can retain or permit passage of dirt particles.

5.7.4.2(2) in the MDRD, with the exception of Administration areas, ceiling, walls, and work surfaces will be impervious to moisture.

5.7.4.2(3) Design and construct interior walls to accommodate closed solid waste disposal system within each Patient room as shown in Appendix 2E [Clinical Equipment and Furniture].

5.7.4.2(4) Partition design will allow for built-in pass through where required by Appendix 3A [Clinical Specifications and Functional Program] and Appendix 3B [Minimum Room Requirements].

5.7.4.2(5) Provide protection against water damage in spaces that contain equipment or services by providing required partition base Design, such as concrete curbs.

5.7.4.2(6) All non Mental Health Patient rooms must have “pony walls” between the bedroom and the ensuite washroom, which is 305mm lower than the Ceiling Height to allow for use of a single X-Y gantry style Patient lift system. Provide structural steel components for reinforcement.

5.7.4.3 Interior Wall Framing

5.7.4.3(1) 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.

5.7.4.3(2) 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.

5.7.4.3(3) Design will account 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.

5.7.4.3(4) Design assembly to accommodate construction tolerances, deflection of Facility structural members, and clearances of intended opening.

5.7.4.3(5) For non-loadbearing interior steel stud walls around acoustically sensitive rooms, wall framing will be constructed using Bailey studs, installed as per manufacturer's recommendations to achieve required STC rating for the wall assembly.

5.7.5 Wall Backing

5.7.5.1 At a minimum, Project Co will provide wall backing as follows:

5.7.5.1(1) Full width of the wall to a minimum height of 1800 mm in alcoves around hand hygiene sinks;

5.7.5.1(2) Full width and height of the wall around chemical dispensing systems in Housekeeping Closets, plumbed emergency washing facilities, eyewashes and showers;

5.7.5.1(3) Full width and height of the wall that has the head of the Patient's bed or stretcher towards it;

5.7.5.1(4) Full width of the wall around hangers to support Patient walkers or mobility aids in inpatient bedrooms;

5.7.5.1(5) Full width of the wall above door frames for automatic door operators;

5.7.5.1(6) For all handrails and crashrails;

5.7.5.1(7) For all window blinds and curtain tracks;

5.7.5.1(8) At all wall mounted door hold open magnets;

5.7.5.1(9) At all door stop locations;

5.7.5.1(10) At all coat hook locations; and

5.7.5.1(11) Full width and height of the walls in the following rooms or areas:

5.7.5.1(11)(a) Housekeeping Closets;

5.7.5.1(11)(b) Medication Rooms;

5.7.5.1(11)(c) Clean Supply Rooms;

5.7.5.1(11)(d) Utility Room, Soiled;

5.7.5.1(11)(e) Soiled Holding Rooms;

5.7.5.1(11)(f) Storage rooms;

5.7.5.1(11)(g) Alcove-Scrub Stations; and

5.7.5.1(11)(h) All spaces within the Food Services area.

5.7.5.2 Provide wall backing to support wall-mounted multimedia devices as further described in Section 7.10.15.

5.7.5.3 Provide wall backing to support wall-mounted dumbbells, weights and other accessories.

5.7.5.4 Provide wall backing to support all wall-mounted items listed in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items], Appendix 2L [Food Services Equipment] and Appendix 3F [Equipment List IM/IT].

5.7.5.5 Provide wall backing securely fastened to span fully the distance between two studs at a minimum.

5.7.6 Ceilings

5.7.6.1 Design ceilings to accommodate ceiling-mounted equipment as set out in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] Appendix 2L [Food Services Equipment] and as set out in Appendix 3A [Clinical Specifications and Functional Space Requirements] and 3B {Minimum Room Requirements].

5.7.6.2 Design ceilings to accommodate the ceiling mounted ceiling lift and track system. Suspended tracks, rails and pipes located in the traffic path for Patients in beds and/or on stretchers will not be less than 2.6 m above the finished floor; refer to Section 6.11.3 Ceiling Lifts.

5.7.6.3 Provide ceilings in spaces described in Appendix 3A [Clinical Specifications and Functional Space Requirements] in accordance with Appendix 3B [Minimum Room Requirements].

5.7.6.4 Ceilings will be constructed without fissures, open joints, or crevices that can retain or permit passage of dirt particles or steam and condensation. Ceiling penetrations will be properly sealed to prevent the entrance of air, insects and rodents.

5.7.6.5 Ceilings will limit the passage of particles from both above the ceiling plane and adjacent non-clinical areas into the clinical environment.

5.7.6.6 Ceilings in mechanical and electrical service rooms will be open, unless required otherwise by BCBC.

5.7.6.7 Design and select ceiling systems and ceiling finishes to comply with the following criteria:

5.7.6.7(1) Repeated cleaning, maintenance and infection prevention and control;

5.7.6.7(2) Repeated removal and re-installation to gain access above without chipping, cracking or delaminating

5.7.6.7(3) Flexibility and access to the spaces above;

5.7.6.7(4) Compatibility with mechanical, plumbing, electrical, communications services and fixtures;

5.7.6.7(5) Low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.7.6.7(6) Aesthetic and design qualities to provide a healing environment for the Patients, Staff and public.

5.7.6.8 Ceilings in spaces referred to as restricted space or semi-restricted space in the Appendix 3A [Clinical Specifications and Functional Space Requirements] will be monolithic and constructed with solid surfacing materials or GWB as a seamless and unbroken surface. Service access panels will be spaced at a maximum of 2.0m apart. Service access panels will be clipped and sealed to maintain the seal after replacement to prevent the transmission of contaminants into or out of the occupied space.

5.7.6.8(1) Solid surfacing ceilings will have minimum 460mm x 460mm access panels laid out so that maintenance Staff can reach all Serviceable items above the ceiling without physically entering the ceiling space.

5.7.6.9 Lay-in ceilings utilized in the following areas will be resistant to humidity, steam and moisture to be encountered and will have a proven use for food preparation/kitchen and clean room areas. Provide ceilings constructed of durable, water-resistant, washable, scratch-resistant and soil resistant, non-porous, non-shedding materials, on non-corrosive aluminum exposed grid system with recessed, enclosed pipes and fixtures so as to create a flush surface, facilitating frequent cleaning. Ceiling access will be provided at a maximum 2.0m apart for maintenance of pipes and fixtures. These ceilings will have a 30-year system warranty against visible sag, mould and mildew.

5.7.6.9(1) MDRD, with the exception of the Administration Area;

5.7.6.9(2) Food Services area;

5.7.6.9(3) Nutrition Centres; and

5.7.6.9(4) Patient Washrooms with showers.

5.7.6.10 All piping, duct work, and structure will be covered by a finished ceiling in location where dust fallout would present a potential problem. All overhead piping and ductwork in dining or food handling areas will be concealed behind a solid finished

ceiling. Exposed services are not permitted in public lobbies, waiting areas and Patient accessible areas.

5.7.6.11 Provide fittings, attachments and internal bracing/backing as required to accommodate and support ceiling-mounted clinical and non-clinical fixtures and equipment, including equipment in Multimedia Rooms and other applicable rooms.

5.7.6.12 Ceiling-mounted ceiling lift will be installed in the ceiling (i.e. recessed track) to be Ligature Resistant.

5.7.6.13 All Patient rooms will have ceilings, and the space between the ceiling and the structure above will be designed and constructed so that location of fixtures and services (such as luminaires, sprinklers, ducts, pipes, etc.) will not require removal or relocation for future installation of ceiling mounted ceiling lifts and their required support layouts.

5.7.6.14 Ceilings will allow access to equipment where necessary, except at those spaces as indicated elsewhere in this Schedule.

5.7.6.15 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.

5.7.6.16 Ceiling Height Requirements

5.7.6.16(1) Ceilings Height will be no less than 2.75 m above the finished floor in all areas except for the following:

5.7.6.16(1)(a) Ceiling Height in normally unoccupied areas such as alcoves, storage rooms for supplies and soiled Utility rooms will not be less than 2.4 m above the finished floor;

5.7.6.16(1)(b) Ceiling Height in rooms or spaces 40.0 NSM or greater such as meeting rooms, service areas (Nutrition Centres), and Multimedia Rooms will be not less than 3.0 m unless otherwise required to comply with UBC FoM Design Guidelines for Learning Space AV Systems and Associated Infrastructure;

5.7.6.16(1)(c) Ceiling Height in Clinical Spaces within Mental Health Areas including Secure Rooms will be not less than 3.0 m;

5.7.6.16(1)(d) Ceiling Height in the Exercise Room will be not less than 3.0 m;

5.7.6.16(1)(e) Ceiling Height in all areas accessible to the public, excluding washrooms, in the I4-Main Entrance Lobby component will be not less than 3.5 m including; waiting areas, food services (retail), gift shop and display areas. Localized ceiling drops to accommodate services will be

kept to a minimum and will not be less than 2.75 m. Exact locations will be agreed with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

5.7.6.16(1)(f) Ceiling Heights in all Operating Rooms to be of a height to accommodate the requirements of Appendix 2E [Clinical Equipment and Furniture] and will not be less than 3.5 m unless otherwise required to be higher based on the ceiling mounted equipment. Ceiling Heights to be coordinated to suit specific floor or ceiling equipment in combination with other ceiling-mounted equipment; and

5.7.6.16(1)(g) Ceilings Height in rooms containing ceiling mounted equipment or ceiling-mounted surgical light fixtures, will be of sufficient height as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] to accommodate the equipment or fixtures and their normal movement.

5.7.7 Flooring and Floor Finishes

5.7.7.1 The floor and floor systems will form a part of the interior space. Accordingly, Project Co will provide flooring that is complementary and integral to the functional and aesthetic requirements of the interior space.

5.7.7.2 Flooring will not be installed over materials that contain moisture content which exceeds that recommended by the flooring manufacturer.

5.7.7.3 Use static-resistant flooring material for Communications Rooms, refer to Section 6.9.8.

5.7.7.4 Provide flash-cove floor base at all locations with vinyl or rubber flooring. Flash cove base will be straight cut, with cove former, finished with metal J-cap and apply proper caulking to any gaps. Silicone caulking will be used only for areas in direct contact with water: around showers, bathtubs, sinks, and toilets. For other surfaces, apply acrylic or polyurethane caulking.

5.7.7.5 At solid surface wet wall panel locations, the panels will overlap minimum 50mm the flash cove detail and be sealed at junction.

5.7.7.6 Project Co will provide flooring:

5.7.7.6(1) To suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated; use heavy-duty materials for flooring on which wheeled, or service vehicle traffic is anticipated, and to which wear and damage may result;

5.7.7.6(2) With low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

5.7.7.6(3) To meet the LEED general emissions evaluation requirements;

5.7.7.6(4) That is impact-absorbing in areas requiring footfall impact noise control such as in Clinical Spaces;

5.7.7.6(5) To meet the acoustic performance criteria set out in Appendix 3C [Acoustic and Noise Control Measures];

5.7.7.6(6) To withstand repeated cleaning, maintenance and infection prevention and control including the frequency and quality of joints;

5.7.7.6(7) Designed for ease of replacement when required by the Authority;

5.7.7.6(8) That is imperviousness to concentrations of moisture anticipated to be on the floors and duration of that moisture;

5.7.7.6(9) That is durability and resistance to concentrated service traffic, both pedestrian and vehicular; and

5.7.7.6(10) To meet the requirements for Multimedia rooms as set out in Section 7.10.15.

5.7.7.7 Aesthetic and design qualities requirements include:

5.7.7.7(1) Provide flooring which promotes the requirement to create a healing environment within the Facility for the benefit of Patients, Staff and public; and complies with the following elder friendly evidence based design principles for the purposes of safety and Wayfinding in Clinical Spaces including:

5.7.7.7(1)(a) Provide one (1) tonally continuous flooring surface;

5.7.7.7(1)(b) Provide a 30-degree difference of LRV between surfaces of floors-to-walls and doors-to-walls;

5.7.7.7(1)(c) Adjoining flooring materials will not contrast more than 10 degrees of LRV;

5.7.7.7(1)(d) Do not use flecked, striped and patterned floors; and

5.7.7.7(1)(e) Do not use highly reflective flooring or reflective trims or transitions.

5.7.8 Surfaces

5.7.8.1 Provide surfaces with the following characteristics, consistent with their functional purpose:

5.7.8.1(1) Resistant to graffiti in public areas such as washrooms;

5.7.8.1(2) Resistant to microbial spread and growth;

5.7.8.1(3) Non-porous, smooth and free of crevices that can trap dirt and harbour microbial growth;

5.7.8.1(4) Durable;

5.7.8.1(5) Seamless;

5.7.8.1(6) Resilient and impact resistant;

5.7.8.1(7) Non-toxic/ non-allergenic;

5.7.8.1(8) Matte finish presenting minimal glare;

5.7.8.1(9) Without bold patterns or flecked colours;

5.7.8.1(10) Constructed in a way that will not soak up or harbour moisture;

5.7.8.1(11) Water impermeable in areas where water or dampness can occur; and

5.7.8.1(12) Cleanable with the hospital grade disinfectants and cleaning products to be used in the Facility.

5.7.8.2 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 3C [Acoustic and Noise Control Measures].

5.7.8.3 Provide fittings, attachments and internal bracing/backup as required to accommodate and support wall-mounted equipment.

5.7.9 Line of Sight

5.7.9.1 Line of Sight means the ability to see what is important from where a person is located; the implications to the Design include the general layout, use of low walls and Furniture, low equipment, glazed walls, signage, screens, lighting fixtures, cameras and other wall or ceiling mounted equipment, straight corridors and doorways that line up.

5.7.9.2 Line of Sight will be determined in accordance with the process described in Appendix 2C [User Consultation and Review Procedure]; and includes:

5.7.9.2(1) For the general public, from main entry points and important circulation paths to elevator doors;

5.7.9.2(2) For Staff, from the location where Staff normally perform their work, centreline of inner entrance doors at the Entry Vestibule, or centre of the Lobby/Waiting Area; and

5.7.9.2(3) For Clinical Spaces, to all four corners of the space where possible, centre point of entrance doors, and head of the Patient bed.

5.7.9.3 Provide Line of Sight as required for functionality as indicated in Appendix 3A [Clinical Specifications and Functional Space Requirements], including the following:

5.7.9.3(1) Location and Design of interior walls and columns will minimize disruption of Line of Sight;

5.7.9.3(2) If the department or Functional Component entry is not clearly visible, provide IP video surveillance camera(s) and/or video intercom. Refer to Section 7.11;

5.7.9.3(3) If the department or Functional Component entry is not clearly visible, provide IP video surveillance camera(s) and/or video intercom. Refer to Section 7.11; and

5.7.9.3(4) Provide fittings, attachments and internal bracing/backing as required to accommodate and support wall-mounted clinical and non-clinical fixtures, storage systems and equipment, including equipment in multimedia and other applicable rooms.

5.7.10 Acoustics and Noise Control

5.7.10.1 Project Co will design and construct the Facility in consultation with an Acoustic and Vibration Consultant.

5.7.10.2 Design and Construct the Facility to comply, at a minimum, with the requirements described in Appendix 3C [Acoustic and Noise Control Measures].

5.7.10.3 Provide acoustic and noise control measures necessary to create a healing environment for Patients, a safe and comfortable environment for Staff and confidentiality where it is required.

5.7.10.4 Acoustic and noise control measures will include the following as a minimum:

5.7.10.4(1) Attenuation of sound within public, Patient and Staff environments;

5.7.10.4(2) Sound isolation between the exterior and interior spaces;

5.7.10.4(3) Sound isolation between interior spaces within the Facility at both horizontal and vertical separations;

5.7.10.4(4) Sound and vibration control of Facility service noises and sound isolation of Facility service rooms;

5.7.10.4(5) Sound isolation and acoustic and vibration controls as required for specialty rooms, and in Multimedia Rooms as further described in Section 7.10.15;

5.7.10.4(6) Sound attenuation (noise control) for equipment within rooms; and

5.7.10.4(7) Sound masking system referred to in Appendix 3C [Acoustic and Noise Control Measures].

5.7.10.5 Where penetrations are necessary to meet the requirements of this Schedule:

5.7.10.5(1) Back-to-back penetrations (e.g., electrical boxes, telecommunications outlets, medical gas outlets, shower/bath valve assembly, etc.) in acoustic rated walls (STC 45 or higher) will be in separate stud cavities or spaced a minimum of 400 mm apart within a common stud cavity filled with batt insulation; if these conditions are not met, then all of the boxes on at least one side of the wall within the common stud cavity will be wrapped with acoustic rated putty patches or boxed and sealed with the equivalent GWB layers as the partition they penetrate;

5.7.10.5(2) Piping passing through any acoustic rated partition, including for shower heads, toilets, faucets etc., will not contact the wall and the gap will be sealed with an acoustic rated caulk; and

5.7.10.5(3) Recessed cabinets and bathtubs will be boxed and sealed with the equivalent GWB layers as the partition they penetrate and the remaining gap in the stud wall will be filled with batt insulation.

5.7.10.6 Minimize constructions such as ducts, rigid conduits, or corridors that act as tubes to transmit sound from one area to another. At common supply and return ducts, provide sound attenuation liners at the diffuser and/or grill to maintain the acoustical requirements described in Appendix 3C [Acoustic and Noise Control Measures]. Seal around conduits where they penetrate walls.

5.7.10.7 Isolate structure-borne vibrations and sound with resilient mountings (appropriate vibration isolators) on vibrating equipment to minimize sound transfer to structural materials. Provide ducts, pipes, and conduits with resilient, non-rigid boots or flexible couplings where they connect to vibrating equipment and isolate them from the structure with resilient gaskets and sealant where they pass through walls, floors, or other Facility surfaces.

5.7.10.8 Use acoustic barriers, vibration isolators, and carefully selected exterior equipment to prevent exterior noise from exceeding noise bylaws and to limit re-entrant noise to the Facility and future buildings on the Site.

5.7.10.9 Provide acoustic barriers and careful design around Facility exterior activities that include loading bay vehicle activity and idling, to prevent noise that neighbours may find offensive.

5.7.10.10 Refer to Appendix 3C [Acoustic and Noise Control Measures], Table 1 for minimum wall STC ratings. Project Co will design to meet all STC requirements of Table 1 – Minimum STC Ratings of Demising Walls and Floor/Ceiling Assemblies as well as the ASTC or NIC compliance tests required in Appendix 3C [Acoustic and Noise Control Measures]. As not all possible adjacency combinations are listed in Table 1, Project Co will propose STC ratings for any such new adjacency combinations for review by the Authority, based on similar adjacency combinations, room type, functionality, intent, and purpose of the room.

5.7.10.11 Acoustic Treatment

5.7.10.11(1) Sound 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:

5.7.10.11(1)(a) All normally occupied spaces will incorporate acoustic surfaces to achieve a design reverberation time equal to or less than those indicated in Appendix 3C [Acoustic and Noise Control Measures];

5.7.10.11(1)(b) In spaces with infection control requirements, the use of washable acoustic finishes will be explored by Project Co.

5.7.10.12 Partitions

5.7.10.12(1) Design and construct the Facility to comply with the minimum sound transmission ratings between spaces described in Appendix 3C [Acoustic and Noise Control Measures].

5.7.10.12(2) All penetrations through partitions will be sealed with non-setting acoustical sealant. This includes all mechanical, electrical, and plumbing. Where smoke or fire ratings are required, sealants with combined acoustic and smoke or acoustic and fire ratings will be used.

5.7.10.12(3) All walls will be insulated.

5.7.10.13 Ceilings

5.7.10.13(1) Provide suspended acoustic ceiling tile with a minimum NRC rating of 0.70 and minimum CAC rating of 35 will be used throughout the Facility, except where equivalent alternate treatment is provided, in NICU areas Appendix 3C [Acoustic and Noise Control Measures], or where prohibited by cleanroom requirements.

5.7.10.14 Doors

5.7.10.14(1) Doors must meet the requirements listed in Appendix 3C [Acoustic and Noise Control Measures] including the minimum STC ratings in Table 3 and door assignments in Table 5.

5.7.10.15 Glazing

5.7.10.15(1) For acoustic requirements for interior glazing refer to Appendix 3C [Acoustic and Noise Control Measures].

5.7.10.16 Mechanical Systems and Equipment

5.7.10.16(1) Mechanical systems will be designed such that background sound levels within the Facility do not exceed levels specified in Table 6 of Appendix 3C [Acoustic and Noise Control Measures].

5.7.10.16(2) Additionally, Project Co will meet the following requirements:

5.7.10.16(2)(a) Ducts, rigid conduits, or other paths that may acoustically connect two spaces will be avoided. Where required, they will be sealed appropriately so as to maintain the sound isolation requirements between spaces; and

5.7.10.16(2)(b) 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.

5.7.10.16(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.

5.7.10.16(4) Insulation jackets (acoustic duct lining) will be utilized as appropriate at supply air diffusers to reduce sound entering space from the plenum.

5.7.10.16(5) Supply air diffusers will be selected so that turbulent airflow noise levels generated by the diffusers will be less than 10 points below the NC range specified for that room type in Appendix 3C [Acoustic and Noise Control Measures], Table 6.

5.7.10.16(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 and/or vibration sensitive equipment.

5.7.10.16(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 acoustical sealant where they pass through walls, floors, or other surfaces of the Facility.

5.7.10.16(8) Noise producing equipment will not be located within corridors or in rooms or alcoves that open onto the corridor.

5.7.10.16(9) When testing sound levels from HVAC equipment the units will be fully operational. Refer to Appendix 3C [Acoustic and Noise Control Measures] for room Noise Criteria (NC) ratings.

5.7.10.16(10) Exterior noise from mechanical and electrical equipment, whether operating continuously, quasi continuously or intermittently but regularly, will not, individually or collectively, cause noise levels to exceed the requirements of Appendix 3C [Acoustic and Noise Control Measures] or City Noise Bylaw 6520.

5.7.10.17 Sound Masking

5.7.10.17(1) Where sound isolation will be compromised due to construction limitations caused by conflicts in partition requirements and/or particularly low background sound levels and/or in open work areas, the option for a sound masking system to enhance privacy will be presented to the Authority for consideration. Project Co will have its Acoustic and Vibration Consultant provide documentation highlighting the need and intended areas for use.

5.8 Areas of Refuge

5.8.1 Project Co will provide areas of refuge to meet the requirements as set out in the BCBC and this Schedule. These will include compartments containing rooms such as operating rooms, recovery rooms, delivery rooms and intensive care units, from which it is impracticable to move Patients in an emergency which for this Project will include:

5.8.1.1 B1. Maternal/Child Unit:

5.8.1.1(1) Patient Room-LDRP;

5.8.1.1(2) Patient Room-LDRP-AIR;

5.8.1.1(3) Patient Room-NICU; and

5.8.1.1(4) Patient Room-NICU-AIR.

5.8.1.2 C1. Medical Inpatient Unit:

5.8.1.2(1) Patient Room-Bariatric/AIR; and

5.8.1.2(2) Patient Room- AIR.

5.8.1.3 G1. Emergency Department:

5.8.1.3(1) Trauma/Resuscitation Suite;

5.8.1.3(2) Anteroom-AIR; and

5.8.1.3(3) Treatment Room-AIR.

5.8.1.4 H1. Perioperative Services

5.8.1.4(1) Operating Room.

5.8.2 Emergency Access to Floor Areas

5.8.2.1 Doors providing access to floor areas from exit stairs through a travel distance up or down of not more than 2 storeys to an unlocked door as set out in BCBC, will not be permitted on floors containing the following programs listed in Appendix 3A [Clinical Specifications and Functional Space Requirements].

5.8.2.1(1) B1. Maternal/Child Unit

5.8.2.1(2) D1. Inpatient Psychiatry Unit

5.8.2.1(3) H1. Perioperative Services

5.9 Structural Design

5.9.1 Structural Design Principles

5.9.1.1 Project Co will retain a Structural Engineer of Record who will be a designated Structural Engineer registered with the Association of Professional Engineers and Geo-scientists of British Columbia, and who has demonstrated experience in the structural design of buildings similar in size and complexity to this Facility.

5.9.1.2 Prior to starting construction of the Facility, Project Co's Structural Engineer of Record will have a qualified second professional engineer licensed in the Province of British Columbia perform an Independent Review of the concept design that satisfies the requirements of the Association of Professional Engineers and Geo-scientists of British Columbia Quality Management By-law.

5.9.1.3 The structural design will 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.

5.9.1.4 Design and construct the Facility so that the long-term total foundation settlement will not exceed 25mm and that the differential long-term total foundation settlement will not exceed 20mm in 10m and that the settlement or differential settlement will not impair the operation of the Facility.

5.9.1.5 Project Co will retain a geotechnical engineer, who is a professional engineer registered in British Columbia, as part of the Project team. A supplementary geotechnical investigation may be required to specify foundation design parameters.

5.9.1.6 During site preparation and construction, a qualified geotechnical engineer, registered in the Province of British Columbia, will provide site reviews and

ongoing testing to confirm the general intent of the foundation and site preparation specification and design recommendations, including densification, are carried out.

5.9.1.7 Field reviews by the Governmental Authority are required as a minimum for the following aspects of the work:

5.9.1.7(1) Review of shoring installation;

5.9.1.7(2) Review of site stripping;

5.9.1.7(3) Review of foundation subgrade prior to footing construction;

5.9.1.7(4) Review of pavement subgrade; and

5.9.1.7(5) Review of pavement base and sub-base compaction.

5.9.2 Design loads

5.9.2.1 Performance Criteria

5.9.2.1(1) Do not exceed design floor loading, as indicated on record structural drawings, in all existing structures, unless detailed analysis and reports signed and sealed by a Professional Engineer licensed in British Columbia are submitted, and approved by the Authority through the Review Procedure, justifying an increase in imposed loading. The design floor loading indicated on existing structural drawings is exclusive of snow loading.

5.9.2.1(2) Use the following minimum specified floor design live loads except where the specific use and occupancy of a space requires a higher live load including future use:

5.9.2.1(2)(a) Basement parking areas 6.0 kPa;

5.9.2.1(2)(b) Basement levels other than parking areas 4.8 kPa;

5.9.2.1(2)(c) Truck loading area: 12 kPa but not less than that required for the designated City fire truck;

5.9.2.1(2)(d) Level 1 floor: 4.8 kPa;

5.9.2.1(2)(e) Patient Rooms 1.9 kPa;

5.9.2.1(2)(f) Mechanical, electrical, telecommunication, and service rooms: 3.6 kPa but not less than actual machinery weight;

5.9.2.1(2)(g) Operating Rooms 3.6 kPa;

5.9.2.1(2)(h) Corridors, exits, stairs, other areas above ground level: 4.8 kPa; and

5.9.2.1(2)(i) File rooms, storage: 7.2 kPa.

5.9.2.1(3) Design all suspended floors to accommodate concentrated loads from specified and planned future equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted, including medical equipment and ceiling lifting devices.

5.9.2.1(4) Design floors for a minimum superimposed specified dead load allowance of 1.0 kPa to allow for partitions, in addition to 0.5 kPa on upper floors and roof levels to allow for ceilings and mechanical equipment (other than medical equipment). Provide for a minimum superimposed dead load of 0.25 kPa on the parking floors.

5.9.2.1(5) 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 in accordance with BCBC and referenced standards. Notwithstanding other requirements, design the roofs to accommodate concentrated loads from specified and planned future equipment, machinery and features, whether roof or ceiling-mounted, including medical equipment and ceiling lifting devices.

5.9.2.1(6) Design roofs for the superimposed specified dead load of roofing materials, green roofs (where applicable), ceilings, mechanical equipment, but not less than 1.5kPa to allow for future re-roofing alternatives.

5.9.2.1(7) Design floors and roofs above mechanical and electrical service rooms for not less than a superimposed suspended equipment specified dead load of 2kPa in addition to the minimum dead load allowances specified above.

5.9.2.1(8) Unless an alternative shoring plan meeting all strength, short-term and long-term deflection, levelness and flatness requirements is prepared by a shoring engineer and is reviewed and approved by the Authority through the Review Procedure:

5.9.2.1(8)(a) Removal of formwork for suspended reinforced concrete floors and immediate re-shoring will commence only once 100% of the 28-day design concrete strength has been achieved, but no earlier than seven days after pouring;

5.9.2.1(8)(b) Re-shoring will be completed during the same day as the formwork was removed.

5.9.3 Flexibility for Future Change

5.9.3.1 Design the floor structure to be able to accommodate, without additional reinforcing, six 130mm diameter cored hole per structural bay at any location in the floor plate.

5.9.3.2 Design the floor structure with a minimum of one 150mm 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 Facility or BH Energy Centre program spaces) where one 150mm 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.

5.9.3.3 Design the floor structure so that it will not interfere with the support layout of future ceiling mounted ceiling lifts installations.

5.9.3.4 The primary structural support grid will be coordinated with internal partitinons and will conform to a minimum support grid of 9m by 9m to accommodate flexibility in the layout of the Facility. Any modification to this requirement is to be agreed by consultation with the Authority in accordance with the process described in Schedule 2 [Design and Constrcurion Protocols].

5.9.3.5 The structural system will make provisions to allow for the installation, servicing and future replacement of any specialized equipment and its components including future MRI and CT scanners. All floors and elevators along the routes of the delivery, servicing and replacement of the equipment will be designed with capacities adequate for the loading of the equipment. Provide floor plans with maximum loadings clearly indicated for the specialized equipment installation and replacement component delivery routes with corridors, doors, and elevations that meets the specification of minimum delivery routes sizes and capacity as required by the Authority and equipment supplier.

5.9.4 Coordination

5.9.4.1 Coordinate the structural members with the architectural finishes to have adequate thickness, cover and reinforcing to satisfy the fire protection and durability requirements.

5.9.4.2 Coordinate all structural members with other disciplines to avoid Utility interferences and to ensure adequate architectural headroom and clearances.

5.9.4.3 Coordinate structure with equipment requirements for slab depressions and cast-in hardware, including for refrigerators, freezers, audiometric rooms, floor troughs and cart wash troughs. Provide adequate depth of slab depressions to avoid the need for ramps.

5.9.4.4 Coordinate all structural floor penetrations in the SFB, except as allowed for in the clause below, to be located within regions of reinforced concrete flat slab only. No openings will be permitted through precast or prestressed beams and girders.

5.9.4.5 Where large structural floor openings are required for additional elevator shafts, local removal of pre-cast double tee beams is permitted. No removal of precast or prestressed girders is permitted without prior approval from the Authority through the Review Procedure.

5.9.5 Deflection limits

5.9.5.1 Design the structure to meet the deflection limits of BCBC and the applicable materials design standards listed in this Schedule 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:

5.9.5.1(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;

5.9.5.1(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;

5.9.5.1(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;

5.9.5.1(4) Wind interstorey drift: Height/500; and

5.9.5.1(5) Seismic interstorey drift:

5.9.5.1(5)(a) Phase 1A and Phase 1B of the Facility, including the parking and BC Engergy Centre: Height/100;

5.9.5.1(5)(b) Support Facilities Building: Height/100.

5.9.5.2 Design the structure conform with specific deflection requirements for equipment as recommended by the supplier or manufacturer of that equipment.

5.9.5.3 Design the structure such that the deformations of the structure under service loads are compatible with the architectural finishes and cladding system.

5.9.6 Vibration Limits

5.9.6.1 Design the structure to minimize the effects of floor vibration due to use, occupancy, equipment and external vibration sources. The design method will include dynamic analysis of the floor system to determine floor accelerations and velocities using published dynamic loading and a demonstration that those accelerations and velocities meet the vibration limits below.

5.9.6.2 An Acoustic and Vibration Consultant will be retained by Project Co. The consultant will be a professional engineer registered in the Province of British Columbia and approved by the Authority through the Review Procedure, with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance of buildings.

5.9.6.3 Equipment or machinery that could be a source of vibration is to be mounted using vibration isolation techniques.

5.9.6.4 Where practical, vibration isolation tables must be used to support vibration sensitive equipment. The Acoustic and Vibration Consultant must provide documentation of the isolation table performance, equipment requirements, and floor vibration modelling results for review and approval by the Authority through the Review Procedure.

5.9.6.5 Design the structure such that vibration does not exceed any of the following:

5.9.6.5(1) Maximum acceptable vibration levels appropriate to the planned use and occupancy of the floors;

5.9.6.5(2) Limits provided in ISO 10137 or any other published and widely accepted specification approved by the Authority through the Review Procedure;

5.9.6.5(3) In areas supporting sensitive equipment, the limits specified by the manufacturer of the specified equipment; and

5.9.6.5(4) The following limits for typical medical and non-medical Facility spaces:

| **Common Classification** | **Occupancy or Equipment Requirement Examples** | **Maximum Vibration Velocity (1) (µm/s, 1-s, r.m.s.)** |
|---|---|---|
| Residential Day (ISO) | Circulation<br>Corridors<br>Lounge Areas<br>Shared Offices and workspaces<br>Public Areas<br>Reception<br>Waiting rooms<br>Washrooms<br>Clinical Spaces (daytime)<br>Multimedia rooms (unless using wall or ceiling mounted video cameras or projectors)<br>Private Offices | 200 |
| Residential Night (ISO) | Patient rooms and any area where occupants may sleep | 140 |
| Operating Theatre (ISO) | Medical/Procedure rooms,<br>Specialty Medical (except imaging – depends on equipment)<br>Operating Rooms and critical work areas<br>MDRD<br>Multimedia Room floors, ceilings or walls that support video cameras or projectors<br>Bench microscopes up to 100 x magnification | 100<br><br>(Note: threshold of human perception) |
| VC-A | Bench microscopes up to 400 x magnification<br>Optical and other precision balances<br>Optical comparators | 50 |
| VC-B | Microsurgery<br>Eye surgery<br>Bench microscopes at magnification greater than 400x<br>Optical equipment on isolation tables | 25 |
| VC-C | Magnetic Resonance Imagers | 12 |
| VC-D | Mass Spectrometers | 6 |

**(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. Vibration velocity at 4 Hz is to be limited to two (2) times the allowable vibration at 8 Hz and interpolated for intermediate bands. For VC-C, VC-D, or in any space where vibration sensitive equipment will be supported by isolation tables, the maximum vibration velocity applies to one-third octave bands from 1 to 80 Hz. Vibration level depends on walker weight and gait; appropriate footfall conditions must be applied for the space type under consideration. In-situ measurement verification of floor vibration characteristics will be carried out where specified by the equipment manufacturer.

5.9.6.6 An independent testing firm may be retained by the Authority to verify compliance with the vibration requirements. The testing firm will measure the vibration using instrumentation that may include transducers, accelerometers, signal-conditioning equipment, data recorders, and analysis systems. Measured vibration performance characteristics for the structure will meet the requirements set out in this Schedule. Where vibrations are found to exceed limits defined in the specification, Project Co will, at their expense, provide and install the structure required to reduce vibrations to within the agreed limits. All retrofitted solutions will be subject to prior approval by the Authority through the Review Procedure.

5.9.7 Durability

5.9.7.1 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 years).

5.9.7.2 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:

5.9.7.2(1) Provide adequate concrete crack control joints and expansion / contraction joints. Caulk exposed joints;

5.9.7.2(2) Provide high strength concrete mixes proportioned to CSA A23.1 and A23.2 durability requirements for exposure class;

5.9.7.2(3) Reinforce concrete for crack control and repair exposed cracks for the maximum allowable crack width in CSA A23.3;

5.9.7.2(4) Chamfer all corners of exposed concrete;

5.9.7.2(5) Hot-dip galvanize all exterior non-exposed steel;

5.9.7.2(6) Hot-dip galvanize all exterior exposed steel and paint with a factory applied two-part epoxy paint system or power coated finish to MPDA requirements. Design parking levels to comply with CSA S413;

5.9.7.2(7) Embed steel protection angles and skid plates for loading docks and garbage compactors; and

5.9.7.2(8) Add corrosion inhibitors to exterior reinforced concrete pavements subject to vehicle traffic.

5.9.8 Equipment Supports

5.9.8.1 Design and provide for support/anchorage of all equipment. 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. Seismic restraints for equipment that are attached to a metal stud and GWB wall shall be provided with appropriate backing.

5.9.8.2 For everything installed by Project Co, it is the responsibility of Project Co to ensure that the proposed solution will be endorsed by an Infection Control Practitioner. The solution will be discreet and aesthetically pleasing and reviewed by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

5.9.8.3 The design for 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.

5.9.8.4 Performance Criteria

5.9.8.4(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 that is sensitive to steel content of the surrounding structure.

5.9.8.4(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.

5.9.8.4(3) Unless proven not to be possible and agreed with the Authority, 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.

5.9.8.4(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.

5.9.8.4(5) In Mental Health Areas, the seismic restraint system will be ligature resistant, to be reviewed and approved by the Authority through the Review procedure prior to use.

5.9.9 Member Design Criteria

5.9.9.1 Design all floor and roof structural framing members to have sufficient stiffness so as to remain Serviceable under the specified loads.

5.9.9.2 Where the cladding system is to be supported by the structural members, design the members to have sufficient stiffness so as to remain Serviceable under the 1 in

50 year service wind pressure and gravity loads and prevent undue stress to the cladding elements.

5.9.10 Structural Systems

5.9.10.1 The preferred structural system for new suspended floors and roof is cast-in-place concrete flat slab construction. Any other proposed system will provide equivalent or better performance in terms of all of the requirements of this specification including flexibility or change, vibration resistance, fire rating, acoustic separation, ceiling space available for services and overall height of the Facility, such performance must be demonstrated to and accepted by the Authority.

5.9.10.2 Post-tensioned or precast concrete structural systems will not be accepted.

5.9.10.3 Roofs must be structural steel or concrete flat 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.

5.9.11 Structural Isolation

5.9.11.1 Design the structure of all new, post-disaster buildings to be completely seismically independent from any existing or planned future adjacent structures by seismic isolation joints that take into account the lateral drifts of all adjacent structures in accordance with the provisions of the BCBC.

5.10 Infection Control

5.10.1 General

5.10.1.1 Project Co will comply with CSA Z317.13 (Infection Control during Construction, Renovation or Maintenance of Healthcare Facilities) and must complete the Infection Control Risk Assessment (ICRA) Matrix of Precautions for Construction and Renovation form. This form must be reviewed with the Authority infection control representative prior to initiating construction (where applicable) and renovations.

5.10.1.2 Design and construct Airborne Isolation Room, AIR Anteroom, to minimize air leakage into the space. Walls, windows, ceilings, and penetrations into the space will be fully sealed. Walls will extend to the underside of the slab and be fully sealed.

5.10.1.3 Design the Facility to:

5.10.1.3(1) Mitigate and prevent, where possible, the spread of infection including via contaminated surfaces and airborne pathogens, consistent with all infection control standards;

5.10.1.3(2) in compliance with all applicable infection prevention and control standards; and

5.10.1.3(3) To prevent where possible, the proliferation and spread of infectious organisms via contaminated surfaces, dust/debris, moisture, plumbing and HVAC system.

5.10.1.4 Select materials that meet CSA Z8000 infection control characteristics to minimize the collection and spread of microorganisms. Use simple detailing with quality workmanship and finishes that facilitate easy accessibility for maintenance and cleaning with hospital-grade disinfectants.

5.10.1.5 Project Co is responsible to ensure that the materials used in the Facility will be endorsed by the Infection Control Practitioner.

5.10.1.6 Design the Facility to segregate sterile, clean, and soiled items, including traffic patterns of clean and soiled transport within the Facility.

5.10.1.7 Design the Facility to mitigate the spread of airborne infections during an outbreak by creating Outbreak Control Zones, as follows:

5.10.1.7(1) C1 – Medical/Surgical Inpatient Unit

5.10.1.7(1)(a) Provide one (1) Outbreak Control Zone consisting of a 12 bed unit and all associated 12 bed unit support spaces as described in Appendix 3A [Clinical Specifications and Functional Space Requirements]; and

5.10.1.7(1)(b) Provide one (1) Outbreak Control Zone consisting of a twenty four (24) bed unit and all associated twenty four (24) bed unit support spaces as described in Appendix 3A [Clinical Specifications and Functional Space Requirements].

5.10.1.7(2) G.1 – Emergency Department

5.10.1.7(2)(a) In the case of an infections outbreak the emergency department will be equipped to provide three (3) Outbreak Control Zones. All air from these spaces will be exhausted and pressure in these zones will be negative in relationship with adjacent areas.

5.10.1.7(3) Outbreak Control Zones will:

5.10.1.7(3)(a) Be bounded by construction that secures the zone and allows the mechanical ventilation systems to create negative pressure within the zone relative to adjacent floor areas;

5.10.1.7(3)(b) Contain space that can be converted into an Anteroom adjacent to the entrance to the unit with a hand hygiene sink;

5.10.1.7(3)(c) Wherever possible, align with BCBC required fire separations; and

5.10.1.7(3)(d) Be designed in coordination with all parts of this Schedule.

5.10.2 Hand Hygiene Sinks

5.10.2.1 Prepare a workflow pattern and risk assessment in collaboration with the Authority to confirm the final placement of hand hygiene sinks in the Facility.

5.10.2.2 Provide hand hygiene sinks at the following locations:

5.10.2.2(1) As described in Appendix 3B [Minimum Room Requirements];

5.10.2.2(2) As described in Appendix 3A [Clinical Specifications and Functional Space Requirements];

5.10.2.2(3) At all points of entry to the NICU and the Surgical and Interventional Services Component Restricted Circulation corridors, including stairwells; and

5.10.2.2(4) In accordance with CSA Z8000 and BC Ministry of Health Best Practices for Hand Hygiene.

5.10.3 Scrub Sinks

5.10.3.1 At minimum, provide specialized, stainless steel scrub sinks in the following locations:

5.10.3.1(1) As indicated in CSA Z8000-18 7.5.12;

5.10.3.1(2) As described in Appendix 3B [Minimum Room Requirements]; and

5.10.3.1(3) As indicated in Appendix 3A [Clinical Specifications and Functional Space Requirements].

5.10.3.2 All scrub sinks will have hands-free operation.

5.10.3.3 Design will include appropriate placement of scrub solutions, eyewash, linens, mirror and surgical supplies such as masks, gloves fingernail cleaners, brushes and other required items identified through the process described in Appendix 2C [User Consultation and Review Procedure].

5.10.4 Alcohol-Based Hand Rub Dispensers

5.10.4.1 Project Co will install all Authority-supplied alcohol-based hand rub dispensers equipped with drip trays for the Facility.

5.10.4.2 Project Co will prepare a workflow pattern and risk assessment in collaboration with the Authority to address the quantity and placement of alcohol-based hand rub dispensers.

5.10.4.3 Install Authority-supplied alcohol-based hand rub dispenser stations with signage at all entrances to the Facility so that visitors stop, take notice, and access them. Dispenser stations will have at least four antiseptic hand rub dispensers mounted for Convenient Access for visitors.

5.10.5 Personal Protective Equipment

5.10.5.1 Project Co will install Authority-supplied wall mounted PPE dispensers.

5.10.5.2 PPE dispensers are not to be installed within 1000 mm of a hand hygiene sink.

5.10.5.3 The exact location of PPE dispensers throughout the Facility will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

5.10.6 Surfaces

5.10.6.1 Materials and finishes will be moisture impervious and compatible with hospital grade disinfectants and cleaning products to be used in the Facility.

5.10.6.2 Surfaces in all clinical areas including Operating Rooms, Inpatient Areas, Food Service - Pantry, Medication Rooms, Utility Room Clean, Utility Room Soiled, MDRD, will be smooth, seamless, and free of crevices or troughs that can collect dust/dirt/microorganisms, and durable enough to withstand the additional repeated cleaning and disinfection that is required in these areas.

5.10.7 Equipment and Storage

5.10.7.1 Provide storage shelves that are:

5.10.7.1(1) Cleanable with the Authority-approved detergents and disinfectants;

5.10.7.1(2) Not located under sinks; and

5.10.7.1(3) Minimum 200 mm above the floor to permit routine cleaning.

5.10.7.2 Dedicated storage space with power outlet for charging required for large wheeled equipment such as mobile Patient lifts.

5.10.7.3 If open shelving is provided for storage, the bottom shelf of such shelving will be a solid surface to prevent contamination from the floor.

5.10.7.4 Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks.

5.10.7.5 Storage space for sharps disposal and Patient waste disposal will be secure to avoid tampering or inappropriate access.

## 5.11 Interior Environment

### 5.11.1 Interior Design

#### 5.11.1.1 General Requirements

5.11.1.1(1) Employ, as part of the Project team, a professional interior designer.

5.11.1.1(2) Project Co will provide interior Design that:

5.11.1.1(2)(a) Reflects the Authority's goals within the Facility;

5.11.1.1(2)(b) Integrates the overall interior Design throughout the Facility;

5.11.1.1(2)(c) Provides a distinct character for the Facility that relates to its purpose and the Patients using the Facility;

5.11.1.1(2)(d) Includes individual Design concepts for each Component area;

5.11.1.1(2)(e) Is sensitive to the user groups in different areas;

5.11.1.1(2)(f) Creates a warm, welcoming and non-institutional environment;

5.11.1.1(2)(g) Uses complementary environmental wall graphics and other thematic décor with a range of themes and colours;

5.11.1.1(2)(h) Is coordinated with all Facility Furniture with regard to Furniture selection, colours and fabrics; and

5.11.1.1(2)(i) Coordinates with progressive disclosure Wayfinding concepts, as described in Appendix 3I [Wayfinding Standards for Burnaby Hospital].

#### 5.11.1.2 Mental Health Interior Design Requirements

5.11.1.2(1) In addition to the requirements as described in Section 5.11.1.2 provide the following for Mental Health interior environments:

5.11.1.2(1)(a) Warm, welcoming, and familiar environment to reduce anxiety and depression and provide a calming effect;

5.11.1.2(1)(b) Elements that assist in normalizing the Patient environment, removing feelings of institutionalization and facilitate participation in treatment;

5.11.1.2(1)(c) Accent colours, lighting, wood-look floors and furnishings will contribute to de-escalation and effective Patient care;

5.11.1.2(1)(d) Natural colour palettes and use of neutral colours that invoke natural scenery;

5.11.1.2(1)(e) Brighter colours such as white and light grey that are less disturbing and less hostility-inducing;

5.11.1.2(1)(f) Darker colours such as black and dark gray will not be used;

5.11.1.2(1)(g) Distribution of ambient full-spectral colour within Patient environments; and

5.11.1.2(1)(h) Finishes that minimize glare.

5.11.2 Ergonomic Design

5.11.2.1 Project Co will provide:

5.11.2.1(1) Detailed Design features that expressly facilitate Staff and Patients safety, efficiency and general well-being, and eliminate ergonomic risk factors through the use of furniture and flexibility for multiple users, the Design of Millwork, ceiling, lighting, lift devices, and Patient assist or equipment manoeuvring space;

5.11.2.1(2) Allow for all Patient care and treatment spaces to accommodate patient mechanical lifting and transfer devices;

5.11.2.1(3) All work spaces including Millwork, Furniture, lighting and finishes will be optimized for staff safety in accordance with FHA standards to reduce the potential for injury to Staff, including consideration of:

5.11.2.1(3)(a) Separation and efficiency of clinical, Patient and support service workflow corridors;

5.11.2.1(3)(b) Convenience of equipment and supply storage for both clinical and non-clinical Staff; specific attention to storage access from each planned Operating Room;

5.11.2.1(3)(c) Thoughtful design consideration of lighting, work heights, workstation dimensions, flexibility over time and adjustability at all task-intensive, sitting or standing work stations; in accordance with the FHA Standards; and

5.11.2.1(3)(d) In accordance with Fraser Health Ergonomic Standards for Workstations.

5.11.3 Elder Friendly Design

5.11.3.1 Project Co will comply with the publication Code Plus, Physical Design Components for an Elder Friendly Hospital, latest edition, or the edition in effect on

the Effective Date, that sets forth elder friendly and dementia-friendly design recommendations that go beyond industrial building codes and standards, in order to preserve the safety of, and promote functional ability of, older adults in health care facilities.

5.11.3.2 Project Co will provide Convenient Access to wheelchairs/stretchers and nestable transport chairs (Staxi) adjacent to the entrance, inside of the Facility.

5.11.3.3 Provide for access for Persons with Disabilities and assistance by nursing Staff, e.g., barrier-free, including flush and level entrances. Use of stairs in Patient circulation routes is not acceptable.

5.11.4 Pediatric Design

5.11.4.1 Design the Facility with pediatric-friendly spaces, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure], using the following criteria:

5.11.4.1(1) Design the Facility to appeal to children of the different ages that will use that part of the Facility;

5.11.4.1(2) Design the Facility to be scaled for children where applicable;

5.11.4.1(3) Provide ergonomically correct features to suit children where applicable;

5.11.4.1(4) Use space Design, daylight, colour, pattern and texture to achieve pediatric friendly spaces; and

5.11.4.1(5) Encourage playfulness and interaction with the environment where applicable.

5.11.5 Colour

5.11.5.1 Project Co will:

5.11.5.1(1) Provide departmental colour palettes appropriate for the emotional and psychological needs of Patients and Staff;

5.11.5.1(2) Provide natural colour palettes that contribute to the creation of a healing environment;

5.11.5.1(3) Avoid yellow and green colour combinations in Clinical Spaces including Patient recovery and treatment areas;

5.11.5.1(4) Provide colours appropriate to the uses of the Facility including mental health;

5.11.5.1(5) Apply colours and textures to enhance pedestrian and elder safety and assist in Wayfinding. Excessive patterning or textures will not be

used, as this can be misconstrued by Patients. High-contrasting colours in the combinations noted in Section 5.11.5 Signage are not permitted;

5.11.5.1(6) Use contrasting colours to highlight distinct features of the environment to enhance visibility;

5.11.5.1(7) Use the matching colours to camouflage features to reduce unwanted use, such as for exits or restricted areas;

5.11.5.1(8) Use colour cueing or coding techniques in conjunction with assistive devices to improve navigation through and use of the physical environment;

5.11.5.1(9) Provide Component colour palettes appropriate for the emotional and psychological needs of the Patients;

5.11.5.1(10) Avoid glare-creating finishes; and

5.11.5.1(11) Comply with the colours and finishes requirements appropriate for accurate video capture and rendering in Multimedia Rooms, as called for in Section 7.10.15.

5.11.6 Art Work

5.11.6.1 Art work means any form of art work, artifacts and archives to be included in the Design of the Facility that enhances the therapeutic environment and/or has a beneficial effect on Patients, families and/or the public.

5.11.6.2 Art work includes the Authority's procured art work and/or public art work which can consist of various sizes and multiple components to be displayed together.

5.11.6.3 Art work will form an integral part of the Design of the Facility and be developed and detail agreed in collaboration with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] at no additional cost to the Authority.

5.11.6.4 Project Co will display art work both inside and outside the Facility to advance the Authority's goal of:

5.11.6.4(1) Improving the quality of the environment by reinforcing the impression of a caring environment and by creating a sense of space through strong ties to the local community;

5.11.6.4(2) Reinforcing FHA's identity; and

5.11.6.4(3) Forming a positive distraction for Patients and promote social interaction and social support as well as Patient's and Staff's sense of ownership.

5.11.6.5 The Authority intends to visibly represent its commitment to Indigenous reconciliation through art work.

5.11.6.6 Project Co will:

5.11.6.6(1) Incorporate art work in the Wayfinding strategy for the Facility;

5.11.6.6(2) Design the Facility to support the Authority's art program by providing and identifying for the Authority effective and appropriate locations for major and minor art works throughout the Facility;

5.11.6.6(3) Provide lighting specifically designed to enhance the display of all art works;

5.11.6.6(4) Provide all necessary structural support and seismic restraint in accordance with the BCBC. Vandal Resistant mounting and other protective measures required for particular art works to be identified by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. Provide all necessary power and data required for digital art work installations;

5.11.6.6(5) Consider the development of major interior and exterior public pathways as galleries with hanging and display systems that can accommodate complete size and spacing flexibility in mounting;

5.11.6.6(6) Use art work at strategic locations for memory cueing; and

5.11.6.6(7) Work in concert with the Authority to coordinate and manage art work that is owned by the Authority or to be procured by the Authority.

## 5.12 Wayfinding and Signage

### 5.12.1 Interior Wayfinding

5.12.1.1 Project Co 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 3I [Wayfinding Standards for Burnaby Hospital] for the Authority requirements.

5.12.1.2 Project Co will coordinate in consultation with the Authority through the Review Procedure to determine any additional Wayfinding standards and Wayfinding language that Project Co will have to follow.

5.12.1.3 Project Co will provide temporary interior wayfinding signs throughout the construction phase at any time where there is a change in access location(s) and/or changes in route(s) of travel to/from all clinical spaces as per Appendix 3I [Wayfinding Standards for Burnaby Hospital].

5.12.1.4 Project Co will:

5.12.1.4(1) Provide a simple configuration of the Facility General Circulation systems and functions that eases Wayfinding by minimizing the navigational choices Patients and families are confronted with. Signs and Wayfinding assets will then assist with Wayfinding decisions by progressively disclosing information and helping to create a welcoming tone;

5.12.1.4(2) Locate major destinations, such as Component or department entrances, directly off of entry spaces and/or along primary General Circulation paths, and make waiting areas as open as possible to circulation routes without forming part of the circulation corridors;

5.12.1.4(3) Provide significant recognizable, easily named and identified elements in key locations that can become ‘meeting points’ for Patients and visitors;

5.12.1.4(4) Design public-use elevator and stair lobbies and General Circulation routes to be distinct from service routes and other non-public routes;

5.12.1.4(5) Provide Wayfinding to easily direct Patients and visitors to points in the Existing Hospital; and

5.12.1.4(6) Digital wayfinding units will be located in the Main Lobby and by all elevator banks on each level. They will include directories, digital floorplan and interactive maps. Maps will be accompanied by a directory listing services and departments that can be cross-referenced against the map.

5.12.1.4(7) All fixed position maps will be digital-interactive signs and will be oriented to reflect the direction from which they are viewed.

5.12.2 Signage

5.12.2.1 Signage Design will incorporate elder friendly principles so that signage is easily understandable by Patients and families using it for first time, including the following requirements:

5.12.2.1(1) Colour will be used tactically, with the use of red reserved for emergency. Colour coding will be used in accordance with Appendix 3I [Wayfinding Standards for Burnaby Hospital] to facilitate Wayfinding as accent elements to create zones and areas;

5.12.2.1(2) Signs will be made as large as appropriately possible for the posting area;

5.12.2.1(3) Signs will be uncluttered and logically structured, using consistent non-technical, non-medical, jargon-free language appropriate for a sixth-grade reading level;

5.12.2.1(4) Directional signs will be posted at intersections and key decision points and placed regularly along long sightlines such as in hallways. Signs will be placed in consistent positions at all major intersections throughout each area and unit. The signage locations are to be agreed by consultation with the Authority during the process described in Schedule 2 [Design and Construction Protocols]; and

5.12.2.1(5) Regulatory signs, such as prohibition and mandatory signs; warning signs, such as caution and danger signs and; identification signs, such as rooms, titles, names, or numbers will be tactile with the use of braille as described in Appendix 3I [Wayfinding Standards for Burnaby Hospital].

5.12.2.2 Project Co will provide all signage required for the Facility in accordance with the following requirements:

5.12.2.2(1) Signage will be highly visible in day and nighttime conditions, clear, concise, and well-differentiated from surrounding information, notices, advertising, etc. A system hierarchy and progressive disclosure approach will be designed and implemented;

5.12.2.2(2) Colour schemes and combinations, as well as, font sizes will be determined through consultation with the Authority during the process described in Schedule 2 [Design and Construction Protocols] for Wayfinding and Signage. Refer to Appendix 3I [Wayfinding Standards for Burnaby Hospital] and Fraser Health Corporate Identity and Brand Standards Manual;

5.12.2.2(3) Signage will be resistant to graffiti and physical damage and be of a material that will stand up to routine repeated cleaning;

5.12.2.2(4) Use international symbols or simple, explanatory graphics where applicable so that signs are understandable to Patients and families who do not or cannot read English;

5.12.2.2(5) Provide signage that directs visitors to all Patient destinations and all other departments. Prioritize Patient destinations over non-Patient destinations;

5.12.2.2(6) Use overhead directional signage, which will either be suspended from a ceiling or bulkhead or be mounted directly over doors. No directional signage will be incorporated into flooring;

5.12.2.2(7) Post directional signage in consistent locations at all major intersections throughout each area and unit;

5.12.2.2(8) Avoid signage systems with gaps, reveals or elements that are hard to clean. Where signs consist of multiple pieces, all components will

be permanently affixed or mechanically lockable with all components secured so that they may not be disassembled by the public;

5.12.2.2(9) All signs will be secured to walls or other surfaces such that they are secure, tamper-proof, Ligature Resistant and cannot be used as weapons;

5.12.2.2(10) Locate maps and directories at Facility Entrances, Reception, Facility and Component entry areas and key decision points such as elevator lobbies;

5.12.2.2(11) Install wall-mounted signs at an intermediate height suitable for both persons standing upright and those using mobility aids including wheelchairs. Exact sign installation height will be determined on Site with the Authority's Representative;

5.12.2.2(12) Avoid multi-layered naming hierarchies and complex numbering systems;

5.12.2.2(13) Project Co will provide spaces for new donor recognition elements as follows:

5.12.2.2(13)(a) Located in proximity to the Main Entrance Lobby;

5.12.2.2(13)(b) Located in each of the public waiting rooms or Component entry and other specific rooms where the Authority may construct a feature to recognize donors, and other supporters of the Facility; and

5.12.2.2(13)(c) Each space is to be provided with power and data. Precise locations to be determined in accordance with the process described in Appendix 2C [User Consultation and Review Procedure].

5.12.2.2(14) Signage in G1.6 – Zone 5: Mental Health and Substance Use (ED) and D1 Inpatient Psychiatry Unit; will be attached to walls with concealed Tamper Resistant fasteners and have beveled edges to prevent the signage from being removed and used as a weapon. Refer to Fraser Health Emergency Department Quality Process Improvements and Model of Care Fraser Health Emergency Network, October 2017.

5.12.2.3 Provide Design and installation of durable temporary signage as required for all key Wayfinding areas throughout the Existing Hospital, Facility and subsidiary spaces that will be necessary for transition from Existing Hospital to Facility for at least 6 months post-occupancy. Coordinate permanent signage changes with the Authority.

5.12.2.4 Design the internal directional signs using progressive disclosure methodology for Wayfinding to include:

5.12.2.4(1) A main map and directory installed at the main public entrance. Map will include the current floor and a keyplan map of the Facility in relation to the overall BH. The directory will be integrated with the Digital Wayfinding unit and will include all Components and public services within the Facility along with the floor they are in. Similar maps and directories will be located at entrances to floor levels with content targeted specifically to the floor. Simple schematic maps will be provided at the entrances to all Components. All maps and directories will be clearly visible from the corridor;

5.12.2.4(2) A progressive disclosure series of signage from the entrances to each of the Components or departments located in the Facility and listed on the directories that are visible from the corridor;

5.12.2.4(3) Installation of signage at each point at which a directional decision is required;

5.12.2.4(4) In the elevator lobby on each floor where every public passenger elevator and patient transfer/staff service elevator stops, provide:

5.12.2.4(4)(a) Directional signage clearly visible from the entrance;

5.12.2.4(4)(b) The floor number on the elevator door jambs; and

5.12.2.4(4)(c) The floor number in a highly visible format on the wall across from the elevator doors upon exit;

5.12.2.4(5) For public elevators also provide a map and directory within the lobby tailored to the floor;

5.12.2.4(6) Provide double the above where the elevators open in different orientations so that each elevator exit has a complete set of signs and indicate the direction for public travel;

5.12.2.4(7) Provide a directory of departments and services on each level within each public passenger elevator and Patient transfer/staff service elevator cab;

5.12.2.4(8) Provide a graphic panel or dimensional lettering at each Component entry, reception area, waiting rooms, elevator lobby, Staff lounge and within the department at Care Team Stations. Coordinate the graphic panel with the departmental signage;

5.12.2.4(9) Elevator door banding will be used for all public elevator doors indicating the floor level and zone colour; and

5.12.2.4(10) Use consistent terminology and location of signage,

5.12.2.5 Door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility. Door signage will:

5.12.2.5(1) Be located in a consistent location for every space in the Facility;

5.12.2.5(2) Indicate restrictions on entry and warn of hazards, including “Laser in use” and “Radiology in use” signage;

5.12.2.5(3) Not be obscured by the emergency systems and code blue system call; and

5.12.2.5(4) Be consistent with the following room numbering protocol:

5.12.2.5(4)(a) Each room has a unique identification number in accordance with the Authority’s numbering standard. Wayfinding numbers to be determined in accordance with the process described in Appendix 2C [User Consultation and Review Procedure];

5.12.2.5(4)(b) Rooms are numbered in accordance to the Authority’s Room Numbering Guidelines as part of the CAD/CAFM Procedure Manual;

5.12.2.5(4)(c) Labelling anticipates a person attempting to follow numbering along corridors in sequence;

5.12.2.5(4)(d) Blocks of numbers are periodically skipped to allow for Future Expansion of the numbering;

5.12.2.5(4)(e) Each Patient room will have a unique number as well as a unique identifier number (refer 5.12.2.5(4)(a) above),

5.12.2.5(4)(f) Numbering of spaces will follow a logical sequence for ease of navigation by Patients and visitors, such as Bay 1, Bay 2, Bay 3, and so on;

5.12.2.5(4)(g) Each room and space require a unique number. It is important that room numbers be determined early in Design and maintained following occupancy;

5.12.2.5(4)(h) Follow the same numbering system on Design and Construction documentation for all disciplines (architectural, mechanical, electrical, etc.); and

5.12.2.5(4)(i) Each Operating Room will have its theatre number installed above the doors inside the theatre in addition to the room number sign outside of the theatre.

5.12.2.6 Administrative space signage will be provided 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 must be used to identify vending areas and waiting areas.

5.12.2.7 Unobtrusive door tags with the room's architectural identification number will be provided for all door frames and for all spaces with architectural identification numbers. The positioning of such labels will be consistent through the Facility. Door tags will be 25 x 50mm raised pane, silver with black letters, installed at top left corner of door frames.

5.12.2.8 In Patient areas of the Facility, provide Patient room signage with a pocket to insert information, and Patient care department directories;

5.12.2.8(1) Pocket to be a minimum of 440 x 210 mm and 64 mm deep.

5.12.2.9 Restricted access and card access signage for all elevators not intended for public use.

5.12.2.10 Directional signage is required at each stairwell level and by each elevator bank at each floor level.

5.12.2.11 Room number signage for Patient rooms will be on large room module signs located next to the room door with the room Wayfinding number. A smaller sign with the BMS identification numbers will be located at the top corner of the doorframe.

5.12.2.12 Final signage wording and Wayfinding numbering will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

5.12.2.13 Provide violence prevention signage at all entrances and other areas as determined by JOHSC and Ministry of Health.

5.12.2.14 Provide instructional signage for specialised wall mounted items including buttons for restricted access and lockdown, and intercoms.

5.12.3 Digital Signage

5.12.3.1 Include digital signage near all public Facility entry points, including entrances from the exterior and from any connected parkades or buildings. Signs will be paired near entrances, with one sign serving as a directory, and the other with generic poster style information.

5.12.3.2 Directory-style digital signage will be included at the entrances to the following and at the locations specified in Appendix 3I [Wayfinding Standards for Burnaby Hospital]:

5.12.3.2(1) Outpatient Clinics;

5.12.3.2(2) Maternal/Child Unit;

5.12.3.2(3) Medical Inpatient Unit;

5.12.3.2(4) Inpatient Psychiatry Unit; and

5.12.3.2(5) Elevators.

5.12.3.3 Digital signs will have a minimum of a 60” diagonal screen with minimum 1080p resolution, and a non-glare surface. Portrait orientation will be used unless content dictates otherwise.

5.12.3.4 Content driving controllers (PC’s) will be recessed into walls or ceilings near the display screen. All wiring will be run inside walls.

5.12.3.5 The screen enclosure will not be less than 27” or more than 84” from the floor. The profile of the screen, it’s frame and mounting hardware will be flush with the wall with suitable ventilation for cooling the electronic components.

5.12.3.6 All screens, content players and controllers will be secured, and Serviceable via secure hinges, access panels or similar methods. All components will be Tamper-Resistant and all access panels will be keyed and secure. Build quality will be suitable for the population and location.

5.12.3.7 All touchable interactive content will be accessible not lower than 36” and not higher than 60” from grade. There will be no obstructions within 10” of the furthest touchable part of the screen.

5.12.3.8 All touchable interactive screens will have anti-microbial surfaces.

5.12.3.9 Digital signage will have the ability to be managed through a site-based solution.

5.12.3.10 For Digital Signage infrastructure requirements refer Section 7.10.15.21.

## 5.13 Building Security and Safety

### 5.13.1 Basic Requirements

5.13.1.1 Provide wall finishes, Anti-Barricade doors, glazing, ceiling systems, fasteners and fittings, mechanical systems and electrical systems in accordance with the Risk Category designation described in Appendix 3B [Minimum Room Requirements].

5.13.1.2 Where spaces are not specifically described in Appendix 3B [Minimum Room Requirements], Project Co in consultation with the Authority will apply the appropriate Risk Category based on similar room types described in Appendix 3B [Minimum Room Requirements] and the Authority's intended use of the space.

5.13.1.3 Unless otherwise noted, all fasteners and fittings will be concealed type in public areas and on the Facility exterior. Where fasteners and fittings are required to be Tamper Resistant in Appendix 3B [Minimum Room Requirements] they will:

5.13.1.3(1) Once installed, only be removable by Staff with a special driver or tools; and

5.13.1.3(2) Resist vandalism or disassembly by public or Patients.

5.13.2 Mental Health Areas

5.13.2.1 Mental Health Area means Secure Outdoor Spaces and the rooms and spaces within the following Components in Appendix 3A [Clinical Specifications and Functional Space Requirements]:

5.13.2.1(1) G1.6 – Zone 5: Mental Health and Substance Use (ED); and

5.13.2.1(2) D1 - Inpatient Psychiatry Unit including Short Stay Assessment and Treatment (SSAT) Unit.

5.13.3 Mental Health Area Requirements

5.13.3.1 The materials and performance of these spaces will be institutional grade.

5.13.3.2 Where Ligature Resistant fixtures and accessories are required they will:

5.13.3.2(1) Be durable and not easily be broken and therefore creating ligature points, sharp edges, or components that can be used as weapons.

5.13.3.2(2) Eliminate ligature points with features that breakaway under a 9.10 kg (20 lbs.) load or have rounded and sloped edges so as not to provide an anchor point for a noose or other strangulation device; and

5.13.3.2(3) Be installed in an anti-ligature fashion.

5.13.3.3 Where Ligature Resistant door hardware is required it will:

5.13.3.3(1) Be designed to reduce the risk of personal harm by restricting the attachment of a cord, rope, or bed sheet to the door and door hardware including; closers, hinges, knobs, locks, levers and handles through feature that include sloped or curved corners to eliminate attachment points.

5.13.3.4 Anti-Barricade means a room is designed such that the occupant cannot cordon themselves within the space, and Staff can gain access to the room, in accordance with New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines.

5.13.3.5 The application of Anti-Barricade requirements is described in the door hardware groups and Appendix 3B [Minimum Room Requirements]. The Authority considers the following as appropriate Anti-Barricade strategies unless noted otherwise:

5.13.3.5(1) Double action dual swing doors;

5.13.3.5(2) Doors which normally swing outward from the occupied space into the corridor or, in the case of Ensuite-MH and Ensuite-MH-Bariatric, swing outward into the Patient Room-MH and Patient Room-MH-Bariatric; and

5.13.3.5(3) Rooms provided with more than one door and have two points of egress. Each egress door to swing in opposite directions.

5.13.3.6 Project Co will provide an Anti-Barricade design that meets the Authority's functional and safety requirements. Anti-Barricade strategies will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

5.13.3.7 Where two means of egress are required, it is desirable to have the second means of egress discharge into a corridor. The Authority may accept the second means of egress discharging into an adjacent room, if unable to provide exit into a corridor.

5.13.3.8 Storage cabinets, equipment and multimedia devices in Clinical Spaces will be securely mounted and fixed to prevent tampering and vandalism. Devices such as television display screens and monitors will be wall-mounted and completely covered and protected with 9.5mm (3/8") transparent, non-breakable polycarbonate type glazing securely fastened to the wall using Tamper Resistant screws; metal frames will not be used.

5.13.4 Secure Room Requirements

5.13.4.1(1) Secure Rooms will meet the requirements as set out in this Schedule and, unless otherwise specified, the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act.

5.13.4.1(2) Design will prevent Patients from being able to access the ceiling void or tamper with fixtures even if standing on the toilet fixture or other fixed Furniture.

5.13.4.1(3) Ceiling fixtures will not be within reach of a Patient standing on toilet or other fixed Furniture.

5.13.4.1(4) Coat hooks, towel bars or shelves to store items are not permitted.

5.13.4.1(5) Secure room door to swing outward 180 degrees into the Anteroom so that the door does not create an impediment to admitting a Patient. Provide a straight path from the Anteroom door into the Secure Room with both doors able to be fully open.

5.13.4.1(6) Wall structure to be of minimum 150 mm wide, hollow, 7.5 MPA, normal weight concrete block (Type D, C or B - reference CSA Standard A165.1- M) to underside of slab; with painted IRGWB finish

and meets the requirements of Appendix 3C [Acoustic and Noise Control Measures]. Steel stud structured walls are not permitted.

5.13.4.1(7) Provide soft wall padding to increase Patient safety from hitting walls with their limbs or heads and to reduce the need for chemical restraint or sedation. Soft wall padding to be minimum 64 mm thick, installed to minimum 2.44 m AFF level with padding flush to coved base and to fully cover the door frame.

5.13.4.1(7)(a) All wall surfaces including padding to covebase interface will be easily cleaned with hospital grade cleaning solutions; and

5.13.4.1(7)(b) Padding and adjoining material interface, including the covebase will be designed to be vandal resistant and not permit the Patient from damaging the padding material through picking or pulling.

5.13.4.1(8) All projections including mechanical, communications, and electrical devices in Secure Room will be ceiling mounted or located such that no device can be accessed or tampered with by the assistance from any equipment, device or projection, such as a water closet.

5.13.4.1(9) Provide the ability for Staff to observe all four corners of the Secure Room from the door window in the Secure Room Anteroom.

5.13.4.1(10) Controls for the Secure Room exterior window blinds will be accessed from the Secure Room Anteroom. Window blinds are to be completely adjustable.

5.13.4.1(11) For structural support of the Secure Room door and to protect the integrity of the adjacent wall in resisting and distributing forces caused by door use, provide the following:

5.13.4.1(11)(a) Vertically install one 15 mm steel rebar from slab to ceiling in the first void of the wall opening on each side of the door;

5.13.4.1(11)(b) Horizontally install one 15 mm steel rebar in the lintel blocks;

5.13.4.1(11)(c) The bar will be bent to engage the blocks to each side of the door opening a minimum vertical distance of 457 mm;

5.13.4.1(11)(d) Tie the horizontal and vertical rebar together;

5.13.4.1(11)(e) Fully grout walls for a distance of 457 mm around the perimeter of the Secure Room door opening with a high yield mortar;

5.13.4.1(11)(f) High yield mortar will also be used to fill any voids containing rebar;

5.13.4.1(11)(g) Fill the wall voids adjacent to the lintel; and

5.13.4.1(11)(h) Position rebar to avoid conflict with door hardware installation.

5.13.5 Security and Safety Risk Mitigation

5.13.5.1 Project Co will include the following risk mitigations requirements:

5.13.5.1(1) Ingestion: The Facility will eliminate the opportunity for Patients to break apart or disassemble and ingest elements in the space or use them for any means of self-harm. For building elements that are breakable, they will be designed in such a way that the components are held in place upon breaking. Provide pick-proof joint sealant at all exposed joints in Patient occupied areas that otherwise provide the Patient an opportunity to damage the finish;

5.13.5.1(2) Weapons: The Patient environment will not have spaces where weapons and contraband can be hidden. In addition, the environment will minimize opportunities where the environment itself can be used as a weapon;

5.13.5.1(3) Interior Glazed Screens and Doors: Interior glazing in Patient areas will be safe, secure and meet the applicable fire rating required by BCBC without restricting the view. Wired glass is not permitted in the Facility;

5.13.5.1(4) Inpatient Psychiatry Unit Outdoor Patio: The Design will maximize views without providing sight lines into Patient bedrooms. The security fencing and guardrails will be visually attractive, non-institutional in appearance, Ligature Resistant, and non-climbable minimum 4m high and have options for both transparency and privacy. Seating and planting elements will be fixed and located far enough from the edge so that they do not aid in scaling the safety perimeter. All fasteners will be tamper resistant stainless steel and flush to surfaces. The outdoor space will have areas that are covered from the elements;

5.13.5.1(5) Wandering: Clinical Spaces will be designed with passive cues that enable Patients with cognitive deficits to navigate to those areas that are meaningful to them without inadvertently intruding on other Patients' spaces; and

5.13.5.1(6) Fixtures: Mechanical and electrical fixtures will be non-institutional, Tamper Resistant, Ligature Resistant, non-weaponizable and will be easy to replace, without impacting the surrounding environment/

assembly if damaged, in order to maintain a safe, clean and comfortable environment for Patients and Staff. Fasteners will be Tamper-Resistant and all supporting elements will have concealed fasteners. There will be no access panels in Patient bedrooms, ensuites, washrooms or in any treatment space.

5.13.6 CPTED Principles

5.13.6.1 Project Co will incorporate the following CPTED principles into the architectural, environmental and systems designs to enhance safety and security in Mental Health Areas:

5.13.6.1(1) Ownership - A space that becomes personalised is one that incurs value in the individuals that identify with it. A design that encourages ownership also creates pride and responsibility;

5.13.6.1(2) Territoriality - Physical or representational boundaries that indicate ownership of a space;

5.13.6.1(3) Clustering - Co-location of groups of Staff/Patients to encourage familiarity thereby making the presence of strangers more apparent;

5.13.6.1(4) Utilization - Planning that ensures that there are not under-utilized or over-utilized spaces;

5.13.6.1(5) Lighting - The backbone of any deterrence strategy, thoughtful application of lighting, both interior and exterior, is a significant component of a successful security plan;

5.13.6.1(6) Surveillance, Passive - A strategy of planning supported by transparent architectural elements and lighting to facilitate surveillance without reliance on technology;

5.13.6.1(7) Surveillance, Active - The uniform application of fixed monitoring devices/technology to indicate that BH is a secure and safe environment for Patients, Staff and the community;

5.13.6.1(8) Control Points, Access - Access controls measures will be implemented uniformly with a real time and scalable level of screening, reporting and authorization;

5.13.6.1(9) Control Points, Perimeter Control - Fixed elements such as fences, guards and walls that secure and control access to the Facility; and

5.13.6.1(10) The security camera system is to be legible, which means that where it is visible, it will be recognizable and standardized throughout the Facility. Cameras will be recognizable as a camera and the same type of camera will be used throughout the Component. Wayfinding signage will notify Patients and families of the presence of cameras.

5.14 Storage Room for Hazardous Substances

5.14.1 Provide an enclosed storage for waste formalin and liquid Nitrogen tanks in O5.17 Store-Hazardous Waste, at a location not normally occupied by Staff or visitors nor where other combustible substances are present. The storage room will be clearly identified by signage.

5.14.2 Storage walls will be constructed with reinforced concrete or grout-filled CMU designed to withstand chemical explosions.

5.14.3 Provide blast-proof doors and self-closing hardware with locks to prevent unauthorized entry.

5.14.4 Provide adequate lighting.

5.14.5 The storage room will be adequate ventilation and discharged directly to the outdoors.

5.14.6 The storage room design and storage cabinets (if applicable) will be in compliance with Part 5 of the Occupational Health and Safety Regulations, including the latest amendments, BCBC, and B.C. Fire Code.

## PART 6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS

6.1 Procurement and Contracting Requirements (Division 1)

6.1.1 Refer to the Agreement for requirements.

6.2 Existing Conditions (Division 2)

6.2.1 Prior to performing any sub-surface investigation identify the location of existing underground service lines in the area to avoid interference. Use latest techniques (ground penetration radar test) to verify and confirm all existing underground services.

6.3 Concrete (Division 3)

6.3.1 General Requirements

6.3.1.1 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.

6.3.1.2 Design concrete for the applicable concrete exposure class and Design Life.

6.3.1.3 Optimize the fly ash content of the mix consistent to ensure satisfactory concrete performance properties. All cast in place concrete will be placed, consolidated and finished by a competent tradesman holding a Certificate of Qualification awarded by B.C. Industry Training Authority or acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. All precast concrete elements will be supplied from a precast

concrete plant certified to Canadian Precast Concrete Quality Assurance (CPCQA) Certification Program.

6.3.1.4 Wet cure concrete slabs for a minimum of seven (7) days using soaked burlap covered with polyethylene or similar methods as per Extended Wet Curing requirements of CSA A23.1-9.

6.3.1.5 Provide reinforced concrete walls in O10.6 Store-NM Radioactive Waste designed to provide adequate shielding for Staff and the public, in accordance to the recommendations and regulations by the Canadian Nuclear Safety Commission, the International Atomic Energy Agency, Burnaby Building Bylaw and WorkSafeBC.

6.3.2 Design and Performance Requirements

6.3.2.1 Inspect and test cast in place concrete and concrete materials through a CSA certified testing laboratory in accordance with CAN/CSA A23.1. Comply with CAN/CSA A23.2 for Non-Destructive Methods for Testing Concrete.

6.3.2.2 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.

6.3.2.3 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, and a maximum surface variation of 5mm along the length of the floor under doorways, 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.

6.3.2.4 Repair cracks in concrete floors and walls to suit the floor finish and long-term serviceability requirements of the floor.

6.3.2.5 Water proof all foundation walls below grade to prevent groundwater ingress. Use purpose-made water stops in construction joints.

6.3.2.6 Comply with CAN/CSA A23.1/A23.2 to minimize honey combing or patching in exposed Architectural Concrete. Honeycombing and bug holes will be repaired immediately under the direction of Project Co’s Structural Engineer-of-Record.

6.3.2.7 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.

6.3.2.8 Architectural Concrete will have smooth and flat surface of uniform colour with sandblast finish including sealer throughout and anti-graffiti coating where in potential contact with human touch.

6.3.2.9 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.

6.3.2.10 See Section 6.5.2 for concrete topping on metal deck requirements.

6.3.2.11 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.

6.3.2.12 Build slopes for drainage using concrete topping in loading dock and garbage enclosure areas to prevent surface water ponding and flowing into adjacent areas.

6.3.3 Precast Architectural Concrete Veneer

6.3.3.1 System Description: Thin veneer precast Architectural Concrete panels reinforced with stainless steel prestressed tendons mounted in a back ventilated Rain Screen fashion.

6.3.3.2 The design standards for the precast concrete veneer will include:

6.3.3.2(1) PCI MNL 117: Prestressed Concrete Institute Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products;

6.3.3.2(2) CSA A23.1/A23.2: Concrete materials and methods of concrete construction/Test methods and standard practices for concrete; and

6.3.3.2(3) CPCI (Canadian Precast / Prestressed Concrete Institute) - Architectural Precast Concrete Technical Guide.

6.3.3.3 The precast concrete will conform to the following design criteria:

6.3.3.3(1) Concrete

6.3.3.3(1)(a) Compressive strength: 35 MPa at 28 days;

6.3.3.3(1)(b) Entrained air: 5-8% as per ACI 318;

6.3.3.3(1)(c) Aggregates: ASTM C33;

6.3.3.3(1)(d) Cement: ASTM C150 and CSA-A3000;

6.3.3.3(1)(e) Air entraining admixtures: ASTM C260; and

6.3.3.3(1)(f) Color pigments: ASTM C979, inorganic natural iron oxide pigments.

6.3.3.3(2) Reinforcement

6.3.3.3(2)(a) Type 316 stainless steel prestressing tendons ASTM A492, ASTM A240 and Federal Standard RR-W-410D.

6.3.3.3(3) Embeds

6.3.3.3(3)(a) Type 316 stainless steel ASTM A240.

6.3.3.3(4) Rain screen attachment

6.3.3.3(4)(a) Furring, Clips, Brackets: G90 Galvanized Sheet per ASTM A653;

6.3.3.3(4)(b) Fasteners: 300 series stainless steel; and

6.3.3.3(4)(c) Ventilated cavity depth: 20mm.

6.3.3.4 Acceptable manufacturers: Knife River, Enterprise Precast, Encon, Gage Brothers or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. The Basis of Design will be ARCIS panel by Altusgroup.

6.3.3.5 Provide warranty for 5 years from the date of installation.

6.3.3.6 Where floor drains are required, design and construct floors with minimum slope to drain of 2% so as to prevent ponding of water or other fluids.

## 6.4 Masonry (Division 4)

### 6.4.1 Basic Requirements

6.4.1.1 Masonry construction will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] for 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.

6.4.1.2 Masonry construction will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] for interior walls and wall systems when priorities include permanence and maintenance, sound transmission control, fire resistance and separation requirements and security

6.4.1.3 Face work will be laid plumb and true with all joints consistent in both width and colour.

6.4.1.4 Provide masonry sealers to all exposed faces of exterior masonry.

6.4.1.5 Provide appropriate control and expansion joints as masonry installation progresses.

6.4.1.6 Where a concrete masonry wall is used as a fire separation, provide appropriate firestopping for all penetrations.

6.4.1.7 Masonry construction below grade for exterior applications is not permitted.

6.4.2 Concrete Masonry Units

6.4.2.1 Concrete unit masonry may be considered for both independent exterior walls and in exterior wall systems as a structural backing to other finish materials or systems.

6.4.2.2 Concrete masonry walls will be laterally restrained at their tops and bases.

6.4.2.3 Concrete unit masonry for interior applications may be considered as an integrally finished material, as a base for applied finish and as a structural backing to other finish systems.

6.4.2.4 Painted or unpainted concrete unit masonry will not be used as an exposed finish in clinical or public areas.

6.4.2.5 Where concrete unit masonry is used as the exposed finish including door and window wall openings, all exposed corners will be radiused.

6.4.2.6 Masonry Design and Construction will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual.

6.4.2.7 Where a temperature difference is anticipated on either side of a concrete masonry wall, provide continuous insulation to prevent thermal conductivity, refer to Section 6.7 Thermal and Moisture Protection.

6.4.3 Brick Masonry

6.4.3.1 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. Exterior brick veneer cladding support is to be designed as a complete system to include all loading and attachments to all structural components including adjacent concrete, miscellaneous steel, load bearing steel stud framing, lateral bracing and brick ties and will be carried out by a professional engineer.

6.4.3.2 Brick masonry below grade for exterior applications is not permitted.

6.4.3.3 Brick masonry in interior applications is to have integral finish and construction compatible with the Authority’s infection prevention and control requirements, refer to Section 5.10.

6.4.4 Stone Masonry

6.4.4.1 Stone masonry may be considered as a finish veneer to concrete walls or concrete masonry walls. Exterior wall systems in such applications will be a Rain Screen or cavity wall system advocated by NRCC. Provide for drainage of water entering envelope cavity wall system.

6.4.4.2 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.30mm minimum thickness.

6.4.4.3 Manufactured stone products will not be used.

6.4.4.4 Stone masonry will be designed for maximum deflection of L/360 of assembly's clear span.

6.4.4.5 Stone masonry installation will conform to CSA S304 and CSA A371.

6.4.4.6 Seismic performance will conform with CAN/CSA S832 and BCBC.

6.4.4.7 Stone anchors will conform to CSA A370. Dowels will be stainless steel, ASTM A276, Type 304. Fasteners for anchors will be stainless steel bolts ASTM F593.

6.4.4.7(1) Provide thermally-broken sub-girts.

6.4.4.8 Provide water repellent coating comprising of modified silane/siloxane monomers and polymers in a clear penetrating sealer conforming to ASTM E-514.

6.4.4.9 Provide anti-graffiti coatings as required.

## 6.5 Metals (Division 5)

### 6.5.1 Basic Requirements

6.5.1.1 Provide structural steel, steel deck, miscellaneous metal fabrications, and cold-formed steel studs as set out in this section.

6.5.1.2 Project Co 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.

6.5.1.3 Load bearing steel studs will be independent of the principal structural system.

### 6.5.2 Performance Requirements

6.5.2.1 Design structural steel, steel deck, and cold-formed steel stud systems to comply with the deflection and vibration criteria set out in Section 5.9 (Structural Design).

6.5.2.2 Erection tolerances for steel construction will be in accordance with CSA S16 Section 29.3.

6.5.2.3 Concrete topping slabs will be finished with a smooth, dense, steel power trowel finish with a Class B Flatness Classification in accordance with CSA A23.1. Thin overlay toppings to level floors will not be used to level floors.

6.5.2.4 Steel floor and roof construction will be designed to account for the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs.

Floor levelness tolerances will be maintained. The Design of the structure will account for the additional concrete ponding weight.

6.5.2.5 Project Co will monitor curing of concrete topping slabs on steel deck and will ensure crack control of such slabs to mitigate random surface shrinkage cracking and radial cracking around re-entrant corners. At minimum, Project Co will implement the following details and procedures:

6.5.2.5(1) Minimize wet weight deflections of steel decking and supporting structure;

6.5.2.5(2) Place concrete in alternate bays. Avoid placing large areas at one time;

6.5.2.5(3) Use concrete topping with a low Design slump. Add superplasticizer to increase slump for placing and finishing;

6.5.2.5(4) Provide extra topping slab reinforcement around openings, columns, and at corners;

6.5.2.5(5) Reinforce topping slabs with a minimum 10M at 300 mm centres each way chaired a minimum 20 mm above steel deck;

6.5.2.5(6) Avoid placing topping slabs on hot or windy days;

6.5.2.5(7) Wet cure topping slab for a minimum of seven (7) days using soaked burlap covered with polyethylene or similar methods as per Extended Wet Curing requirements of CSA A23.1-9;

6.5.2.5(8) Use 14 mm or larger aggregate topping mix; and

6.5.2.5(9) Provide extra topping slab reinforcement around openings, columns, and at corners, over beams.

6.5.2.6 Cracks in concrete topping slabs will be repaired to suit the floor finish and long-term serviceability requirements of the floor.

6.5.2.7 Steel floor/roof decking is to be wide rib profile for ease of attachment of current and future services, equipment, and fixtures using drilled insert expansion anchors into the bottom of the deck ribs.

6.5.2.8 Steel floor/roof decking plus the concrete topping slab thickness will satisfy the requirements of a ULC-rated assembly meeting the code requirements. Applied fireproofing material on the underside of the steel deck is not to be used to achieve required floor deck fire rating.

6.5.2.9 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 2.3 of this Schedule to verify soundness of representative shop and field welds.

6.5.2.10 All welding is to be performed by welders certified by the Canadian Welding bureau to the requirements of CAN/CSA W47.1. Project Co will provide certification that all welders comply with this requirement, if requested by the Authority.

6.5.2.11 Exterior exposed structural steel will be hot-dipped galvanized to 600 g/m2 before being factory-painted with a quality two-part epoxy paint system. Steel works with brush or roller finishes will not be accepted.

6.5.2.12 Fire proofing will be mechanically fastened compressed mineral wool fire protection board. Spray on fire proofing applications are not acceptable.

6.5.3 Load-Bearing Steel Studs

6.5.3.1 Design, detail and construct load bearing steel stud Design and Construction to comply with all applicable CAN/CSA standards.

6.5.3.2 Ensure all load bearing steel stud construction is designed by a professional engineer registered in the Province of British Columbia.

6.5.3.3 Ensure the steel stud manufacturer is certified in accordance with CSSBI Standard 30M06 and all applicable CAN/CSA standards.

6.5.3.4 Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.5.3.5 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.

6.5.3.6 Design components to accommodate erection tolerances of the structure.

6.5.3.7 Design wind bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially.

6.5.3.8 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.

6.5.3.9 Provide appropriate firestopping at all penetrations through fire-rated assemblies in conformance to the BCBC and BC Fire Code.

6.5.4 Structural Steel

6.5.4.1 Quality Requirements

6.5.4.1(1) Quality assurance testing and monitoring of workmanship to be carried out by an approved testing laboratory using testing procedures as specified in the CAN/CSA standards listed in Section 2.3 of this Schedule, including CSA S16 Design of Steel Structures,

to verify soundness of representative shop and field welds. Test all full strength welds.

6.5.4.1(2) Material quality including sourcing and welding quality will be monitored and approved by an independent testing agency.

6.5.4.1(3) Exterior exposed structural steel will be hot dipped galvanized to 600 g/m2, in accordance with CSA G164 Hot Dip Galvanizing of Irregularly Shaped Articles, before being factory painted with two-party epoxy paint or powder coated, as per architectural requirements All fasteners will be either hot-dipped galvanized or stainless steel.

6.5.4.1(4) All dissimilar metal components in contact and subject to potential galvanic corrosion will be galvanically isolated with insulation such as polyamide washers.

6.5.4.1(5) All exposed structural steel and its fitting connecting to exterior grade subject to potential de-icing chemicals/salts and damage from snow removal will be supported on 150 mm high concrete pedestals

## 6.5.5 Cold-Formed Metal Framing

### 6.5.5.1 Overriding Principles

6.5.5.1(1) Load bearing and non-load bearing steel studs may be considered as a component of the exterior wall systems to support exterior wall finishes and form an integral part of the perimeter envelope.

6.5.5.1(2) Rain Screen walls utilizing cold-formed metal framing will be non-load bearing.

6.5.5.1(3) Load bearing steel studs will be independent of the principle structural system.

6.5.5.1(4) Utilize cold-formed metal framing systems as part of Rain Screen systems, including tested air barrier assemblies.

### 6.5.5.2 Quality Requirements

6.5.5.2(1) Cold-formed metal framing Design will be carried out by a professional engineer; Construction will comply with CSA-S136 North American Specification for Design of Cold Formed Steel Structural Members.

6.5.5.2(2) The steel stud manufacturer will be certified in accordance with CSSBI 30M Standard for Steel Building Systems and all applicable CAN/CSA standards including CSA A660 Certification of Manufacturers of Steel Building Systems.

6.5.5.2(3) Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.5.5.3 Performance Requirements

6.5.5.3(1) Limit maximum deflection under specified wind loads to L/360, unless a smaller maximum deflection is specifically required due to wall finishes.

6.5.5.3(2) Design components to accommodate erection tolerances of the structure.

6.5.5.3(3) Design wind bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially.

6.5.5.3(4) 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.

6.5.5.3(5) Where studs complying with ASTM C645 are used to receive ARGWB or IRGWB panels, they will not be less than 0.0359 in (0.91 mm) design thickness and will be in accordance with Sections 4.3 and 8.1 of Specification ASTM C645. Verify that walls subject to these requirements comply with Appendix 3C [Acoustic and Noise Control Measures].

6.5.6 Miscellaneous Metals

6.5.6.1 Basic Requirements

6.5.6.1(1) Provide continuous raised steel rails along the floor, corner guards and bumpers constructed of extra heavy-duty steel angles and plates to protect the Back of House corridors where wheeled dollies, pallet jacks, and tow motor traffic is anticipated.

6.5.6.1(2) Paint all steel rails, corner guards and bumpers in hazard yellow or as otherwise required by the Authority.

6.5.6.2 Quality Requirements:

6.5.6.2(1) Primers and paints of miscellaneous metals will conform to MPI Architectural Specification Standards Manual.

6.5.6.2(2) Exterior elements will be hot-dipped galvanized with 600 g/m2 to CAN/CSA – G164 Hot Dip Galvanizing of Irregularly Shaped Articles then factory-painted with a quality two-part epoxy paint system with one coat epoxy zinc rich primer, one coat high build epoxy coating and two coats of polyurethane coating.

6.5.6.3 Performance Requirements:

6.5.6.3(1) Welding to be in accordance with CSA W59-13 Welded Steel Construction (Metal Arc Welding).

6.5.7 Metal Fabrications

6.5.7.1 Project Co will provide all shop fabricated stainless steel items, including:

6.5.7.1(1) Countertops;

6.5.7.1(2) Wall panels with access doors including wall panels as infill between equipment, such as MDRD cart washers, with piano hinged doors;

6.5.7.1(3) Integral sinks, counters, removable under-counter shelves, backsplash and skirt;

6.5.7.1(4) Exhaust hoods as required; and

6.5.7.1(5) Wall caps for partial height walls in MDRD, as required

6.5.7.2 Stainless Steel Sinks, Counters and Assemblies

6.5.7.2(1) Project Co will determine all sink and accessory requirements with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.5.7.2(1)(a) Where joints in stainless steel sinks are required, provide welded seams.

6.5.7.2(2) Stainless integral sinks will be provided for all Utility sinks and process sinks as described in Appendix 3B [Minimum Room Requirements].

6.5.7.2(3) Provide stainless steel sinks in MDRD as described in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements] which will include:

6.5.7.2(3)(a) Height adjustable design, triple compartments with water spray hoses and water guns;

6.5.7.2(3)(b) Sink faucets supplied with reverse osmosis water;

6.5.7.2(3)(c) Task Lighting for each sink location;

6.5.7.2(3)(d) Sink bays paired in back-to-back position, separated by half-height wall fitted with continuous and seamless wet wall panel system;

6.5.7.2(3)(e) Sink bays with local overhead exhaust ventilation above and low wall exhaust behind each sink. Ventilation to meet Health and Safety Requirements;

6.5.7.2(3)(f) Sink bays with splash / water resistant electrical and data outlets;

6.5.7.2(3)(g) Surfaces sloped to adjacent drain boards where required;

6.5.7.2(3)(h) A DISS (Amico Brand) instrument air outlet and air hoses and nozzles at each sink;

6.5.7.2(3)(i) Drain outlets with removable stainless steel strainers, where required; and

6.5.7.2(3)(j) The MDRD Decontam sinks must have volume demarcation lines for half and full.

6.5.7.2(4) Provide the following stainless steel sink accessories:

6.5.7.2(4)(a) Sinks with removable under-counter shelf, backsplash and skirts with indented mount for taps;

6.5.7.2(4)(b) Over-counter shelves;

6.5.7.2(4)(c) Exhaust shrouds to span sinks;

6.5.7.2(4)(d) Vacuum canister holders;

6.5.7.2(4)(e) Dividers between counters or sinks;

6.5.7.2(4)(f) Removable sink covers; and

6.5.7.3 Stainless Steel Countertops & Workbenches

6.5.7.3(1) Provide stainless steel counter tops designed to withstand minimum 100 kg (200 lbs) point load.

6.5.7.3(2) Fabrication tolerances for stainless steel are as follows unless otherwise noted:

6.5.7.3(2)(a) Squareness: 3 mm maximum difference in diagonal measurements;

6.5.7.3(2)(b) Maximum offset between faces: 1.5 mm;

6.5.7.3(2)(c) Maximum misalignment of adjacent members: 1.5 mm;

6.5.7.3(2)(d) Maximum bow: 3 mm in 1.2 m; and

6.5.7.3(2)(e) Maximum deviation from plane: 1.5 mm in 1.2 m.

6.5.7.4 Stainless Steel Pass Through Windows/Cabinet

6.5.7.4(1) Provide stainless steel, fully welded body, sealed bio-designed pass through windows for transferring parts and equipment, as indicated in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements].

6.5.7.4(2) Pass through requirements as follows:

6.5.7.4(2)(a) Continuous set down;

6.5.7.4(2)(b) Width of window frames will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.5.7.4(2)(c) Stainless steel doors in heavy-duty stainless steel frames, with continuous stainless steel hinges;

6.5.7.4(2)(d) Tempered safety glass viewing windows;

6.5.7.4(2)(e) Stainless steel over-centre compression latches;

6.5.7.4(2)(f) Silicone bulb gaskets;

6.5.7.4(2)(g) Double wall construction with built-in mechanical interlock; and

6.5.7.4(2)(h) Facilitates cleaning.

6.5.7.4(2)(i) Automated no-touch design.

6.5.7.5 Stainless Steel Material Requirements

6.5.7.5(1) Provide stainless steel meeting the following requirements:

6.5.7.5(1)(a) Provide highest architectural quality in various forms, straight and true;

6.5.7.5(1)(b) Scratches, scars, creases, buckles, ripples or chatter marks will not be accepted;

6.5.7.5(1)(c) Finished surfaces exposed to view will be free of pitting, seam marks, roller marks, oil canning, stains, discolorations or other imperfections;

6.5.7.5(1)(d) Provide finish surfaces suitable for polishing, where required;

6.5.7.5(1)(e) Sheet, Strip, Plate and Flat Bar: ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic

Stainless Steel Sheet, Strip, Plate, and Flat Bar, 304 grade stainless steel; and

6.5.7.5(1)(f) Nuts, bolts, screws, washers and other fastenings: 304 grade stainless steel. No exposed threads allowed.

6.5.7.5(2) Stainless steel countertops will meet the following requirements:

6.5.7.5(2)(a) Comply with ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip;

6.5.7.5(2)(b) Provide minimum 1.52 mm thick, 316 grade, No. 4 Satin Finish 1 side, 180 grid finish. Ensure direction of grain matches throughout units;

6.5.7.5(2)(c) Provide sound-deaden tops reinforced with waterproof plywood core, bonded to tops with waterproof contact cement. Seal underside of top (plywood core) with a waterproof finish;

6.5.7.5(2)(d) Provide marine edge unless otherwise noted or required by the Authority;

6.5.7.5(2)(e) Provide a formed backsplash as an integral part of the counter tops, radiused where the backsplash occurs;

6.5.7.5(2)(f) Bond all backsplashes to marine-grade plywood core, bonded the same as specified for the tops;

6.5.7.5(2)(g) Fabricate countertops, backsplash, and front aprons out of one piece of stainless steel; and

6.5.7.5(2)(h) Weld counter and sink assemblies into single units without seams or joints. Drill backsplash, tops and sinks to receive plumbing and electrical fittings.

6.5.7.5(3) Stainless steel sinks will meet the following requirements:

6.5.7.5(3)(a) Comply with ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip;

6.5.7.5(3)(b) Provide minimum 1.9 mm thick, 316 grade, No. 4 satin finish 1 side, 180 grid finish. Ensure direction of grain matches throughout units;

6.5.7.5(3)(c) Provide integrally formed sinks with all-welded, rounded corners having minimum 25 mm radius, seamless

construction, and ground, polished with all traces of welding removed; and

6.5.7.5(3)(d) Joints and welds will be polished to a uniform No. 4 satin finish.

6.5.7.6 Suspended Steel Grid for Therapy Equipment

6.5.7.6(1) Provide engineered structural steel grid suspended from structure above for therapy equipment attachment in the areas as listed below:

6.5.7.6(1)(a) C1.2.10 Rehab Room;

6.5.7.6(2) Finishes for the suspended grid will be determined in consultation with Authority through the process described in Appendix 2C [User Consultation and Review Procedure] to meet the functional requirements of the Authority; and

6.5.7.6(3) Provide seismic design in compliance with the BCBC.

6.5.7.7 Steel Guardrails

6.5.7.7(1) Design all guardrails and handrails to their usage classification and per applicable codes.

6.5.7.7(2) Provide a durable painted finish for steel guardrails. Guardrails will be hot dipped galvanized to 600 g/sm2 prior to factory painted with two part epoxy paint or powder coated, as per architectural requirements. Powder coated finish is preferred.

6.5.7.7(3) Provide a manufactured pre-finish for stainless steel or aluminum guardrails where specified

6.6 Wood, Plastics and Composites (Division 6)

6.6.1 Basic Requirements

6.6.1.1 Provide all rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/Communications Rooms (minimum 2400 mm AFF), roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including exterior fascia’s, cabinets, casework, frames, panelling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required.

6.6.1.2 Provide wood, plastics and composites to support functionality as defined in Appendix 3A [Clinical Specifications and Functional Space Requirements] and as required by the Authority for the operation of the Facility.

6.6.1.3 Do not use products containing added urea formaldehyde in the Facility.

6.6.1.4 Use pressure treated wood for exterior exposed wood intended for structural support or backing. Exposed ends shall be protected from moisture.

6.6.1.5 Where used, exposed architectural wood is not required to be pressure treated. Project Co to propose other solutions to protect exposed architectural wood from premature deterioration due to exposure to moisture and other weather elements to the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.6.2 Performance Requirements

6.6.2.1 Conform to Architectural Woodwork Standards, as issued by Architectural Woodwork Manufacturer's Association of Canada (AWMAC). Typically comply with Quality Standards Manual for minimum "Custom Grade," and Door and Hardware Institute (DHI) standards for the design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork.

6.6.2.2 Provide adhesives that are non-toxic, low VOC, and use non-solvent glue complying with AWMAC Quality Standards Manual, Canadian Eco-Logo program, and the associated LEED credits.

6.6.2.3 Provide seismic anchorage on all cabinets and shelving over 1200 mm high or where units are likely to be a hazard from overturning.

6.6.3 Millwork and Modular Casework

6.6.3.1 Quantity Requirements

6.6.3.1(1) Project Co will provide Millwork and Modular Casework for the Facility as required to meet the Authority's functional and operational requirements as described in this Schedule including Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.6.3.1(2) Project Co will provide Millwork and Modular Casework according to the category of each space listed Appendix 3B [Minimum Room Requirements].

6.6.3.1(3) The category will be calculated based on the amount of Millwork or Modular Casework in the space expressed as a percentage of the total NSM program area of that space.

6.6.3.1(4) Regardless of whether the Millwork or Modular Casework is floor mounted or wall-mounted, the amount will be calculated as the horizontal area footprint projected onto the total floor area.

6.6.3.1(5) The category and minimum length dimensions provided in Appendix 3B [Minimum Room Requirements] are intended to describe the minimum requirements and will be increased as required to accommodate the equipment listed in Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

6.6.3.1(6) The greater quantity requirement between the category and minimum length dimensions provided in Appendix 3B [Minimum Room Requirements] will govern.

6.6.3.1(7) Refer to Food Services and Equipment section for Millwork requirements specific to Food Services.

6.6.3.2 Basic Requirement

6.6.3.2(1) Project Co will provide Millwork and Modular Casework in the quantities, dimensions, Design and layout, including heights, spacing of drawers, doors, cupboards and openings, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] to meet the functional requirements of the Authority.

6.6.3.2(2) Where upper and/or lower cupboards are indicated on Appendix 3B [Minimum Room Requirements], provide the same length of cupboards to match the counter length.

6.6.3.2(3) Project Co may use Modular Casework to satisfy the requirements of Millwork provided it meets the functionality requirements of Authority as described in the Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.6.3.2(4) Where Modular Casework has been identified as required by a check mark and/or comments added in the Architectural Comments in Appendix 3B [Minimum Room Requirements], Project Co will provide a Modular Casework solution in lieu of Millwork, as required to allow proper function and operation in that room or area.

6.6.3.2(5) Plywood substrate will be used for all Millwork and Modular Casework of wood construction. No MDF or particle board allowed.

6.6.3.2(6) At all upper cabinets or cupboards; provide either GWB bulkhead or matching panels extended full height to underside of the ceiling to close in the top of the unit.

6.6.3.2(7) Provide upper and/or lower cupboards designed to fit binders stacked vertically.

6.6.3.2(8) Provide upper and/or lower cupboards with sliding doors where required by the Authority, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. Otherwise, all door hinges for millwork, modular casework, systems furniture and clinical systems furniture will be minimum 170 degrees opening. Acceptable products must be approved by the Authority through the Review Procedure prior to construction (e.g. Blum Clip Top product).

6.6.3.2(9) Project Co will incorporate multifunctional printers and scanners into the Millwork design by providing counters placed at an ergonomically appropriate height to set the printer such that Staff can easily reach the device without use of steps. Provide service space around printers and scanners and other office machines so the service panels can be opened without moving the machine.

6.6.3.2(10) Project Co will provide downtime chart storage at locations described in Appendix 3B [Minimum Room Requirements]. Downtime chart storage will consist of minimum 1.8 m high x 1.2 m wide shelving units comprised of multiple rows of shelves designed to store charts.

6.6.3.3 Performance Requirements

6.6.3.3(1) All bottoms of sink cabinet boxes and areas that may come into contact with water will have a marine-grade plywood substrate. Do not use fibreboard or particle board.

6.6.3.3(1)(a) All sink bottom cabinets will have locks keyed to FMO service key in the building master key system on Schlage WTSR keyway.

6.6.3.3(2) Use marine-grade plywood substrate for countertops. Do not use fibreboard or particle board. Where appropriate, provide steel support brackets (knee bracing) to support countertops throughout the Facility. Do not support countertops with legs extending to the floor. Steel brackets will conform to ANSI/BHMA A156.9 -2000 drop weight test. Millwork casework will be capable of supporting structural loads without deflection in compliance with the current edition of the AWMAC-NAAWS Standard Manual.

6.6.3.3(3) For Millwork cabinets, seal all wood surfaces and edges. All door, drawer, grommets and other exposed Millwork edges will have applied a minimum 3 mm PVC edge strip, heat applied. All PVC edging to match tone of adjacent Millwork. There will be no edge conditions where plastic laminate abuts plastic laminate.

6.6.3.3(4) Adhesives will be non-toxic, low VOC, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian ‘Eco-Logo’ program, and the applicable LEED credits.

6.6.3.3(5) Provide a Millwork base equal to the height of the flash cove flooring for flash cove flooring to return up at all floor mounted lower cabinet locations.

6.6.3.3(6) Provide built in valance lighting underneath upper cupboards, except in locations where ceiling pot lights are determined to be acceptable, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.6.3.3(7) All door hinges in millwork, modular furniture, clinical systems furniture and modular casework will be the concealed type with 170 degree opening minimum. Acceptable product is Blum Cip Top.

6.6.3.4 Coordination with Services & Systems

6.6.3.4(1) Incorporate all required mechanical, electrical and communication services into the Millwork and Modular Casework so that wires, chords, vents and pipes are hidden from view.

6.6.3.4(2) Project Co is responsible for coordination of all fixtures, including plumbing, to be provided.

6.6.3.4(3) For locations where countertops, workbenches or workstations are flush to the wall, provisions for cord management under the work surface will be provided.

6.6.3.4(4) Provide access panels to all services to allow for future adjustment.

6.6.3.4(5) Coordinate with equipment indicated in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items], Appendix 2L [Food Services Equipment] and Appendix 3F [Equipment List IM/IT].

6.6.3.5 Hardware Requirements

6.6.3.5(1) All doors, drawers and access panels will be provided with locks using the Schlage WRSR keyway and on the building master key system and determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.6.3.5(1)(a) Cabinet door and drawer locks will be Schlage CL-1000 series.

6.6.3.5(1)(b) Locks will be oriented vertically with the pins at the top of the lock cylinder.

6.6.3.5(2) All hardware to be stainless steel of durable quality to meet the standards of AINSI/BHMA grade 1 Cabinet Hardware.

6.6.3.6 Millwork Requirements

6.6.3.6(1) Provide Millwork that meets the following requirements:

6.6.3.6(1)(a) Core for doors will consist of plywood;

6.6.3.6(1)(b) Core for all other panel products will consist of hardwood plywood;

6.6.3.6(1)(c) Laminate grade: general purpose grade, standard duty, and minimum 1.06 mm thick;

6.6.3.6(1)(d) Plastic laminate to both sides of doors and drawer fronts;

6.6.3.6(1)(e) 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;

6.6.3.6(1)(f) Seal all surfaces and edges to meet infection control requirements, refer to Section 5.10;

6.6.3.6(1)(g) All cabinets will be flush overlay construction; and

6.6.3.6(1)(h) Designed such that no sharp edges are exposed.

6.6.3.7 Modular Casework Requirements

6.6.3.7(1) Modular Casework means a composition of factory produced components that are replaceable, reconfigurable and interchangeable in the future by the Authority.

6.6.3.7(2) Modular Casework will have the capability to be easily rearranged to change configuration or to include additional modules.

6.6.3.7(3) Project Co will provide all workbenches, shelves, workstations, storage, and cabinets as described in Appendix 3B [Minimum Room Requirements] and to meet the functional and operational requirements of the Authority as described in Appendix 3A [Clinical Specifications and Functional Space Requirements]

6.6.3.8 Solid Polymer Fabricated Surface Requirements

6.6.3.8(1) Provide solid polymer fabricated surfacing consisting of reacted monomers and resins, mineral fillers and pigments manufactured in sheets of 13 mm nominal thickness.

6.6.3.8(2) Solid polymer fabricated surfacing will be:

6.6.3.8(2)(a) Solid, non-porous, impervious, homogeneous, hygienic, renewable, and will feature inconspicuous hygienic seams;

6.6.3.8(2)(b) Resistance to caustic action of chemicals or agents used by the Authority;

6.6.3.8(2)(c) Free from conspicuous internal strengthening fibers; and

6.6.3.8(2)(d) Design with sufficient strength for handling, placement and utilization stresses.

6.6.3.8(3) Provide solid polymer fabricated surfacing for all counters complete with solid polymer fabricated surfacing backsplashes and splash barriers that incorporate lavatory sinks, Utility sinks and kitchen sinks as described in the Appendix 3B [Minimum Room Requirements], with the exception of where counters are required to be stainless steel such as Soiled Utility rooms.

6.6.3.8(4) Provide surfaces with:

6.6.3.8(4)(a) Uniform matte, satin, or gloss finish as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.6.3.8(4)(b) No sharp corners or exposed edges. Exposed top and bottom edges will be radiused minimum 7 mm. Outside corners will be radiused minimum 25 mm.

6.6.3.8(5) Provide solid surfacing with the following properties:

6.6.3.8(5)(a) Flexural Strength: ASTM D790, 68.9 kPa (10,000 psi);

6.6.3.8(5)(b) Abrasion Resistance: ANSI/IAPMO Z124.6, pass;

6.6.3.8(5)(c) Fungi Resistance: ASTM G21, rating 0 (no effect);

6.6.3.8(5)(d) Stain Resistance: ANSI/IAPMO Z124.6, pass; and

6.6.3.8(5)(e) Flame Spread Test: ASTM E84, 10 or less, Class A.

6.6.3.9 Plastic Laminate Countertops and Work Surface Requirements

6.6.3.9(1) For administrative areas without sinks, where stainless steel, solid polymer or other surface is not required by this Schedule, provide plastic laminate countertops and work surfaces which meet the following requirements:

6.6.3.9(1)(a) High pressure plastic laminate: general purpose grade, standard duty, minimum 1.06 mm thick;

6.6.3.9(1)(b) Core: western softwood plywood in compliance with CSA 0151-M1978, good one side, solid two sides, for use as plastic laminate cores. Provide liner grade backer sheet to the underside of all countertops; and

6.6.3.9(1)(c) Countertops to be minimum 3mm PVC edge strip, heat applied, to match color of adjoining countertop surface.

6.6.3.10 Hardwood Countertops and Work Surface Requirements

6.6.3.10(1) Provide butcher block counter tops at workbenches as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] such as:

6.6.3.10(1)(a) Biomedical Engineering Component; and

6.6.3.10(1)(b) FMO Component.

6.6.3.10(2) Provide butcher block counter tops with solid edge banding construction meeting the following requirements:

6.6.3.10(2)(a) Butcher Block Countertop: 50 mm (2 inch) thick solid laminated wood top; and

6.6.3.10(2)(b) Countertop Core: 19 mm (3/4 inch) plywood.

6.6.3.11 Recycling Accommodation

6.6.3.11(1) Where recycling accommodation is checked as required in Appendix 3B [Minimum Room Requirements], provide a Modular Casework solution as follows:

6.6.3.11(1)(a) Freestanding 5, 4 or 3 opening unit systems;

6.6.3.11(1)(b) Provide changeable messaging display on each waste disposal and recycling bin;

6.6.3.11(1)(c) Provide access to enable ease of servicing;

6.6.3.11(1)(d) Provide interchangeable inserts to create a recycling centre that fits the needs of the Authority;

6.6.3.11(1)(e) Provide shaped inserts and recycling icons that provide clear direction for disposal and recycling;

6.6.3.11(1)(f) Meet the following minimum size requirements:

6.6.3.11.1.(f).1 5-opening will be 36″H x 60″W x 25″D;

6.6.3.11.1.(f).2 4-opening will be 36″H x 48"W x 25"D; and

6.6.3.11.1.(f).3 3-opening will be 36"H x 36"W x 18"D.

6.6.3.11(1)(g) Provide 3-opening recycling accommodations at all public entrances to the Facility; and

6.6.3.11(1)(h) All recycling accommodations will be accessible to Persons with Disabilities.

6.6.3.12 Medication Room and Alcove Requirements

6.6.3.12(1) Provide modular, standardized storage and stocking systems and bins as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.6.3.12(2) Provide the ability to store medications at eye-level height.

6.6.3.12(3) Provide sufficient capacity in the storage and stocking systems to avoid overcrowding of medication stock.

6.6.3.12(4) Provide ability for medications to be arranged alphabetically by drug formulation. Space will accommodate Automated Dispensing Cabinets.

6.6.3.12(5) Provide the ability for high risk medications to be stored away and separately from other medications.

6.6.3.12(6) Provide the ability for Staff to easily and safely locate medications and supplies.

6.6.3.12(7) Design the storage and stocking system ergonomically based on the range of motion of Staff to provide easy access to medications, workstations and supplies.

6.6.3.13 Pneumatic Tube Station Requirements

6.6.3.13(1) Project Co will provide directly adjacent to the PTS a dedicated, standing height Millwork counter top with two deep lockable drawers below and lockable storage for an anticipated six carriers. The exact number of carriers will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.6.3.14 Patient Wardrobe Requirements

6.6.3.14(1) Project Co will provide Modular Casework wardrobes at the locations listed in Appendix 3B [Minimum Room Requirements].

6.6.3.14(2) The Patient wardrobe will:

6.6.3.14(2)(a) Have a 45 degree sloped top to prevent objects from being stored on top of the wardrobe and prevent dust collection;

6.6.3.14(2)(b) Have a combination of cupboards, compartments, drawers and a clothing rod for storage of personal items;

6.6.3.14(2)(c) Have locks using WTSR keyway and on building master key system on all cupboards and drawers,

6.6.3.14(2)(d) Be Ligature Resistant in Mental Health Areas; doors and drawers are not acceptable in Mental Health Areas; and

6.6.3.14(2)(e) Be approximately 1m in width, 610mm in depth, and 2.4m in height. The final sizes and configurations will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

## 6.7 Thermal and Moisture Protection (Division 7)

### 6.7.1 Basic Requirements

6.7.1.1 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.

6.7.1.2 Mock-ups

6.7.1.2(1) Approximately two weeks prior to scheduled commencement of cladding installation and associated work, convene pre-installation meeting and mock-up at Project site or at an off premise facility to be located within the Greater Vancouver Regional District as may be required by and at no expense to the Authority. Cladding mock-up to be attended by cladding installer, representative of the cladding manufacturer, window manufacturer, window installer, Project Co, Architect, Authority, Building Envelope Consultant, and other representatives directly concerned with the performance of the work. Record discussions of conference and decisions and agreements or disagreements reached and furnish copy of record to each party attending. Submit to the Authority all building envelope test results, witnessed by the Building Envelope Consultant.

6.7.1.2(2) Physical mock-ups will include the following at a minimum:

6.7.1.2(2)(a) Wall assemblies for claddings included in the approved design, including roof and parapet conditions;

6.7.1.2(2)(b) Intermediate exterior vertical and horizontal joints for dissimilar cladding or material interface; and

6.7.1.2(2)(c) Inside and outside exterior corner conditions.

6.7.1.3 Design construction assemblies to prevent the ingress of moisture through foundation walls below grade;

6.7.1.3(1) The exterior foundation walls below grade are to be protected using a continuous fully reinforced membrane waterproofing system or concrete waterproofing ad-mixture (including construction cold-joint waterproofing and at all mechanical or electrical service penetrations

through the below-grade foundation walls) to prevent moisture ingress into occupied spaces or habitable areas below grade; and

6.7.1.3(2) The below grade waterproofing protection system will meet the requirements of the City Ground Water Management Bulletin dated July 18, 2019.

6.7.1.4 Provide fire-resistance rated exterior and interior walls as required by BCBC and locate these separations to minimize impact on clinical adjacencies and flows.

6.7.1.5 Provide resistance to the propagation and spread of fire for exterior walls and interior walls designated as fire-resistance rated separations where appropriate.

6.7.2 Performance Requirements

6.7.2.1 Waterproofing

6.7.2.1(1) Provide waterproofing to prevent moisture ingress to occupied spaces below grade;

6.7.2.1(1)(a) Waterproofing will be provided to prevent water ingress to occupied spaces below grade, parking level structure, and at below-grade vertical concrete walls where hydrostatic head is indicated on geotechnical report;

6.7.2.1(1)(b) The waterproofing membrane system is to provide a minimum 10-year leak-free performance warranty in accordance with the following standards: CAN / CSA-A23.2-04 "Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete" and CAN / CSA;

6.7.2.1(1)(c) Suspended slabs, decks, and associated walls over habitable spaces are to be protected using a continuous fully reinforced membrane waterproofing system and concrete waterproofing ad-mixture as construction cold-joint waterproofing and at all mechanical or electrical service penetrations to prevent moisture ingress into occupied spaces or habitable areas;

6.7.2.1(1)(d) Accepted Products: Soprema Canada reinforced Colphene BSW and BSV sheet-applied foundation wall waterproofing system designed for vertical and horizontal waterproofing applications conforming to ASTM D5385 resistance to hydrostatic head >110 m (< 360ft), or approved alternate. Kryton (Kim) Internal Concrete Waterproofing Ad-mixture, manufactured by Kryton International or acceptable alternative approved by the

Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.7.2.1(1)(e) Acceptable product for hydrophyllic crystalline admixture is "Kryton (Kim) Internal Concrete Waterproofing Admixture, manufactured by Kryton International" or, acceptable alternate as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.2.1(2) Provide waterproof membranes in exterior walls as part of the building envelope and integral with Rain Screen or cavity wall assemblies.

6.7.2.1(3) Self-adhesive membrane air barriers conforming to CAN/CGSB 37-GP-56M – Membrane, Modified, Bituminous, Prefabricated, and reinforced for Roofing;

6.7.2.1(3)(a) Approved products: Sopraseal Stick 1100T Self-Adhesive Membrane as manufactured by Soprema Inc., Protecto Wrap, Protecto Seal 45 as manufactured by Protecto Wrap, 3M - 3015 Self-Adhered Air Barrier Membrane manufactured by 3M Company, or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.2.1(4) Provide waterproofing membrane on floors, housekeeping pads and curbs for all mechanical rooms and MDRD to contain water from mechanical equipment failure.

6.7.2.1(5) Provide waterproofing membrane on floors, floor recesses and curbs for all MDRD rooms to contain water from mechanical equipment failure.

6.7.2.1(6) Dam the floor under key water-containing mechanical equipment in the mechanical penthouse, mechanical rooms, and MDRD. Provide a continuous curb around mechanical shafts and penetrations. Provide a curb or step under door threshold in mechanical rooms. Curbs and steps will be minimum 100mm high.

6.7.2.1(7) Provide minimum 100mm high housekeeping pads for mechanical equipment or as specified by the equipment manufacturer.

6.7.2.1(8) Provide waterproofing membrane to cover all MDRD housekeeping pads and sleeve all pipe penetrations The waterproof membrane is to extend to a minimum height of 150mm up the walls, and be overlapped by the rigid wall covering by 50mm.

6.7.2.1(9) Floor in mechanical rooms and MDRD rooms will be sloped to floor drains.

6.7.3 Vapour Barriers

6.7.3.1 Prevent water vapour transmission and condensation in wall assemblies, roofing assemblies, and under concrete slabs-on-grade within the Facility perimeter by means of a continuous vapour barrier membrane:

6.7.3.1(1) Vapour Retarder Film conforming to CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction;

6.7.3.1(2) Polyethylene, (6 mils) thickness, or Self-Adhered Air/Vapour/Moisture Barrier Membranes conforming to CAN/CGSB 37-GP-56M – Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing;

6.7.3.1(3) Acceptable materials include Sopraseal Stick 1100T Self-Adhered Air/Vapour/Moisture Barrier Membrane manufactured by Soprema Inc., 3M - 3015 Self-Adhered Air/Vapour/Moisture Barrier Membrane, manufactured by 3M Company, Sopravap'r VP Self-Adhered Vapour Permeable Membrane manufactured by Soprema Inc., or acceptable alternatives as approved by Authority though the Review Process; and

6.7.3.1(4) Minimum membrane thickness of self-adhered vapour barrier membrane to be used in roofing assemblies to be per RCABC warranty requirements.

6.7.3.2 At underslab conditions, at parking, provide continuous vapour barrier not less than 0.25 mm (10 mil) thick plastic sheet complying with ASTM E1745, Class A:

6.7.3.2(1) Water Vapour Permeance: ASTM F1249, not more than 1.7ng/Pa-s-sq.m (0.03 perms);

6.7.3.2(2) Puncture Resistance: ASTM D1709, not less than 2,200 grams; and

6.7.3.2(3) Tensile Strength: ASTM D882, not less than 7.9kN/m (45lbf/in).

6.7.3.3 At underslab conditions, at finished floors, provide continuous vapour barrier not less than 0.38 mm (15 mil) thick plastic sheet complying with ASTM E1745, Class A:

6.7.3.3(1) Water Vapour Permeance: ASTM F1249, not more than 0.6ng/Pa-s-sq.m (0.01 perms);

6.7.3.3(2) Puncture Resistance: ASTM D1709, not less than 3,200 grams; and

6.7.3.3(3) Tensile Strength: ASTM D882, not less than 12.6kN/m (70lbf/in).

6.7.3.4 Conduct dew-point analysis to determine correct placement of vapour barrier within wall and roof assemblies.

6.7.3.5 Coordinate locations of thermal insulation, waterproof membranes, and air and vapour barriers to prevent creation of dew point, resulting in condensation within assemblies.

6.7.4 Air Barriers

6.7.4.1 Prevent air leakage caused by air pressure across the wall and roof assembly by means of air barrier assemblies.

6.7.4.2 Air barrier testing will be conducted in compliance with City of Burnaby Green Buildings Policy for Rezoning and BCBC (if applicable).

6.7.4.3 Self-adhesive membrane air barriers conforming to CGSB 37-GP-56M – Membrane, Modified, Bituminous, Prefabricated, and reinforced for Roofing.

6.7.4.4 Approved Materials: Sopraseal Stick 1100T Self-Adhered Air/Vapour/Moisture Barrier Membrane manufactured by Soprema Inc., 3M - 3015 Self-Adhered Air/Vapour/Moisture Barrier Membrane, manufactured by 3M Company, Sopravap'r VP Self-Adhered Vapour Permeable Membrane manufactured by Soprema Inc., or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.4.5 Provide air barrier assemblies that:

6.7.4.5(1) 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 Facility elements including the roof;

6.7.4.5(2) 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;

6.7.4.5(3) Self-adhesive air barrier membrane conforming to CGSB 37-GP-56M – Membrane, Modified, Bituminous, Prefabricated, and reinforced for Roofing; and

6.7.4.5(4) Acceptable products include Sopraseal Stick 1100T Self-Adhesive Membrane as manufactured by Soprema Inc., Protecto Wrap, Protecto Seal 45 as manufactured by Protecto Wrap, 3M - 3015 Self-Adhered Air Barrier Membrane manufactured by 3M Company, or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.5 Thermal Protection

6.7.5.1 Provide 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.

6.7.5.2 Use thermal protection materials of a type and quality that will provide consistent environmental quality to enclosed spaces.

6.7.5.3 Use foamed plastic insulation that is CFC-free and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations:

6.7.5.3(1) Acceptable products include: "Polar Foam PF-7300-0 Soya" by Polyurethane Foam Systems Inc., or "Walltite Eco v.2" by BASF Canada Inc., Type 3 air barrier CFC free or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.5.4 Extruded Polystyrene (Exterior Walls) will conform to CAN / ULC-S701, Type 2:

6.7.5.4(1) Acceptable rigid, extruded, closed-cell polystyrene foam insulation as manufactured by Dow Chemical Canada ULC, or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.5.5 Mineral wool insulation in fire rated assemblies will conform to the BCBC requirements for fire rated assemblies:

6.7.5.5(1) Acceptable mineral wool insulation includes Roxul AFB by Rockwool or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.5.6 Thermal Batt Insulation will conform to CAN / ULC-S702:

6.7.5.6(1) Acceptable manufacturer for thermal batt insulation includes Soprema, Rockwool, Johns Manville International Canada Inc. or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.5.7 In all circumstances, any foamed plastic insulation applications where exposed will require a code compliant fire rated thermal protective cover/barrier:

6.7.5.7(1) R20 (U-Value 0.05) for exterior walls;

6.7.5.7(2) R30 (U-Value 0.033) for roof areas;

6.7.5.7(3) or higher as necessary to achieve targeted energy performance.

6.7.6 Roofing

6.7.6.1 The roofing contractor will be a RCABC member and provide roofing which complies with the RCABC Guarantee Corp latest standards and requirements for a minimum ten (10) year guarantee for re-roofing existing and a minimum fifteen (15) year Guarantee for new roofs, as published in the RCABC Roofing Practices Manual. Perform roofing quality inspections as required by the RCABC to obtain the RCABC warranty.

6.7.6.2 Provide a complete horizontal barrier to the exterior using SBS modified bitumen roofing system (multi-ply) for all roofs in accordance with the following standards:

6.7.6.2(1) Base sheet: Conforming to CGSB 37-GP-56-M and ASTM D6162, Type II;

6.7.6.2(2) Base sheet flashing: Conforming to CGSB 37-GP-56M;

6.7.6.2(3) Cap Sheet and Cap Sheet Flashings: Conforming to CGSB 37-GP-56-M and ASTM D6162, Type II; and

6.7.6.2(4) Traffic Cap Sheet: Conforming to CGSB 37-GP-56-M.

6.7.6.3 Minimum membrane thickness of self-adhered vapour barrier membrane to be used in roofing assemblies to be per RCABC warranty requirements.

6.7.6.4 Approved products for two (2) ply roof membrane systems, all from one manufacturer as approved for torch-applied base sheet and base sheet striping and torch-applied cap sheet and cap sheet stripping systems providing compliance with ULC Standards for a Class A Roof all as manufactured by Soprema Inc., Temco or Siplast as listed in RCABC Approved Products Listing. The alternate will need approval from the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.6.5 Approximately two weeks prior to scheduled commencement of roofing installation and associated work, convene pre-installation meeting at Project site with installer, installer of each component of associated work, installers of deck or substrate construction to receiving roofing work, installers of roof-top units and other work in and around roofing that will precede or follow roofing work (including mechanical work), representative of approved primary materials manufacturer, Project Co, Architect, Authority, and other representatives directly concerned with performance of the work. Record discussions of conference and decisions and agreements or disagreements reached and furnish copy of record to each party attending. "Protection" - Prevent traffic over completed roofing except where required by work above roof level. Comply with precautions deemed necessary by the Authority. Repair damage caused by non-compliance with the Authority’s requirements. At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

6.7.6.6 Comply with RCABC Roofing Practices Manual “Acceptable Materials List,” including:

6.7.6.6(1) Flexible membrane for reflective roofs – Elastomeric or Thermoplastic (single-ply system), Energy Star compliant, highly reflective, and high emissivity, of at least 0.9 when tested in accordance with ASTM 408.

6.7.6.7 Roof assembly Design including deck, vapour barrier, insulation, board stock, and membranes will comply with the BCBC for fire classifications and with RGC requirements for wind uplift requirements, as well as requirements for live loads, dead loads, snow loads and wind uplift. Comply with UL 580 Class 60 wind uplift classification.

6.7.6.8 Use foamed plastic insulation that is CFC- and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations:

6.7.6.8(1) Sprayed Polyurethane Insulation: Approved Products: "Polar Foam PF-7300-0 Soya" by Polyurethane Foam Systems Inc., or "Walltite Eco v.2" by BASF Canada Inc., Type 3 air barrier CFC free.

6.7.6.9 Provide a complete horizontal barrier to weather and climate using one of the aforementioned roofing systems.

6.7.6.10 Roofing systems will include the following components:

6.7.6.10(1) Flashings and sheet metal;

6.7.6.10(2) Thermal insulation;

6.7.6.10(2)(a) Acceptable rigid insulation at roofs include Type 4 extruded expanded closed-cellular foam structure as manufactured by Dow Chemical Canada, or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.6.10(3) Roofing specialties and accessories required for completion including roof penetration housings for rooftop communications pathway system;

6.7.6.10(4) Interior access systems to roof areas;

6.7.6.10(5) Protection from pedestrian traffic and solar radiation; and

6.7.6.10(6) Roof drainage in compliance to RCABC warranty requirements, including overflow scuppers.

6.7.6.11 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 roofing membrane continuously under the metal flashings. Ensure that sheet metal components comply with wind uplift requirements established for roofing system:

6.7.6.11(1) References for sheet metal flashings include: Roofing Contractors Association of British Columbia (RCABC). "Roofing Practices in British Columbia", Sheet Metal and Air Conditioning Contractors National Association (SMACNA), CSA HA Series-Mi 980, "CSA Standards for Aluminum and Aluminum Alloys", ASTM A653 / A653M-06 "Standard Specification for Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy Coated (Galvanealed) or 55% Aluminum-zinc alloy coated (Galvalum) by hot dip process.

6.7.6.12 Metal roofing systems, if used, will 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. 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.

6.7.6.13 Ponding of water on roofs will not be accepted.

6.7.6.14 For flat roofs, drains will be positioned a minimum of 2 m away from unguarded roof edges.

6.7.6.15 All wood that is exposed to the exterior will be covered by an overhang or provided with flashing above of wood members, with drip edges that protect the wood from water exposure.

6.7.6.16 10 years roofing warranty for re-roofing of existing and 15 year roofing warranty for new roofs, as per RCABC.

6.7.6.17 For the rooftop communications pathway system, provide roof penetration housings consisting of the following:

6.7.6.17(1) 2 mm thick aluminum housing and curb;

6.7.6.17(2) UV protected powder coated finish at 0.05 mm;

6.7.6.17(3) Stainless steel fasteners;

6.7.6.17(4) Gasketed lid to housing and housing to curb connection joints to ensure compliance to ICC 2015 Air Permeance Levels; and

6.7.6.17(5) Constructed to withstand BCBC-required wind loading.

6.7.7 Fire and Smoke Protection

6.7.7.1 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.

6.7.7.2 Apply protection around penetrations through vertical and horizontal fire-resistance rated separations.

6.7.7.3 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.

6.7.7.4 Use firestopping that:

6.7.7.4(1) Is compatible with substrates;

6.7.7.4(2) Allows for movement caused by thermal cycles; and

6.7.7.4(3) Prevents the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.

6.7.7.5 When more than one product is required for an assembly, use products that are compatible with one another and from the same manufacturer. Products will comply with requirements established by ULC-tested assemblies:

6.7.7.5(1) Is compatible with substrates;

6.7.7.5(2) Allows for movement caused by thermal cycles; and

6.7.7.5(3) Prevents the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.

6.7.7.6 Are silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water. Do not use acrylic-based coatings and sealants.

6.7.7.7 Is installed by an FM Global approved firestop contractor or an UL-qualified firestop contractor.

6.7.7.8 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.

6.7.7.9 Are designed to allow for the 25% spare capacity of the corresponding Building System.

6.7.7.10 Use fire stopping sealants and coatings that are silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water. Do not use acrylic-based coatings and sealants.

6.7.7.11 All firestopped penetrations will be labelled with appropriate labels indicating the manufacturer name, system used, product used, installer and installed date. Project Co will provide a full inventory of firestopped penetrations to be indicated on the as-built drawings as part of the Project close-out document submission.

6.7.8 Sealants

6.7.8.1 All sealants and sealant primers used on the exterior and the interior of the Facility will comply with the requirements of LEED - low VOC.

6.7.8.2 Provide sealant around and over cavities, in or behind surface elements to meet infection control requirements, refer to Section 5.10. Sealant around door frames will include joints at bottom of door frames between floor finish and frames. Silicone is not allowed for this application.

6.7.8.3 Sealed joints between dissimilar or similar materials to allow a smooth or even transitions.

6.7.8.4 Sealed expansion or controls joints in the building envelope systems or structural systems to allow movement.

6.7.8.5 Provide security pick proof sealants at all interior joints in Mental Health Areas.

6.7.8.6 Apply sealant materials to achieve:

6.7.8.6(1) Seals to the building envelope systems and around openings in the building envelope systems, as required to prevent water ingress;

6.7.8.6(2) Sealed joints between dissimilar or similar materials to allow a smooth or even transitions; and

6.7.8.6(3) Sealed expansion or controls joints in the building envelope systems or structural systems to allow movement.

6.7.8.6(4) Sealant will not be used as a primary water barrier for building envelop conditions.

6.7.8.7 Provide sealants to meet the following standards:

6.7.8.7(1) CAN / CGSB-19.24-M90 – Multi-Component, Chemical Curing Sealing Compound; and

6.7.8.7(2) CAN / CGSB-19.13-M87 – Sealing Compound, One Component, Elastomeric, Chemical Curing.

6.7.8.8 Acceptable sealants, depending on each application, will include Polyurethane Single Component-Tremco Dymonic, Dow Corning 795 Silicone Building Sealant, Dow Corning 790 Silicone Waterproofing Sealant, Silicone Sealant (for sealing butt glazing).

6.7.8.9 Do not use unsealed joints in Clinical Spaces.

6.7.8.10 For the exterior, use sealants to completely and continuously fill all joints.

6.7.8.11 For the interior, use one component, acrylic emulsion, paintable type sealants at all frames to completely fill joints between dissimilar materials in order to:

6.7.8.11(1) Seal all door frames to floor; and

6.7.8.11(2) Seal all top edge of equipment rails and wood hand, bumper and crash rails to wall.

6.7.8.12 Use polyurethane caulking that is mildew-resistant and impervious to water for caulking washroom plumbing fixtures and showers.

6.7.8.13 Use sealants with self-levelling properties for expansion and control joints in concrete floors using two-component epoxy urethane sealants.

6.7.8.14 Use non-sag sealants for exterior vertical expansion and control joints in masonry or wall cladding.

6.7.8.15 Use sealants that allow for minimum 25% movement in joint width.

6.7.8.16 In corridors and other traffic areas used by laundry carts, supply carts, material handling equipment etc., use traffic bearing type sealants suitable to support imposed load without deformation or failure.

6.7.8.17 Use only paintable sealants and caulking adjacent to any painted surface. Do not use silicone caulking adjacent to any painted surface.

6.7.9 Traffic Coatings

6.7.9.1 Protect the suspended structural concrete floor slabs with a traffic coating to prevent the ingress of moisture into the slab. Areas requiring traffic coating will include:

6.7.9.1(1) Mechanical rooms; and

6.7.9.1(2) MDRD, including where concrete is exposed such as at equipment pits, or as otherwise determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.7.9.2 Use traffic coating that complies with the following:

6.7.9.2(1) Membrane: Fluid applied aliphatic polyurethane waterproof traffic membrane, colour as selected by the Authority, liquid applied, two component 100% solids, and meeting or exceeding the following specifications:

6.7.9.2(1)(a) Property ASTM Test Result;

6.7.9.2(1)(b) Tensile Strength D638 9.1 MPa;

6.7.9.2(1)(c) Elongation at Break D638 435%;

6.7.9.2(1)(d) Tear Strength D624 38.2 KN/mm;

6.7.9.2(1)(e) Hardness D2240 80 Shore A;

6.7.9.2(1)(f) Abrasion Resistance wear course (cs-17 wheel) D4068; and

6.7.9.2(1)(g) Maximum Weight loss of 22 mg/1000 cycles.

6.7.9.2(2) References include: STM C957-06 Standard Specification for High Solids Content, cold Liquid - Applied Elastomeric waterproofing membrane with Integral Wearing Surface, City Building Bylaw 2014, CAN / CSA-S4 13-07 (R2012, "Parking Structures";

6.7.9.2(3) Acceptable products include “Sonoshield Sonoguard" manufactured by Sonneborn / BASF, "Urelastic 5000 / 6000 TC Deck Waterproof Membrane" manufactured by Universal Polymers Inc., or acceptable alternate as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.7.9.2(4) Topping: Polyurethane compound wear course. Install additional layer at all drive isles, entrance/exit, ramps, and expansion joints to Manufacturer’s recommendations. Ensure that the topping will provide sufficient traction during adverse weather conditions;

6.7.9.2(5) Filler and Primer: As recommended by membrane manufacturer; and

6.7.9.2(6) Sealant: Polyurethane type, compatible with system and adjacent materials.

6.7.9.3 Provide fluid applied integral flashings at all locations where a horizontal surface butts a vertical surface. Apply the membrane over the prepared surfaces at a minimum thickness of 500 microns thick and extend the membrane a minimum of 10 cm on vertical and horizontal surfaces.

6.8 Openings (Division 8)

6.8.1 Basic Requirements

6.8.1.1 Provide white matte translucent privacy film on interior window and door glazing where required for privacy as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.1.2 Project Co will, in collaboration with the Authority, review the extent of glazing in doors, and balance the extent of observation and the privacy requirements of the occupants of the room.

6.8.1.3 Subject to any other glazing specifications set out in this Section, at minimum provide all exterior and interior glazing of tempered-laminated glass.

6.8.1.4 Installation methods and locations for doors, frames and hardware will comply with the standards of the Door and Hardware Institute (DHI) for Hospitals Facilities unless otherwise indicated in this Schedule.

6.8.2 Doors

6.8.2.1 Basic Requirements

6.8.2.1(1) For spaces listed in Appendix 3A [Clinical Specifications and Functional Space Requirements], provide the minimum width; quantity, and type of door described in Appendix 3B [Minimum Room Requirements].

6.8.2.1(2) At all corridor doors, including secured and fire separation doors, where Patient wheelchair/stretcher/bed movement is required, including doors into or between major departments, restricted zones or activity areas, provide automatic doors activated by touch-free controls located at a height accessible to Persons with Disabilities on the inside and outside of the doors. Doors will be configured for push-pull manual operation in addition to automatic operation. Timing of door controls, including distance from the opening, will be designed and adjusted by Project Co before Substantial Completion to facilitate Persons' moving Patients, stretchers or other large Equipment through the doors.

6.8.2.1(3) For door acoustical requirements, refer to Appendix 3C [Acoustic and Noise Control Measures]. Provide acoustic seals and drop seals as required.

6.8.2.1(4) Doors will not swing into corridors, obstruct traffic flow or reduce the minimum required corridor width.

6.8.2.1(5) Doors will be located so that the swing does not strike any plumbing fixture, block access to light switches or falsely trigger handsfree operated equipment.

6.8.2.1(6) Provide sealed double glazing in aluminum frame sliding doors, sliding doors to be without floor tracks, and be provided with emergency swing breakout.

6.8.2.1(7) Provide doors and door frames that will withstand the varying and high levels of humidity and impact while maintaining their inherent aesthetic and functional capacities.

6.8.2.1(8) Wood doors will not be used for service or Staff Back-of-House entrances to Component due to high traffic of transfers and equipment/supply movements.

6.8.2.1(9) For the process-oriented Components such as Biomedical Engineering, provide doors in addition to those listed in Appendix 3B [Minimum Room Requirements] as required by the Authority to suit its functional requirements based on the Design.

6.8.2.1(10) For all doors: floor mounted rails, slides and/or locking pins are not permitted, top mount only. Provide extensions for top bolts for over-height doors so operable hardware is within 1.8 m mm AFF.

6.8.2.1(11) Operating Room doors will be of a quality that allows for the required seal to maintain HVAC as well as acoustical privacy. These doors and frames will be fabricated using 16 gauge stainless steel with extra heavy duty stainless steel ball bearing hinges c/w auto door operators.

6.8.2.1(12) Provide glazing in interior and exterior doors to allow for proper security, Line of Sight, and as a means of achieving Direct Natural Light or Borrowed Light.

6.8.2.1(13) Exterior doors will meet the requirements of ASHRAE 90.1. All exterior doors will be thermally broken.

6.8.2.1(14) All stairwell doors to have door lites when allowable by Code.

6.8.2.1(15) Minimum clear doorway height will not be less than 2120mm. No hardware will be allowed to be mounted in the door header that diminishes the clearance. Door closers and ADO arms are exempt from this requirement.

6.8.2.1(16) The floor in the doorway will be level to within 3mm over 1220mm.

6.8.2.1(17) The gap between the door and the frame will not exceed 4.76mm nor less than 3.0mm.

6.8.2.1(18) All fire-rated doors will have maximum 13mm gap clearance between door bottom and finished floor, complete with concealed automatic door bottoms.

6.8.2.1(19) All doors will comply with ADA requirements.

6.8.2.1(20) All doors and door frames will be installed plumb and square. The jambs will be plumb within 3mm over 2150mm in any plane. The header will be 90 degrees square to the jambs.

6.8.2.2 Washroom Door Requirements

6.8.2.2(1) In Mental Health areas, all Patient washroom doors including ensuite washrooms will be designed as Ligature Resistant, Vandal Resistant, tamper resistant and Anti-Barricade.

6.8.2.2(2) Public washrooms are to be provided with automatic operators.

6.8.2.2(3) Doors will either swing out into the adjacent room or be dual swing. Provide an emergency override for Staff access. During the swing trip, doors will not hit any plumbing fixture or objects mounted on the walls.

6.8.2.2(4) All Patient ensuite washroom doors described as Door Type K in the Appendix 3B [Minimum Room Requirements] will be Ligature Resistant and Anti-Barricade that are specifically designed for behavioural health and will include:

6.8.2.2(4)(a) Door panel with sloping top held down 300mm from the top of the door frame; and

6.8.2.2(4)(b) Door panel raised above the floor 300mm.

6.8.2.3 Size Requirements for Doors

6.8.2.3(1) The door widths described in Appendix 3B [Minimum Room Requirements] are minimums and will be widened as follows:

6.8.2.3(1)(a) To allow equipment or supplies to be easily moved in and out of the space;

6.8.2.3(1)(b) To allow Patients and visitors in wheelchairs or other mobility aids;

6.8.2.3(1)(c) To enable multiple Staff to accompany a Patient on a stretcher where required; and.

6.8.2.3(1)(d) As otherwise required by the Authority to meet the functional requirements of the space.

6.8.2.4 Bariatric Requirements for Doors.

6.8.2.4(1) Swing doors for bariatric Patients will have a clear floor area beside the latch edge that extends the full height of the door, for 940 mm on the pull side and 640 mm on the push side.

6.8.2.4(2) Provide a clear dimension extending 2.4 m on the pull side and 1.725 m on the push side for bariatric Patient rooms and 1.8 m on the pull side and 1.725 m on the push side for all other bariatric doors.

6.8.2.4(3) Sliding doors for bariatric Patients will have a clear floor area beside the latch edge that extends the full height of the door of 600 mm on both sides of the door.

6.8.2.4(4) The minimum bariatric door width will be 1530mm clear in a double door configuration (1070mm and 460mm).

6.8.3 Wood Doors

6.8.3.1 Project Co will provide flush wood core doors for the Facility including the following:

6.8.3.1(1) Solid core flush doors with plastic laminate faces;

6.8.3.1(2) Fire-rated flush wood core doors;

6.8.3.1(3) All transoms, glass lites non-rated, fire rated and stops and openings; and

6.8.3.1(4) Sealed door edges.

6.8.3.2 Wood doors will have hardware and finishes that suit the intended function and aesthetics of the Facility. All wood door edges will be sealed; top and bottom door edges will be sealed with two coats of high gloss clear acrylic polyurethane sealer.

6.8.3.2(1) Door closer or ADO components installed on wood doors will be through-bolted using post and screw fasteners (sex bolts). Wood screws or self tapping screws will not be used.

6.8.3.3 In locations requiring radiation shielding, line doors with lead and label such doors with lead thickness. Doors in walls will have the same radiation shielding as the walls in which they are located, unless otherwise required by the RPA. Lead lining to be minimum 1800 gram pure lead, non-alloy.

6.8.3.4 Provide door frames, specially designed for the weight of the door, and with radiation shielding equivalent to the wall in which they are located. Where there are double doors, provide a shielded astragal.

6.8.3.5 Wood doors are not permitted in areas and service rooms (e.g., mechanical, electrical, communications, exit stairs, etc.).

6.8.3.6 Project Co will provide flush wood core doors with CSA approved wiring system and conduits for all electronic hardware and automatic door operators including openings to suit electronic and regular hardware.

6.8.3.7 Project Co will ensure doors are obtained from one (1) source by a single manufacturer.

6.8.3.8 Ensure fire rated doors comply with NFPA-80 and carry labels acceptable to the Governmental Authority; Site applied and stamped fire-labeling is not acceptable.

6.8.3.9 Construct doors with five (5) ply construction for plastic laminate faces in accordance with AWS and ANSI/WDMA I.S 1A standards unless otherwise indicated.

6.8.3.10 Provide doors which meet the STC ratings as specified in Appendix 3C [Acoustic and Noise Control Measures].

6.8.3.11 Performance Requirements

6.8.3.11(1) Provide flush wood core doors which comply with WDMA I.S 1A, Section C-13, Flush Wood Door Minimum Performance Standards, Duty Level: Extra Heavy Duty unless otherwise approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.3.11(2) Provide fiber reinforced laminate door facing as follows:

6.8.3.11(2)(a) Fiber reinforced laminate, 1.9 mm (0.075 inches) thick, monolithic panel with 20% continuous glass fibers; with the following properties:

6.8.3.11.2.(a).1 Barcol Hardness: ASTM D2583, 35 typical;

6.8.3.11.2.(a).2 Wear Resistance: NEMA 3, 13: Minimum 3,500;

6.8.3.11.2.(a).3 Surface Burning: ASTM E84, Class A. .1 Flame Spread: 25 or less; and

6.8.3.11.2.(a).4 Smoke Developed: 30 or less.

6.8.3.11(3) Provide standard duty non-rated flush wood core doors to meet the following requirements:

6.8.3.11(3)(a) Facing: as noted above;

6.8.3.11(3)(b) Core: Particle Board: ANSI A208.1; 449 kg/m3 – 513 kg/m3 (28 lb/ft3 – 32 lb/ft3) density solid particle core, mat-formed sanded both sides, thickness as recommended by AWI/AWMAC for specified requirements. Ensure items are classified M2 in accordance with ASTM E1333;

6.8.3.11(3)(c) Stiles: Minimum 38 mm thick (1-1/2”) thick hardwood laminated to 25 mm (1”) thick structural composite lumber or laminated veneer lumber bonded to core with matching sealed hardwood edge strips. Total Thickness: 50mm (2”).

6.8.3.11(3)(d) Rails: Minimum 30 mm thick (1-3/16”) thick hardwood, structural composite lumber or laminated veneer lumber bonded to core;

6.8.3.11(3)(e) Crossbands: Provide high-density composite crossbands in manufacturer's standard thicknesses required to meet performance requirements specified herein. Ensure crossbands extend full width of door; and

6.8.3.11(3)(f) Adhesive: Type I, Waterproof, as recommended by product manufacturer for designated application and containing no added urea-formaldehyde.

6.8.3.11(4) Provide heavy duty non-rated flush wood core doors at locations such as doors which have push bar exit devices or as otherwise required as follows:

6.8.3.11(4)(a) Facing: as noted above;

6.8.3.11(4)(b) Core: ASTM D5456 or ANSI I.S.4, structural composite lumber or laminated veneer lumber laminated using hot pressing process with Type 1 adhesive as specified herein. Floating cores are not acceptable;

6.8.3.11(4)(c) Stiles: Minimum 38 mm thick (1-1/2") thick, hardwood, structural composite lumber or laminated veneer lumber bonded to core with matching sealed hardwood edge strips;

6.8.3.11(4)(d) Total Thickness: Manufacturer's standard thickness required to meet performance requirements specified herein;

6.8.3.11(4)(e) Rails: Integrated;

6.8.3.11(4)(f) Crossbands: Provide high-density composite crossbands in manufacturer's standard thicknesses required to meet performance requirements specified herein. Ensure crossbands extend full width of door; and

6.8.3.11(4)(g) Adhesive: Type I, Waterproof, as recommended by Product manufacturer for designated application and containing no added urea-formaldehyde.

6.8.3.11(5) Provide fire-rated flush wood core doors which meet the following requirements:

6.8.3.11(5)(a) Facing: as noted above;

6.8.3.11(5)(b) Core: Incombustible mineral core to meet fire-resistance rating requirements specified herein;

6.8.3.11(5)(c) Stiles: Minimum 38 mm thick (1 1/2") thick, as required by manufacturer for fire rating;

6.8.3.11(5)(d) Rails: Manufacturer's standard rails as required for fire rating;

6.8.3.11(5)(e) Interior Blocking: Approved fire-retardant reinforcement minimum 120 mm (4-3/4") high at top, bottom rails and at mid height of doors as required to secure surface applied hardware with screw meeting WDMA Extra Heavy-Duty Performance. Provide minimum 11 mm (7/16") hardwood blocking in accordance with WDMA standards. On doors over 900 mm (36") wide, provide additional approved fire-retardant reinforcement to hinge stile of door; and

6.8.3.11(5)(f) Vision Framing: ULC labeled, prime painted metal framing or fire rated wooden molding kit to match door faces;

6.8.3.11(6) Provide specialty doors to meet the following requirements:

6.8.3.11(6)(a) Sound Retardant Flush Wood Core Doors: Unless otherwise indicated, fabricate doors as follows:

6.8.3.11.6.(a).1 Facing: as noted above;

6.8.3.11.6.(a).2 Core: Acoustical sound attenuating core with proprietary sound attenuating material to achieve minimum STC ratings specified in Appendix 3C [Acoustic and Noise Control Measures] when tested in accordance with ASTM E90;

6.8.3.11.6.(a).3 Stiles: Minimum 38 mm (1 1/2") thick. Manufacturer's standard stiles as required for sound attenuation rating;

6.8.3.11.6.(a).4 Rails: Manufacturer's standard rails as required for sound attenuation rating;

6.8.3.11.6.(a).5 Crossbands: Provide high-density composite crossbands in manufacturer's standard thicknesses required to meet performance requirements. Ensure crossbands extend full width of door; and

6.8.3.11.6.(a).6 Sound Traps and Seals: as required for sound attenuation rating.

6.8.4 Hollow Metal Doors and Frames

6.8.4.1 Provide interior metal doors with flush face and no trims construction.

6.8.4.2 Doors with an inactive leaf will not be floor bolted. Bolt into frame instead.

6.8.4.3 Provide 16-gauge steel doors with vertical interlocking steel stiffeners and continuous welded edge seams for all doors over 915 mm wide. Provide high frequency hinge reinforcing to suit heavy weight hinges.

6.8.4.4 Provide 18-gauge steel doors with continuous welded edge seams for all doors up to 915 mm wide.

6.8.4.5 Provide factory baked-on electrostatic painted prefinished doors and door frames. Color selection will suit architectural requirements.

6.8.4.6 Provide exterior metal doors with:

6.8.4.6(1) Flush face construction, continuously welded, seamless edge construction using steel sheet;

6.8.4.6(2) Fully sealed weather cap on top of door;

6.8.4.6(3) Welded edge seams;

6.8.4.6(4) Edge seams to correspond with door function and minimize maintenance needed;

6.8.4.6(5) Prepared surfaces to receive finishes that resist corrosion from exposure to weather. Provide with ZF180 coating; and

6.8.4.6(6) All exterior doors that open out will be capped to avoid water collecting in welding channels.

6.8.4.7 Provide pressed metal frames with:

6.8.4.7(1) Fully welded construction. Provide fully welded 16 gauge frames. Provide high frequency hinge reinforcing to suit heavy weight hinges. Provide 12 gauge welded reinforcing for all surface applied door hardware;

6.8.4.7(2) Thermally-broken door frames for exterior door; and

6.8.4.7(3) Anchors to each jamb to suit wall type and receive the frame.

6.8.4.8 Provide door glazing as follows:

6.8.4.8(1) For exterior hollow metal door glazing, use sealed units with warm edge, in thermally-broken frames to prevent heat loss; and

6.8.4.8(2) For interior hollow metal door glazing use tempered glass. Provide with safety label where required.

6.8.5 Automatic Sliding Doors

6.8.5.1 Provide automatic sliding doors for the entrance vestibule, with swing doors to either side of the sliding doors to provide emergency egress and out of hours Staff access. The entrance vestibule will be designed such that inner and outer doors are sequenced.

6.8.5.2 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.

6.8.5.3 Provide door operators, including the motion and presence detection system that are capable of operating within the temperature ranges existing at the Facility and ancillary buildings and unaffected by ambient light or ultrasonic interference. Presence detection system must work in both directions of the door swing.

6.8.5.4 Provide energy-saving devices to reduce conditioned air or heat loss.

6.8.5.5 Installation will be by a certified technician approved by the manufacturer.

6.8.5.6 Automatic sliding door operators: Provide Record-USA series 5100 Electromechanical Automatic Operators or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. Provide with electromechanical locking device and door leaf surveillance. Provide with request to exit device to release integrated lock. Provide safety sensors including sidelight protection sensors.

6.8.5.7 Provide a complete sliding door package, including the following: framing, flush mounted header (mounted between jambs), sliding door panel(s), stationary panel(s), operators (belt drive only-linear rod not accepted), activation and safety devices in both directions, key switch for de-activation, carrier assemblies, noise isolating roller track, threshold, and guide tracks, to match threshold dimensions on full breakout units.

6.8.5.8 Traffic patterns to be determined by Authority and set by installer using Record-USA exclusive S.M.A.R.T. panel per application.

6.8.5.9 Door and frame materials will comply with the following standards:

6.8.5.9(1) Header, frames, stiles and rails: 6063-T5;

6.8.5.9(2) Extruded bars, rods, profiles and tubes: ASTM B221;

6.8.5.9(3) Sheet and plate: ASTM B209; and

6.8.5.9(4) Framing Members: Will be manufacturer’s standard extruded aluminum.

6.8.5.10 Provide bumper stop or cushioned stop on all automatic sliding doors.

6.8.5.11 Provide perimeter seals integrated into door and frame as required for airborne isolation and pressure control.

6.8.5.12 Provide integration with access control system.

6.8.5.13 Provide a key switch located on the secure side to toggle function Auto/Open/Close. The key switch is to be keyed into the building master key system.

6.8.5.14 Automatic door operators will be installed to fully comply with AAADM and ADA recommendations for automatic sliding doors.

6.8.6 Automatic Swing Doors

6.8.6.1 Use automatic swing doors, or automatic sliding doors as alternate will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] for interior and exterior locations where required, including cross-corridor double-egress doors, entrances to departments, and areas where stretchers or equipment are frequently wheeled, and doors to exterior spaces that are required to be accessible to Persons with Disabilities. Door controls will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] to ensure placement is accessible to Staff pushing wheeled equipment including Patient stretchers.

6.8.6.2 If used, provide directional motion sensor control devices that are unaffected by ambient light or ultrasonic frequencies. Consult with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] to determine where motion sensors can be used in place of a hands-free operation to activate auto door operators.

6.8.6.3 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.

6.8.6.4 Implement longer hold-open times to accommodate the elderly and frail in coordination with the Authority. Hold open times, speed of opening and closing for all doors with operators will be determined in consultation through the Review Procedure with the Authority through the Commissioning process.

6.8.6.5 Provide both door mounted and overhead presence sensors on both sides of door opening to prevent doors from striking persons when in motion.

6.8.6.6 Automatic swing door operators: Provide Record-USA series 8100 Electromechanical Automatic Operators. Provide operators with on-board timing sequencers, power close mode, dynamic stack pressure compensation and opening assist. Upon loss of power, manual opening force will not exceed 15 lbf. Provide door mounted safety sensors on both sides of doors with automatic operation.

6.8.6.7 Provide a three position (On/Off/Hold) key switch located on the secure side to toggle function Auto/Open/Close. The key switch is to be keyed into the building master key system.

6.8.6.8 Automatic door operators will be installed to fully comply with AAADM and ADA recommendations for automatic doors.

6.8.7 Aluminum Entrances and Storefronts

6.8.7.1 Aluminum entrances and storefront framing and doors may form part of the exterior envelope of the Facility. Stiles and rails will be oversized to avoid the failure of glazing unit and potential twisting and fastener failure of door frame assembly.

6.8.7.2 Provide glazed interior partitions to meet the functional requirements of the spaces as defined by Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.8.7.3 Provide aluminum doors within aluminum entrances and storefront.

6.8.7.4 Provide frames that are thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.

6.8.7.5 Provide Rain Screen frames drained and vented system 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.

6.8.7.6 Provide aluminum swing entrance doors that are heavy-duty commercial or institutional grade, automatically operated, motion-detector controlled.

6.8.7.7 Finish to be permanent and resistant to corrosion caused by weather exposure and climate.

6.8.7.8 Provide a minimum 150-mm wide mid-rail at a height between 900 and 1100 mm AFF.

6.8.7.9 Swing doors will be provided with a continuous hinge. Pivot hinges are not acceptable.

6.8.7.10 Apply aluminum finish for exposed aluminum surfaces. Finish to be permanent and resistant to corrosion caused by weather exposure and climate.

6.8.7.11 Aluminium mullions will have a deflection limit in conformance with ASTM E330.

6.8.7.12 Acceptable architectural aluminium doors and frames will include Kawneer Trifab, Metro Aluminium, Columbia or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.7.13 Provide the following warranties:

6.8.7.13(1) Framing, panels and glazing: 2 years; and

6.8.7.13(2) Aluminium breakshapes including oil-canning and delaminating: 2 years.

6.8.8 Specialty Doors

6.8.8.1 Overhead Rolling Counter Shutters

6.8.8.1(1) Provide shutter curtains fabricated with extruded aluminum, or galvanized steel interlocking flat slats, complete with guides of similar materials.

6.8.8.1(2) Provide motorized operation for overhead shutters with manual override and locking capability.

6.8.8.1(3) Provide monitored electric or photoelectric sensors for entrapment protection.

6.8.8.1(4) Provide lockable service access to all shutters or overhead roll-up doors.

6.8.8.2 Overhead Rolling Service Doors

6.8.8.2(1) Provide overhead rolling service doors at all loading bays and at the BH Energy Centre;

6.8.8.2(2) Provide ULc listed heavy-duty, high-starting torque electric motor operation for all overhead doors, complete with manual override for times of power outage or motor failure, and inertia brakes, located on the drive shaft, to prevent curtain free fall. Restrain lateral movement of door curtain slats. Provide windlocks as required by door size or wind load requirements.

6.8.8.2(3) Provide interlocking flat slats, complete with bottom bar and contact type bottom astragal.

6.8.8.2(4) Where manually operated doors are required, 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.

6.8.8.2(5) For fire doors, provide automatic closing device operated by fire door release device connected to fire alarm system.

6.8.8.2(6) Insulate overhead rolling service doors with a minimum insulation value of RSI-1.4 (R-8) and provide weather stripping / seals.

6.8.9 Interior Sliding Doors

6.8.9.1(1) Unless otherwise noted, provide interior sliding doors with recessed mounted track, sliding and fixed panel(s) single glazed with 6.0 mm clear fully tempered glass with safety glazing labelling. Provide soft open/close hardware for manually operated interior sliding doors.

6.8.9.1(2) Provide interior glass sliding doors without floor track.

6.8.9.1(3) Provide interior sliding doors and interior glass sliding doors with break-out capability.

6.8.9.1(4) Provide visual cues/glazing film in transparent glass panels as appropriate to prevent collisions.

6.8.10 Door Sidelights

6.8.10.1 Provide door sidelights at locations described in Appendix 3B [Minimum Room Requirements] and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.10.2 Provide interior windows and door sidelights consisting of 6.0 mm clear fully tempered glass with safety glazing labelling.

6.8.10.3 Provide white matte translucent privacy film on door sidelight glazing which balances the extent of observation required and the privacy requirements of the occupants of the room.

6.8.10.4 Project Co will provide minimum 460mm wide door sidelight glazing.

6.8.10.5 Provide the lower horizontal mullion of the door sidelight such that it is horizontally aligned with the adjacent handrail height to allow for extension of adjacent handrail.

6.8.10.6 Door sidelights will have STC ratings equal to or greater than that of the door they are adjacent to. The perimeters will be sealed to prevent sound leakage.

6.8.10.7 Refer to Drivers' Visibility Section 4.11.6 for additional door sidelight requirements.

6.8.11 Door Hardware

6.8.11.1 Basic Requirements

6.8.11.1(1) The Authority's goal is to limit the use of keys through door hardware technology. Location of card readers and other technologies are described in Divisions 27, 28 Appendix 3B [Minimum Room Requirements]**.**

6.8.11.1(2) All doors with card readers must also provide a mechanical key override to manage access during a failure of the access control system.

6.8.11.1(3) Project Co will, at a minimum, provide the following door hardware for each door hardware group listed under Section 6.8.12 Door Hardware Groups. Doors, door hardware and controls will be reviewed and determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.1(4) Refer to Appendix 3B [Minimum Room Requirements] for door hardware groups for each space listed in Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.8.11.1(5) In Clinical Spaces, provide a permanent, non-toxic antimicrobial finish on door handles, push plates and pulls.

6.8.11.1(6) Doors in Patient-accessible spaces within Mental Health Areas will be provided with Ligature Resistant hardware and Tamper Resistant fasteners. Unless otherwise noted, locks and latches will be push/pull style that is Ligature Resistant and provides for hands-free operation.

6.8.11.1(7) All doors within Patient accessible corridors and at Component entrances that are closed due to BCBC requirements and/or controlled access requirements will be on automatic operators.

6.8.11.1(8) Provide automatic operators on doors in all service areas to facilitate the movement of materials, carts and equipment. Both leaves are to open allowing for maximum corridor width. Automatic opening hardware will be touch-free actuator type in all areas. The touch-free actuator type in all Staff areas will be a touchless switch, wave-to-open type sensor, designed for health care applications. Provide push button actuators as required at locations determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.1(8)(a) 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 BC Fire Code requirements.

6.8.11.1(9) Areas requiring card reader access comprise those described in Appendix 3B [Minimum Room Requirements] and include but are not limited to the following:

6.8.11.1(9)(a) All entrances into restricted areas of the Interventional – Perioperative Service Platform;

6.8.11.1(9)(b) Environmental Services closets;

6.8.11.1(9)(c) All entrances into MDRD;

6.8.11.1(9)(d) All exterior entrance doors;

6.8.11.1(9)(e) All doors that access off the 24-hour public corridor;

6.8.11.1(9)(f) Outbreak Control Zones;

6.8.11.1(9)(g) Elevator lobbies;

6.8.11.1(9)(h) Medication Rooms;

6.8.11.1(9)(i) Soiled Utility Rooms, Clean Supply Rooms;

6.8.11.1(9)(j) Entrance to FMO department;

6.8.11.1(9)(k) All Multimedia Rooms;

6.8.11.1(9)(l) Into and out of stairwells as determined through consultation with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.8.11.1(9)(m) Any other location as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.1(10) For card reader placement, key override, door contact, request to exit device, video door intercom, remote release requirements, refer to Section 7.11.

6.8.11.1(11) All doors throughout the Facility require door hardware Evacuation Room Verification System including hinges and evacuation indicators that are highly visible in low light and smoke-filled environments to signal if the room is vacant or in-use. The Evacuation Room Verification System will indicate the status of the room during emergency conditions. The system will be activated when occupants have vacated the room and indicate if someone has re-entered the room. The system will enable the fire department to quickly assess the status of a room; if the device is in closed position then the room has been accessed and will be verified. If the door to a room is opened by more than one inch, the spring hinge will revert the system automatically to the closed position. The unit will not be reset from inside the room.

6.8.11.1(12) Project Co's Architectural Openings Consultant will attend in person all door hardware meetings held during the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.1(13) For all Anti-Barricade doors, provide kerfed-in seal with a pile insert for the door header and jamb, and a pile sweep at the door bottom, in compliance with door acoustic requirements;

6.8.11.1(14) All fasteners will be flush with the hardware surface. The fastener will be in good condition and not stripped.

6.8.11.1(15) Door hardware, including but not limited to smoke seals, acoustic seals, weather stripping, automatic door bottoms, mutes, threshold, sweeps, and door and frame protection will be installed as per details in shop drawings approved by the Authority through the Review Procedure.

6.8.11.2 Performance Requirements

6.8.11.2(1) Finish hardware will be heavy duty suitable for institutional use.

6.8.11.2(2) Hinges: Stainless Steel ANSI Grade 1, warranted for the life of the Facility. Size hinges according to manufacturer's recommendations. Provide hinges with concealed maintenance free Teflon or plastic bearings and non-removable pins.

6.8.11.2(3) Continuous hinges: ANSI Grade 1 warranted for the life of the Facility. Provide removable Serviceable power transfers where required. Use continuous hinges on high frequency doors. Locations to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.2(3)(a) Single acting: Provide Stanley Architectural Stainless Steel Barrel Type Continuous Hinges Full Mortise with Full-Wrap Edge Guard 652HD – (ANSI A51011B & A51021B) – Heavy duty 12 gauge stainless steel with adjusta-screws, suitable for doors up to 900 lbs. Provide removable serviceable power transfers where required.

6.8.11.2(3)(b) Single acting swing clear: Provide 12 gauge stainless steel pin and barrel swing clear hinge with Adjusta-Screw fasteners.

6.8.11.2(3)(c) Double acting: Provide geared aluminum hinge capable of 100-degrees swing in both directions.

6.8.11.2(4) Pivot hinges: ANSI Grade 1. Use pivot hinges only where standard or continuous hinges are not feasible. Size pivots according to manufacturer's recommendations.

6.8.11.2(5) Locksets and latch sets: ANSI A156.13, fully mortised grade 1 type, lever handles will be solid material and provide a full return to the door. Provide lever handle locksets are with break-away/free-

wheeling levers. Locks are to be provided with cylinders that will accept the keying requirements in Section 6.8.13.

6.8.11.2(5)(a) Provide locks from one of the following manufacturers:

6.8.11.2.5.(a).1 Schlage

6.8.11.2.5.(a).2 Sargent

6.8.11.2.5.(a).3 Best

6.8.11.2(6) Deadbolts: ANSI A156.13, fully mortised grade 1 type

6.8.11.2(7) Door closers: ANSI A156.4, Grade 1 type. Provide concealed door closers in Clinical Spaces. Size all door closers to suit Facility conditions and in accordance with barrier-free accessibility codes. Provide delayed action closers at all locations. Do not locate door closers on the corridor side of openings. Provide through-bolt mounting for closers. Selectable hold open arms and spring-loaded stops are to be provided where applicable and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.11.2(7)(a) Provide closers from one of the following manufacturers:

6.8.11.2.7.(a).1 LCN

6.8.11.2.7.(a).2 Sargent

6.8.11.2.7.(a).3 Norton

6.8.11.2(7)(b) Door closing speed from 90 degrees open position will be 5 – 7 seconds;

6.8.11.2(7)(c) The lock will latch by the door closer.

6.8.11.2(8) Exit devices: ANSI 156.3 Grade 1 type. All exit devices will be listed for accident hazard and fire exit. Latch retraction devices will require an inrush of 1amp or less and will not require proprietary power supplies. Vertical rod exit devices are to be concealed, less bottom rod type.

6.8.11.2(8)(a) Provide exit devices from one of the following manufacturers:

6.8.11.2.8.(a).1 Von Duprin

6.8.11.2.8.(a).2 Sargent

6.8.11.2.8.(a).3 Precision

6.8.11.2(9) Door stops: Provide heavy duty wall or overhead stops. Floor stops are not permitted for safety and cleanliness reasons. Provide solid backing for wall stops.

6.8.11.2(10) Astragals: Provide full length astragals for all exterior and parkade doors. For lead lined doors, refer to 6.13 Special Construction (Division 13). Proved stainless steel astragals that are formed to accommodate a standard strike plate without interference. The astragal is not to be cut to accommodate strike plates.

6.8.11.2(11) Flush bolts: Provide heavy duty automatic latching top bolts. Provide heavy duty manual bottom bolts with dust proof strikes, except in Clinical Spaces. Provide extensions for top bolts for over-height doors so operable hardware is within 1.8 m mm AFF.

6.8.11.2(12) Manual sliding door hardware: Provide heavy duty tracks and hangers with a load capacity suitable for the door weight. Surface mounted track and hangers are to be concealed with fascia and end caps. Provide all manual sliding doors with soft open/close hardware.

6.8.11.2(13) Perimeter seals: Provide seals with replaceable gaskets. Do not surface mount perimeter seals to the face of the door frame. Provide semi mortised automatic door bottoms. In areas where Ligature Resistant hardware is required, provide seals designed to break into segments. Refer to Appendix 3C [Acoustic and Noise Control Measures] for acoustic requirements and provide seals accordingly.

6.8.11.2(14) Power transfers: Conceal power transfers in the hinge.

6.8.11.2(15) Electric Strikes: ANSI A156.31, Grade 1 type. Provide heavy duty UL 1034 burglary-resistant, tamper resistant, stainless steel construction strikes.

6.8.11.2(16) Power supplies: Provide power supplies with relay boards that completely isolate hardware power from the access control system and individually fused outputs for each hardware device. Provide a minimum of 25% room for expansion and 5Ah battery backup.

6.8.11.2(17) Request to exit devices: Locate request to exit devices in the door hardware wherever the hardware allows.

6.8.11.2(18) Door position switches: Provide double throw double pole door position switches.

6.8.11.2(19) Delayed egress hardware: Except where required by BCBC, delayed egress hardware will not be used.

6.8.11.2(20) Multimedia Room door requirements are further described in Section 7.10.15.

6.8.12 Door Hardware Groups

6.8.12.1 For each specified rooms(s) or area, the following door hardware will be utilized:

6.8.12.1(1) AO-01 – Interior Automatic (sliders)

6.8.12.1(1)(a) Doors are to be automatic sliders with break-away doors for emergency egress;

6.8.12.1(1)(b) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(1)(c) Card reader;

6.8.12.1(1)(d) Presence/safety sensors; and

6.8.12.1(1)(e) Touch-free actuator.

6.8.12.1(2) AO-02 – Interior Automatic single with card reader

6.8.12.1(2)(a) Doors are to be automatic swing;

6.8.12.1(2)(b) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(2)(c) Card reader;

6.8.12.1(2)(d) Presence/safety sensors;

6.8.12.1(2)(e) Touch-free actuators;

6.8.12.1(2)(f) Hinges;

6.8.12.1(2)(g) Electric strike;

6.8.12.1(2)(h) Mortise lockset; and

6.8.12.1(2)(i) Door stop.

6.8.12.1(3) AO-10 – Entrances and Entry Vestibule (outer doors)

6.8.12.1(3)(a) Doors are to be fully automatic bi-parting sliding doors with recessed panic hardware for emergency egress. Doors and hardware will be capable to accommodate heavy two-way pedestrian traffic. Doors will be reinforced for security when not in use;

6.8.12.1(3)(b) Doors to have the ability to remotely lock and unlock (scheduled, or by emergency lock-down);

6.8.12.1(3)(c) Provide concealed electro-mechanical locks in the operator housing to resist forced entry;

6.8.12.1(3)(d) Presence/safety sensors;

6.8.12.1(3)(e) Touch-free actuators;

6.8.12.1(3)(f) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(3)(g) Provide perimeter seals; and

6.8.12.1(3)(h) These doors will have the capability to sequence opening time with the inner vestibule doors.

6.8.12.1(4) AO-11 - Main Entry Vestibule (inner doors)

6.8.12.1(4)(a) Doors are to be fully automatic bi-parting with recessed panic hardware for emergency egress;

6.8.12.1(4)(b) Presence/safety sensors;

6.8.12.1(4)(c) Touch-free actuators;

6.8.12.1(4)(d) Remote three position key switch (On/Off/Hold) for operator; and

6.8.12.1(4)(e) These doors will have the capability to sequence opening time with the outer vestibule doors.

6.8.12.1(5) AO-12 – Interior Automatic pair with card reader

6.8.12.1(5)(a) Doors to have remote locking and unlocking capabilities (scheduled, card reader, or by emergency lock-down);

6.8.12.1(5)(b) Presence/safety sensors;

6.8.12.1(5)(c) Touch free actuators;

6.8.12.1(5)(d) Remote three position key switch (On/Off/Hold) for operator; and

6.8.12.1(5)(e) Card reader.

6.8.12.1(6) AO-13 – Outbreak Control Zone corridor doors, Interior Automatic pair with card reader and hold open

6.8.12.1(6)(a) Consist of inner and outer doors to create an anteroom. Sequenced so both doors cannot be open at the same time in an outbreak scenario;

6.8.12.1(6)(b) Presence/safety sensors;

6.8.12.1(6)(c) Actuated by card reader;

6.8.12.1(6)(d) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(6)(e) Ability to be held open; and

6.8.12.1(6)(f) Perimeter seals.

6.8.12.1(7) CR-01 - Typical Card Reader Door (Single)

6.8.12.1(7)(a) Hinges;

6.8.12.1(7)(b) Concealed power transfer;

6.8.12.1(7)(c) Electronic mortise lock with request to exit;

6.8.12.1(7)(d) Door closer;

6.8.12.1(7)(e) Door stop;

6.8.12.1(7)(f) Door position switch (DPDT); and

6.8.12.1(7)(g) Pin code proximity reader.

6.8.12.1(8) CR-02 - Typical Card Reader Door (Single) – Hold Open

6.8.12.1(8)(a) Hinges;

6.8.12.1(8)(b) Concealed power transfer;

6.8.12.1(8)(c) Electronic mortise lock with request to exit;

6.8.12.1(8)(d) Door closer with holder;

6.8.12.1(8)(e) Door stop;

6.8.12.1(8)(f) Door position switch (DPDT);

6.8.12.1(8)(g) Card reader; and

6.8.12.1(8)(h) Door to be programmed to ignore door held open status.

6.8.12.1(9) CR-03 - Typical Card Reader Door (Single) – Hold Open

6.8.12.1(9)(a) Consist of inner and outer doors to create an anteroom. Sequenced so both doors cannot be open at the same time;

6.8.12.1(9)(b) Hinges;

6.8.12.1(9)(c) Mortise passage;

6.8.12.1(9)(d) Magnetic lock;

6.8.12.1(9)(e) Door closer with holder;

6.8.12.1(9)(f) Door stop;

6.8.12.1(9)(g) Door position switch (DPDT);

6.8.12.1(9)(h) Card reader; and

6.8.12.1(9)(i) Door to be programmed to ignore door held open status.

6.8.12.1(10) CR-10 – Typical Card Reader Door (Pair)

6.8.12.1(10)(a) Hinges;

6.8.12.1(10)(b) Concealed power transfer;

6.8.12.1(10)(c) Flush-bolts;

6.8.12.1(10)(d) Electronic mortise lock with request to exit;

6.8.12.1(10)(e) Door closers;

6.8.12.1(10)(f) Door stops;

6.8.12.1(10)(g) Door position switches (DPDT); and

6.8.12.1(10)(h) Card reader.

6.8.12.1(11) CR-11 –Card Reader Door (Pair) Laser

6.8.12.1(11)(a) Hinges;

6.8.12.1(11)(b) Concealed power transfer;

6.8.12.1(11)(c) Flush-bolts;

6.8.12.1(11)(d) Push/Pull;

6.8.12.1(11)(e) Shear magnetic lock (both leaves);

6.8.12.1(11)(f) Door closers;

6.8.12.1(11)(g) Door stops;

6.8.12.1(11)(h) Door position switches (DPDT);

6.8.12.1(11)(i) Pin code proximity reader; and

6.8.12.1(11)(j) Door will be electronically locked when laser is in use.

6.8.12.1(12) OR-01 – OR single (sterile core)

6.8.12.1(12)(a) Heavy-duty double acting continuous hinge;

6.8.12.1(12)(b) Push/Pull;

6.8.12.1(12)(c) Shear magnetic lock;

6.8.12.1(12)(d) Door closer;

6.8.12.1(12)(e) Door stop;

6.8.12.1(12)(f) Perimeter seals;

6.8.12.1(12)(g) Two labeled momentary switches, one inside, one outside, that will disable the door lock for 5 seconds without deactivating the laser;

6.8.12.1(12)(h) Door is electronically locked when laser is in use:

6.8.12.1(12)(i) Doors are to be automatic swing;

6.8.12.1(12)(j) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(12)(k) Presence/safety sensors; and

6.8.12.1(12)(l) Touch-free actuators.

6.8.12.1(13) OR-10 – OR pair - Automatic

6.8.12.1(13)(a) Swing clear continuous hinges;

6.8.12.1(13)(b) Push/Pull;

6.8.12.1(13)(c) Shear magnetic lock (both leaves);

6.8.12.1(13)(d) Automatic operator;

6.8.12.1(13)(e) Three position key switch (On/Off/Hold) for operator;

6.8.12.1(13)(f) Touch-free actuators;

6.8.12.1(13)(g) Door stops;

6.8.12.1(13)(h) Perimeter seals; and

6.8.12.1(13)(i) Doors are electronically locked when laser is in use.

6.8.12.1(14) PP-01 – Push/Pull (non-locking) – sterile core from corridor

6.8.12.1(14)(a) Hinges;

6.8.12.1(14)(b) Push/Pull;

6.8.12.1(14)(c) Door closer;

6.8.12.1(14)(d) Door stop:

6.8.12.1(14)(e) Doors are to be automatic swing;

6.8.12.1(14)(f) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(14)(g) Presence/safety sensors; and

6.8.12.1(14)(h) Touch-free actuators.

6.8.12.1(15) PP-11 - Alcove/Closet (pair)

6.8.12.1(15)(a) Hinges;

6.8.12.1(15)(b) Mortise dummy;

6.8.12.1(15)(c) Heavy duty roller latches; and

6.8.12.1(15)(d) Door stop/holders.

6.8.12.1(16) PR-01 - Patient Room Doors

6.8.12.1(16)(a) Ligature Resistant/Anti-Barricade;

6.8.12.1(16)(b) Small leaf can be released and pulled open from the corridor side;

6.8.12.1(16)(c) Continuous hinges;

6.8.12.1(16)(d) Face of door mounted flush-bolt (small leaf);

6.8.12.1(16)(e) Mortise passage;

6.8.12.1(16)(f) No door closers;

6.8.12.1(16)(g) Door stop (inswing and outswing);

6.8.12.1(16)(h) Perimeter seals (for acoustics); and

6.8.12.1(16)(i) Mortised Automatic Door Bottom.

6.8.12.1(17) PR-02 - Patient Room Doors – Mental Health Areas

6.8.12.1(17)(a) Ligature Resistant/Anti-Barricade;

6.8.12.1(17)(b) Continuous double acting power transfer hinges;

6.8.12.1(17)(c) Continuous safety stop;

6.8.12.1(17)(d) Electronic mortise lockset;

6.8.12.1(17)(e) No door closers;

6.8.12.1(17)(f) Door stop (inswing and outswing);

6.8.12.1(17)(g) Perimeter seals (for acoustics); and

6.8.12.1(17)(h) Mortised Automatic Door Bottom.

6.8.12.1(18) SL-PR-01 – Sliding Patient Room Doors

6.8.12.1(18)(a) Ligature Resistant/Anti-Barricade;

6.8.12.1(18)(b) Track and Hangers;

6.8.12.1(18)(c) Soft open/close hardware; and

6.8.12.1(18)(d) Pulls.

6.8.12.1(19) PW-01 - Patient Ensuite Bathrooms

6.8.12.1(19)(a) Door to swing into the bedroom side;

6.8.12.1(19)(b) Hinges;

6.8.12.1(19)(c) No door closers;

6.8.12.1(19)(d) Privacy with override; and

6.8.12.1(19)(e) Door stop.

6.8.12.1(20) CW-01 - Patient Ensuite Bathrooms (Mental Health)

6.8.12.1(20)(a) Ligature Resistant;

6.8.12.1(20)(b) Door to swing into the bedroom side;

6.8.12.1(20)(c) Continuous hinge;

6.8.12.1(20)(d) No door closers;

6.8.12.1(20)(e) Privacy with override; and

6.8.12.1(20)(f) Door stop.

6.8.12.1(21) SPR-01 - Secure Room Doors

6.8.12.1(21)(a) Ligature Resistant;

6.8.12.1(21)(b) Swing out of the secure room;

6.8.12.1(21)(c) Continuous hinge;

6.8.12.1(21)(d) Magnetic lock;

6.8.12.1(21)(e) 3-point locking mortise lock, 1 strike into head and two into the jamb – middle and lower;

6.8.12.1(21)(f) No door closers;

6.8.12.1(21)(g) Wall-mounted door stop; and

6.8.12.1(21)(h) Be designed and constructed to comply with the requirements of the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act.

6.8.12.1(22) SPR-02 – Secure Room Anteroom Doors (outer)

6.8.12.1(22)(a) Ligature Resistant/Anti-Barricade;

6.8.12.1(22)(b) Outswing;

6.8.12.1(22)(c) Continuous hinge with power transfer;

6.8.12.1(22)(d) Electronic Mortise lock with request to exit;

6.8.12.1(22)(e) No door closers; and

6.8.12.1(22)(f) Door stop.

6.8.12.1(23) IA-01 –Interview / Assessment

6.8.12.1(23)(a) Ligature Resistant /anti- barricade;

6.8.12.1(23)(b) Continuous double acting hinge;

6.8.12.1(23)(c) Continuous safety stop;

6.8.12.1(23)(d) Mortise lockset; and

6.8.12.1(23)(e) Door stop.

6.8.12.1(24) IA-02 –Interview / Assessment with Card reader

6.8.12.1(24)(a) Ligature Resistant /Anti-Barricade;

6.8.12.1(24)(b) Continuous double-acting hinge with power transfer;

6.8.12.1(24)(c) Continuous safety stop;

6.8.12.1(24)(d) Electronic mortise lock with request to exit;

6.8.12.1(24)(e) Door stop;

6.8.12.1(24)(f) Card reader;

6.8.12.1(24)(g) Perimeter seals (for acoustics); and

6.8.12.1(24)(h) Mortised Automatic Door Bottom.

6.8.12.1(25) WR-01 –Washrooms, Single Occupant

6.8.12.1(25)(a) Ligature Resistant /Anti-Barricade;

6.8.12.1(25)(b) Automatic operator with touch free actuators in public washrooms;

6.8.12.1(25)(c) Continuous double acting hinge where door can't swing out;

6.8.12.1(25)(d) Continuous safety stop;

6.8.12.1(25)(e) Mortise privacy set with occupied indicator and ability to lock door when out of service; and

6.8.12.1(25)(f) Continuous perimeter door seal for user privacy.

6.8.12.1(26) WR-02 –Multiple Occupant

6.8.12.1(26)(a) Hinges;

6.8.12.1(26)(b) Deadbolt (classroom function);

6.8.12.1(26)(c) Automatic operator with touch free actuators in public washrooms;

6.8.12.1(26)(d) Push/Pull hardware;

6.8.12.1(26)(e) Closer; and

6.8.12.1(26)(f) Door stop.

6.8.12.1(27) WR-03 –Washrooms, Staff

6.8.12.1(27)(a) Hinges;

6.8.12.1(27)(b) Electronic mortise lock with card reader and privacy function;

6.8.12.1(27)(c) Closer; and

6.8.12.1(27)(d) Door stop.

6.8.12.1(28) WR-04 –Washrooms, Single Occupant

6.8.12.1(28)(a) Anti-Barricade;

6.8.12.1(28)(b) Automatic operator with touch free actuators in public washrooms;

6.8.12.1(28)(c) Continuous double acting hinge where door can't swing out;

6.8.12.1(28)(d) Continuous safety stop;

6.8.12.1(28)(e) Mortise privacy set with occupied indicator and ability to lock door when out of service; and

6.8.12.1(28)(f) Continuous perimeter door seal for user privacy.

6.8.12.1(29) SR-01 - Service Rooms

6.8.12.1(29)(a) Hinges;

6.8.12.1(29)(b) Mortise locksets;

6.8.12.1(29)(c) Door closer (where required);

6.8.12.1(29)(d) Door stop; and

6.8.12.1(29)(e) Perimeter seals (where required).

6.8.12.1(30) SR-10 - Service Rooms (pairs)

6.8.12.1(30)(a) Hinges;

6.8.12.1(30)(b) Flush bolts;

6.8.12.1(30)(c) Mortise locksets;

6.8.12.1(30)(d) Door closer (where required);

6.8.12.1(30)(e) Coordinator (where required);

6.8.12.1(30)(f) Door stops;

6.8.12.1(30)(g) Full length astragal; and

6.8.12.1(30)(h) Perimeter seals (where required).

6.8.12.1(31) CL-01 – Conference Room – Single

6.8.12.1(31)(a) Hinges;

6.8.12.1(31)(b) Mortise lockset;

6.8.12.1(31)(c) Door closer; and

6.8.12.1(31)(d) Door stop.

6.8.12.1(32) CL-10 – Conference Room – Pairs

6.8.12.1(32)(a) Hinges;

6.8.12.1(32)(b) Flush bolts;

6.8.12.1(32)(c) Mortise lockset;

6.8.12.1(32)(d) Door closer with hold open (where required due to fire rating);

6.8.12.1(32)(e) Coordinator (where required due to fire rating);

6.8.12.1(32)(f) Door stops;

6.8.12.1(32)(g) Astragal; and

6.8.12.1(32)(h) Perimeter seals (where required).

6.8.12.1(33) PA-01 - Typical Single Door (non-locking)

6.8.12.1(33)(a) Hinges;

6.8.12.1(33)(b) Mortise passage; and

6.8.12.1(33)(c) Door stop.

6.8.12.1(34) OF-01 - Typical Single Door (Offices)

6.8.12.1(34)(a) Hinges;

6.8.12.1(34)(b) Mortise lockset; and

6.8.12.1(34)(c) Door stop.

6.8.12.1(35) OF-02 - Typical Single Door - On-Call Rooms

6.8.12.1(35)(a) Hinges;

6.8.12.1(35)(b) Mortise lockset with occupied indicator; and

6.8.12.1(35)(c) Door stop.

6.8.12.1(36) SL-01 - Typical Sliding Passage Door (non-locking)

6.8.12.1(36)(a) Track and Hangers; and

6.8.12.1(36)(b) Pulls.

6.8.12.1(37) SL-02 - Sliding Bi-pass Passage Door

6.8.12.1(37)(a) Track and Hangers;

6.8.12.1(37)(b) Pulls; and

6.8.12.1(37)(c) Doors can slide then fold and stack.

6.8.12.1(38) XC-01 - Cross-corridor doors on inpatient areas floors (Secure Double Egress). These doors are normally locked and can be released (scheduled, card reader, or in an emergency). Connected into the Patient wandering system.

6.8.12.1(38)(a) Hinges;

6.8.12.1(38)(b) Concealed power transfer;

6.8.12.1(38)(c) Exit hardware (request to exit provided in the door hardware);

6.8.12.1(38)(d) Magnetic locks;

6.8.12.1(38)(e) Door closers;

6.8.12.1(38)(f) Door stops;

6.8.12.1(38)(g) Perimeter seals (where required);

6.8.12.1(38)(h) Thresholds (where required);

6.8.12.1(38)(i) At secure vestibules provide the ability to interlock inner and outer doors;

6.8.12.1(38)(j) Card reader;

6.8.12.1(38)(k) Doors are to be automatic swing;

6.8.12.1(38)(l) Remote three position key switch (On/Off/Hold) for operator;

6.8.12.1(38)(m) Presence/safety sensors; and

6.8.12.1(38)(n) Touch-free actuators.

6.8.12.1(39) ST-01 - Exit stairs from typical inpatient areas floors. These doors are normally locked and can be released (card reader or in 2nd stage fire alarm). Connected into the Patient wandering system as required by the Authority and described in this Schedule. Delayed egress with remote notification at Care Team Station. Always locked from the stair side.

6.8.12.1(39)(a) Hinges;

6.8.12.1(39)(b) Concealed power transfer;

6.8.12.1(39)(c) Exit hardware;

6.8.12.1(39)(d) Delayed egress;

6.8.12.1(39)(e) Door closers;

6.8.12.1(39)(f) Door stops;

6.8.12.1(39)(g) Perimeter seals (where required);

6.8.12.1(39)(h) Thresholds (where required); and

6.8.12.1(39)(i) Card reader.

6.8.12.1(40) ST-01 - Exit Only Stairs. These doors are normally locked and can be remotely released on 2nd stage fire alarm. Card reader access in direction of exiting.

6.8.12.1(40)(a) Hinges;

6.8.12.1(40)(b) Concealed power transfer;

6.8.12.1(40)(c) Exit hardware;

6.8.12.1(40)(d) Magnetic locks (contained use area);

6.8.12.1(40)(e) Door closers;

6.8.12.1(40)(f) Perimeter seals (where required); and

6.8.12.1(40)(g) Thresholds (where required).

6.8.12.1(41) ST-02 - Exit Stairs Circulation. These doors are normally locked and can be remotely released on 2nd stage fire alarm. Card reader access from both sides.

6.8.12.1(41)(a) Hinges;

6.8.12.1(41)(b) Concealed power transfer;

6.8.12.1(41)(c) Exit hardware;

6.8.12.1(41)(d) Magnetic locks (contained use area);

6.8.12.1(41)(e) Door closers;

6.8.12.1(41)(f) Door stops;

6.8.12.1(41)(g) Perimeter seals (where required); and

6.8.12.1(41)(h) Thresholds (where required).

6.8.12.1(42) ST-03 - Exit Stairs from the Maternal/Child Unit. These doors are normally locked and can be released (card reader or in 2nd stage fire alarm). Card reader access from both sides.

6.8.12.1(42)(a) Hinges;

6.8.12.1(42)(b) Concealed power transfer;

6.8.12.1(42)(c) Exit hardware;

6.8.12.1(42)(d) Magnetic lock;

6.8.12.1(42)(e) Door closers;

6.8.12.1(42)(f) Door stops;

6.8.12.1(42)(g) Perimeter seals (where required);

6.8.12.1(42)(h) Thresholds (where required); and

6.8.12.1(42)(i) Card reader (both sides).

6.8.12.2 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.

6.8.12.3 Provide Patient room, Patient washrooms, laundry facility, and consult/interview rooms with hardware that allows the doors to stay in an open position and facilitates casual observance of Patients by the Staff.

6.8.12.4 Finish doors and frames with a suitable finish that prevents dirt and fingerprint accumulation and will be easily cleaned and disinfected.

6.8.12.5 Provide glazing in doors to allow Patient observation and operational safety of the spaces they serve as follows:

6.8.12.5(1) As indicated in Appendix 3B [Minimum Room Requirements]; and

6.8.12.5(2) 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.

6.8.12.6 Provide black-out blinds and perimeter seals in doors:

6.8.12.6(1) Where rooms or spaces are described as requiring black-out function in Appendix 3A [Clinical Specifications and Functional Space Requirements];

6.8.12.6(2) Where window treatment also requires black-out functionality as described in this Schedule; and

6.8.12.6(3) As determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.12.7 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.

6.8.12.8 Design doors at mechanical, electrical, plumbing and Telecommunication Rooms to swing out 180 degrees, unless required otherwise by code.

6.8.12.9 Wicket and “door within a door” types of doors are not acceptable.

6.8.12.10 Provide doors into stairwells with glass vision panel (exit stairs and convenience stairs), as permitted by BCBC.

6.8.13 Keying

6.8.13.1 Provide factory master keyed cylinders with Schlage WTSR keyway to match Existing Hospital. Cylinders are to be construction keyed. Permanent keys will be given directly to the Authority by the manufacturer. Four (4) keys will be supplied for each lock cylinder. Install permanent cylinders prior to Substantial Completion.

6.8.13.1(1) Supply and install 6 pin WSTR Schlage keyway cylinders, (factory recorded, factory pinned). Do not supply interchangeable cores.

6.8.13.1(2) Implement a 3-level system. Master key bitting will be provided by FMO manager. New system will have sufficient room to include 50% expansion.

6.8.13.1(3) Supply four (4) keys for each lock cylinder. One (1) keyed and three (3) blank.

6.8.13.1(4) Keying groups will be assigned by the Authority.

6.8.13.1(5) New key bittings will be provided to and controlled by Authority.

6.8.13.1(6) Turn over keys from factory to the Authority.

6.8.13.1(7) Project Co will remove construction cylinders and install permanent cylinders under the direction of the Authority.

6.8.13.1(8) Provide an HPC KeKab model H-5645 key cabinet.

6.8.13.1(9) See Section 6.8.2. and Appendix 3B [Minimum Room Requirements] for additional requirements.

6.8.14 Windows

6.8.14.1 Size, configure, and adequately construct windows for areas that require daylight, views and/or natural ventilation. Refer to Access to Daylight and Views for minimum window size in certain areas.

6.8.14.2 Provide Borrowed Light deep into the Facility, either through interior windows to occupied rooms that do not have exterior windows or through other means. The intent is to borrow light to create a more comfortable and less closed-in environment that will benefit Staff and Patients alike.

6.8.14.3 Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

6.8.14.4 Framing members, mullions, and similar members to accept integral blinds to have adequate structural strength to support weight of glass and louvers. Frames are to be level, plumb, square, and in plane. Provisions are to be made in frames to receive required hardware and accessories. Integral blinds in exterior windows will be enclosed in separate cavity accessible from the inside of room for repair without the need to remove/replace the thermal unit assembly.

6.8.14.5 In Secure Rooms and Secure Anterooms, windows and integral blinds will have tamper resistant finishes, seams,

6.8.14.6 Exterior Windows

6.8.14.6(1) All exterior windows will conform to ASJRAE 90.1, complete with thermal breaks.

6.8.14.6(2) Size, configure, and adequately construct windows to suit rooms that require daylight, views and/or natural ventilation.

6.8.14.6(3) Provide window framing systems that are thermally-broken and designed based on principles of pressure equalized Rain Screen.

6.8.14.6(4) Unless a larger size of window is required to comply with other applicable requirements in this Schedule, exterior windows in Patient rooms 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. Where, due to the clinical

functionality of the room and the room is not in an Inpatient Unit, Maternal/Child Unit room or is a Secure Room, a smaller window that meets the requirements of Clauses 5.7.1.5(4)(b) and 5.7.1.4.(4)(c) can be proposed by Project Co to the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.14.6(5) The exterior window in Secure Rooms will be designed and constructed to comply with the requirements of the provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act.

6.8.14.6(5)(a) Bottom of exterior windows in Secure Rooms will be not less than 1524mm AFF.

6.8.14.6(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 3.11.

6.8.14.7 Interior Windows

6.8.14.7(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.

6.8.14.7(2) For Secure Rooms and their associated Anterooms, provide an interior window (in-door observation panel) in each door 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.

6.8.14.7(3) Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

6.8.14.7(4) Provide interior windows in all conference rooms including;

6.8.14.7(4)(a) Conference/Meeting Room.

6.8.14.7(5) The extent of glass in the conference room interior windows will be from floor to finished ceiling, and from interior wall to interior wall of the conference room facing the adjacent circulation corridor or conference room.

6.8.14.7(6) Provide roller blinds and/or privacy film on conference room interior windows for privacy as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.14.7(7) Interior and exterior window treatments for Multimedia Rooms are described in Section 7.10.15.

6.8.14.8 Security Transaction Windows

6.8.14.8(1) In addition to the glazing requirements described in the Appendix 3B [Minimum Room Requirements], Project Co will provide security glass with security transaction windows at all high-risk locations such as:

6.8.14.8(1)(a) Control-Security;

6.8.14.8(2) The transaction windows will be provided with a secure speaker hole/opening and backer system consists of custom prefabricated panels with secure air passage as required for voice transmission.

6.8.14.8(3) Provide a 38 mm thick shelf, full width of window, centered under the glazing and finished with stainless steel 18-gauge #4 finish. Design to be determined as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.15 Aluminum Curtain Walls and Aluminum Windows

6.8.15.1 Provide Architectural Grade.

6.8.15.2 Incorporate in the curtain wall framing and 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.

6.8.15.3 Provide curtain wall framing and windows that incorporate a thermal-break.

6.8.15.4 For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.15.5 Provide assemblies that resist local seismic conditions.

6.8.15.6 Provide integration with access control system.

6.8.15.7 Aluminum curtain wall will be fabricated to the following criteria:

6.8.15.7(1) Aluminium extrusions: CSA HA.5M alloy and temper 6063-T54;

6.8.15.7(2) Aluminum sheet and panels: CSA HA.4M alloy and temper suitable for their purpose and finish. Minimum thickness to be 0.060";

6.8.15.7(3) Steel sections: CAM/CSA-G40-2M;

6.8.15.7(4) Extrusions, channels, bars, rods and wire: ASTM B211 and ANSI H35.1 / H35AA6063 alloy, T6 temper; and

6.8.15.7(5) Fasteners: stainless steel.

6.8.15.8 Acceptable curtainwall will include 1600 SSG Curtain Wall System by Kawneer, US Aluminium, Alumicor Ltd. or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.15.9 Provide a 10-year warranty for the curtainwall system.

6.8.15.10 Mock-Ups

6.8.15.10(1) Approximately two weeks prior to scheduled commencement of curtainwall or window installation and associated work, convene pre-installation meeting and mock-up at the Site or at an off-premise building to be located within the Greater Vancouver Regional District as may be required by and at no expense to the Authority. Window mock-up to be attended by window installer, representative of the window manufacturer, Project Co, Architect, Authority, Building Envelope Consultant, and other representatives directly concerned with the performance of the work. Record discussions of conference and decisions and agreements or disagreements reached and furnish copy of record to each party attending.

6.8.15.10(2) Window mock-up to also include leak testing of mock-up window in accordance with ASTM E1105 – 15 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

6.8.15.10(3) Coordinate with and provide mock-up of entire exterior wall system, including cladding finishes, showing window head, sill and jamb interface conditions.

6.8.15.10(4) Submit to the Authority all building envelope test results, witnessed by the Building Envelope Consultant.

6.8.16 Clerestory

6.8.16.1(1) Roof or skylight & clerestory glazing will be provided to bring Borrowed Light into interior spaces to complement interior ambient lighting, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.16.1(2) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.16.1(3) Glazing will be designed or guarded to prevent personnel from falling through from roof level.

6.8.16.1(4) Incorporate in 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.

6.8.16.1(5) Provide skylights and clerestory windows that incorporate a thermal break.

6.8.16.1(6) Roof or skylight, & clerestory glazing may be provided where natural light is required in interior spaces to augment or complement interior ambient lighting.

6.8.16.1(7) Provide skylights & clerestory window frames that are sealed double glazed in thermally-broken, internally drained Rain Screen type extruded aluminum frames. Plastic skylights are not to be used.

6.8.16.1(8) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.16.1(9) Refer to Section 3.11 for shading devices requirements.

6.8.16.1(10) Clerestory glazing is preferred over sloped glazing.

6.8.16.1(11) Glazing slope 30° or greater is not permitted.

6.8.16.1(12) Ensure, sloped glazing and clerestory windows are fully accessible for maintenance and cleaning from the interior and exterior of the Facility without disruption to their operations.

6.8.16.1(13) Ensure air seal and water seal connections to curbs and walls will be fully accessible and will not be dependent on construction sequence.

6.8.16.1(14) Provide drainage of water entering the glazing system to the exterior under all conditions.

6.8.16.1(15) No condensation on the interior face of the glazing or framing system is allowed.

6.8.16.1(16) Provide dry glazing.

6.8.16.1(17) Skylight glazing will be protected from impact damage, such as stone drops from birds.

6.8.17 Roof Hatches

6.8.17.1(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 1220 mm x 1220 mm.

6.8.17.1(2) Roof hatches and ladder access will be permitted only for small roof areas (less than 100 sq. meters) that do not contain equipment that requires frequent maintenance.

6.8.17.1(3) Rappelling down from upper roofs to access lower roofs is not acceptable.

6.8.17.1(4) Design of roof hatches will comply with all regulatory requirements by the BC Building Code, Authority Fall Protection Program and Authority Fall Protection Requirements for Facility Design and WSBC.

6.8.18 Glass and Glazing

6.8.18.1 Glass and glazing materials and workmanship will conform to the Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines, and the Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual.

6.8.18.2 Exterior and/or interior glass and glazing may be provided as integral components of the exterior building envelope, interior partitions and screens, exterior and interior doors, handrail balustrades in public areas, skylights and decorative and ornamental glazing.

6.8.18.3 The assembly will be designed to resist local seismic conditions as a post-disaster Facility.

6.8.18.4 Laminated safety glass will be used in single- glazed skylights and entry doors, or as the inboard light of a double-glazed skylight.

6.8.18.5 Type EXT-1 and EXT-3 will comply with 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.

6.8.18.6 Exterior Glazing Types:

6.8.18.6(1) Type EXT-1: For exterior glazing in the following higher risk areas:

6.8.18.6(1)(a) Spaces freely accessed and occupied by Patients. Sightlines are required into these spaces so Patients are observed and supervised by Staff from locations including: Care Station-MH and Reception/Care Station. Examples include: Lounge-Patient, Dining/Lounge-Patient and the connecting corridors;

6.8.18.6(1)(b) Spaces freely accessed and occupied by Patients. Staff can casually observe and provide supervision, but may not have direct sightlines into these spaces from locations such as; Care Station-MH and Reception/Care Station. Examples include; Laundry Room;

6.8.18.6(1)(c) Spaces will be accessed and occupied by Patients without continuous supervision and where Patient privacy is required. Examples include; Patient Room-MH, Ensuite-MH, and Washroom-Public; and

6.8.18.6(1)(d) 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 and meet the acoustic requirements as listed in Appendix 3C: Acoustic and Noise Control Measures. Examples include; Care Station-MH and Reception/Care Station.

6.8.18.6.1.(d).1 Provide the following minimum requirements:

- (d).1.1 Exterior: 6mm clear tempered low 'E' glass;
- (d).1.2 Cavity: 12.7mm (1/2”) hermetically sealed argon filled airspace;
- (d).1.3 Interior: 9mm (7/16") glass clad polycarbonate:
  - (d).1.3.1 3mm clear heat strengthened;
  - (d).1.3.2 3mm polycarbonate; and
  - (d).1.3.3 3mm clear heat strengthened.
- (d).1.4 Security film on #6 surface;
- (d).1.5 Low ‘E’ Coating: On the #2 surface; and
- (d).1.6 Where integral blinds are required by Appendix 3B [Minimum Room Requirements], adjust cavity to suit the system.

6.8.18.6(2) Type EXT-2: For exterior glazing in the following lower risk areas:

6.8.18.6(2)(a) Spaces accessible to visitors from the exterior where no screening procedures by staff have been applied. Examples include: Waiting Area-Outside, Vestibule, and Waiting Area-Inside.

6.8.18.6(2)(b) Spaces where access for Patients is controlled by clinical Staff. Examples include; Consult Room, Exam Room, Group Therapy Room-Large.

6.8.18.6.2.(b).1 Provide the following minimum requirements:

(b).1.1 Exterior: 6mm clear tempered low 'E' glass;

(b).1.2 Cavity: 12.7mm (1/2”) hermetically sealed argon filled airspace;

(b).1.3 Interior: 6mm clear tempered laminated glass:

(b).1.3.1 3mm clear tempered;

(b).1.3.2 090 ionoplast interlayer; and

(b).1.3.3 3mm clear tempered.

(b).1.4 Low ‘E’: On the #2 surface.

6.8.18.6(3) Type EXT-3: For exterior glazing in Secure Rooms, provide the following minimum requirements:

6.8.18.6(3)(a) Exterior: 6mm clear tempered low ‘E’ glass;

6.8.18.6(3)(b) Cavity: 12.7mm (1/2”) hermetically sealed argon filled airspace;

6.8.18.6(3)(c) Interior: 9mm (7/16") glass clad polycarbonate:

6.8.18.6(3)(d) Security film on #6 surface;

6.8.18.6(3)(e) Low ‘E’ on the #2 surface;

6.8.18.6(3)(f) Where integral blinds are required by Appendix 3B [Minimum Room Requirements], adjust cavity to suit the system;

6.8.18.6(3)(g) Glass-clad polycarbonate performance:

6.8.18.6.3.(g).1 HP White HPW-TP-0500.02 Forced Entry
Level 1 (Report WJE 972491); and

6.8.18.6.3.(g).2 HP White HPW-TP-0500.02 Ballistics Level A (Report HPW 7305-09A).

6.8.18.6(3)(h) Glass-clad polycarbonate applicable standards:

6.8.18.6.3.(h).1 ASTM C 1349-04;

6.8.18.6.3.(h).2 ASTM C 1048-04; and

6.8.18.6.3.(h).3 ASTM C 1036-06.

6.8.18.7 Security film will be 3M 'ULTRA S600' or approved equal applied to the surface indicated and extend to the outer edge of the glass panel.

6.8.18.8 Interior Glazing Types:

6.8.18.8(1) Type INT-1: For interior windows, sidelights and door glazing in the following higher risk areas:

6.8.18.8(1)(a) Spaces freely accessed and occupied by Patients. Sightlines are required into these spaces, so Patients are observed and supervised by Staff from locations including: Care Station-MH and Reception/Care Station. Examples include: Lounge-Patient, Dining/Lounge-Patient and the connecting corridors;

6.8.18.8(1)(b) Spaces freely accessed and occupied by Patients. Staff can casually observe and provide supervision but may not have direct sightlines into these spaces from locations such as; Care Station-MH and Reception/Care Station. Examples include; Laundry Room; and

6.8.18.8(1)(c) 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 and meet the acoustic requirements as listed in Appendix 3C: Acoustic and Noise Control Measures. Examples include; Care Station-MH and Reception/Care Station.

6.8.18.8.1.(c).1 Provide the following minimum requirements:

(c).1.1 12mm clear tempered laminated glass:

(c).1.1.1 3mm clear tempered;

(c).1.1.2 6mm polycarbonate lexan; and

(c).1.1.3 3mm clear tempered.

6.8.18.8(2) Type INT-2: For interior windows, sidelights and door glazing in the following lower risk areas:

6.8.18.8(2)(a) Spaces accessible to visitors from the exterior where no screening procedures by Staff have been applied. Examples include; Waiting Area-Outside, Vestibule, and Waiting Area-Inside; and

6.8.18.8(2)(b) Spaces where access for Patients is controlled by clinical Staff. Examples include; Consult Room, Exam Room, Group Therapy Room-Large.

6.8.18.8.2.(b).1 Provide the following minimum requirements:

(b).1.1 12mm clear tempered laminated glass:

(b).1.1.1 6mm clear tempered;

(b).1.1.2 1.5mm PVB interlayer; and

(b).1.1.3 6mm clear tempered.

6.8.18.8(3) Type INT-3: For interior windows, sidelights and door glazing in higher risk areas, as follows:

6.8.18.8(3)(a) Spaces will be accessed and occupied by Patients without continuous supervision and where Patient privacy is required. Examples include; Patient Room-MH, Ensuite-MH, and Washroom-Public; and

6.8.18.8(3)(b) Spaces where Patients are at risk to harm themselves or others. The intent for these spaces is to confine and protect the Patient. Examples include; Secure Room, Anteroom-Secure Room and Anteroom.

6.8.18.8.3.(b).1 Provide the following minimum requirements, provide the following minimum requirements:

(b).1.1 12mm clear tempered laminated glass:

(b).1.1.1 3mm clear tempered;

(b).1.1.2 6mm polycarbonate lexan; and

(b).1.1.3 3mm clear tempered.

(b).1.2 Cavity to suit the system.

(b).1.3 12mm clear tempered laminated glass:

(b).1.3.1 3mm clear tempered;

(b).1.3.2 6mm polycarbonate lexan; and

(b).1.3.3 3mm clear tempered.

6.8.18.9 One-Way Glass

6.8.18.9(1) Provide glass to create a one-way mirror in locations described in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements].

6.8.18.9(2) Provide one-way glass which meets the following requirements:

6.8.18.9(2)(a) Creates a visual barrier between subjects and their observers while providing clear and discreet vision; and

6.8.18.9(2)(b) Provides undetected surveillance to achieve privacy;

6.8.18.9(3) Performance Requirements

6.8.18.9(3)(a) Nominal glass thickness: 6mm;

6.8.18.9(3)(b) Glass substrate: Grey;

6.8.18.9(3)(c) Visible transmittance (%): 11; and

6.8.18.9(3)(d) Visible reflectance glass side (%): 16.

6.8.18.9(4) Maintain privacy in the observing area through proper light level ratio of at least 8:1 from bright (subject) side to dark (observer) side or as otherwise required by the manufacturer.

6.8.18.10 Refer to Section 6.13.1 for lead lined glass requirements.

6.8.19 Mirrors

6.8.19.1 General Requirements

6.8.19.1(1) The size, type, quantity, locations and positioning of all mirrors to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.19.1(2) Unless otherwise noted, mirrors will consist of 6 mm thick minimum float glass with electrolytically-applied copper plating and polished edges.

6.8.19.1(3) Grind smooth and polish all exposed mirror edges.

6.8.19.1(4) Mirrors will be high quality distortion-free glass.

6.8.19.1(5) All mirrors will be installed with Tamper Resistant fasteners.

6.8.19.2 Project Co will:

6.8.19.2(1) Provide wall-mounted mirrors in all the following areas;

6.8.19.2(1)(a) Washrooms;

6.8.19.2(1)(b) Locker rooms; and

6.8.19.2(1)(c) Change rooms or cubicles.

6.8.19.2(1)(d) All Eyewash stations.

6.8.19.2(2) Provide wall-mounted posture mirrors and adjustable mirrors in all Patient Room-LDRP; Back with galvanized steel; and

6.8.19.2(3) Provide full height unframed mirrors in the General Medical/Surgical Inpatient Unit Rehabilitation Rooms.

6.8.19.3 Provide Vandal Resistant and Ligature Resistant stainless steel mirrors that are unbreakable and securely fastened to the wall and do not distort the viewer's reflection in Mental Health Areas. Angled mirrors as required.

6.8.19.4 Corridor Requirements

6.8.19.4(1) Provide Vandal Resistant convex channel framed mirrors that will consist of one-piece, stainless steel with a No. 1 quality, with minimum 6 mm thick float glass backed with electrolytically applied copper plating at all intersections, rooms and elevators where stretchers, beds, equipment or carts are traveling and across from doors where equipment exits from within the space.

6.8.19.4(2) For Corridors in Mental Health and other high-risk areas only, provide Vandal Resistant and Ligature Resistant convex mirrors made from polycarbonate with a minimum tensile strength of 9,400 psi at all intersections, rooms and elevators where stretchers, beds, equipment or carts are traveling and across from doors where equipment exits from within the space.

6.8.19.4(3) Mirror perimeter will be secured with fully enclosed heavy-duty powder coated steel frame mounted flush with the wall and ceiling and with countersunk screw holes with Tamper Resistant fasteners.

6.8.19.4(4) Provide and install an additional 10% above those planned in the design phase as directed by the Authority based on review of post-occupancy operations prior to Total Completion.

6.8.19.5 Parking Area Requirements

6.8.19.5(1) Provide Vandal Resistant convex mirrors throughout the parking levels. Locations to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.8.19.5(1)(a) Performance Requirements

6.8.19.5.1.(a).1 Channel frame mirrors will consist of one-piece, stainless steel with a No. 1 quality, with minimum 6 mm thick float glass backed with electrolytically applied copper plating.

## 6.9 Finishes (Division 9)

### 6.9.1 Basic Requirements

6.9.1.1 In areas where finishes and systems of installation will occur, and water is anticipated to be present as part of repeated cleaning or other procedures, allow water to collect and exit without causing damage to the finishes or substrate.

6.9.1.2 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.

6.9.1.3 Give priority to infection prevention and control in the selection of finishes for all Clinical Spaces, refer to Section 5.10.

6.9.1.4 Select the appearance of finishes and colours to create and promote a natural healing environment, prevent glare, and minimize artificial lighting requirements.

6.9.1.5 Select materials to promote sustainability by, for instance, having low-emissivity or comprising of renewable resources.

6.9.1.6 Select finish materials that do not use known carcinogenic material or chemicals in their manufacture or disposal. Consult the Green Guide for Healthcare.

### 6.9.2 Gypsum Board

6.9.2.1 Do not apply GWB until bucks, anchors, blocking, insulation, vapour barrier, and electrical and mechanical work, which will be concealed after GWB application, are subject to pre-boarding inspections by the Authority.

6.9.2.1(1) Project Co will use HoloBuilder or an equivalent program subject to Authority approval through the Review Procedure, to provide a 360 degree photographic record of all electrical and plumbing services and backing installed in pertinent wall assemblies. Photos will be taken prior to the installation of batt insulation, if required.

6.9.2.1(2) The HoloBuilder (or equivalent) output will be provided to the Authority to validate the as-built BIM model.

6.9.2.2 Where GWB systems are required to provide fire resistance ratings, design wall assemblies tested by fire testing laboratories acceptable to the Governmental Authority.

6.9.2.3 GWB application and finishing will be fully coordinated with the work of other trades.

6.9.2.4 MMRGWB will be used behind wet wall panel system in showers or other wet areas (areas exposed to liquids and moisture). Reinforced cementitious board or cementitious backer unit may be used as an alternative to moisture-resistant GWB. Moisture-resistant GWB will be full height and extend from wall to wall in all

areas exposed to liquids and moisture. MMRGWB will have inorganic fiberglass face and back.

6.9.2.5 Provide ARGWB and/or IRGWB where required by Appendix 3B [Minimum Room Requirements] or as otherwise indicated.

6.9.2.6 Provide IRGWB to minimum 1.2 m AFF in all corridors.

6.9.2.7 Use glass scrim exterior sheathing GWB wherever exterior GWB sheathing is required at exterior walls.

6.9.2.8 The bottom edge of GWB will be set at a minimum of 12 mm above the finished floor level, and the gap will be fully sealed.

6.9.2.9 Materials and workmanship for GWB and accessories will conform to the following:

6.9.2.9(1) AWCC Wall and Ceiling Specification Standards Manual;

6.9.2.9(2) Northwest Walls and Ceilings Bureau (NWCB) Recommended Levels for Finishing of Gypsum Board standard;

6.9.2.9(3) Applicable requirements of ASTM C754 for installation of steel framing;

6.9.2.9(4) Applicable requirements and recommendations of GA 216 Recommended Specifications for the Application and Finishing of Gypsum Board, except for more stringent requirements of manufacturer;

6.9.2.9(5) Conforming to: ASTM C1658, ASTM C1396, ASTM C1177 and ASTM C1629;

6.9.2.9(6) Soft-body impact penetration: to ASTM E695;

6.9.2.9(7) Applicable requirements and recommendations of Gypsum Association GA 216, Recommended Specifications for the Application and Finishing of Gypsum Board except for more stringent requirements of manufacturer;

6.9.2.9(8) Finish GWB in accordance with applicable requirements and recommendations of GA 214 Recommended Levels of Finish for Gypsum Board, Glass-Mat and Fiber-Reinforced Gypsum Panels, except for more stringent requirements of manufacturer;

6.9.2.9(9) Apply acoustical sealant to meet Appendix 3C [Acoustic and Noise Control Measures] in accordance with applicable requirements of ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications;

6.9.2.9(10) GWB shaft wall liner: conform to ASTM C1396, 0.25 mm minimum thickness; and

6.9.2.9(11) Cement board: conform to ANSI A118.9, 12.5 mm cementitious tile backer board. High strength Portland cement building panel with self-adhesive glass tape.

6.9.2.10 Acceptable Products and Materials

6.9.2.10(1) GWB and Accessories: Listed products establish standard of quality and are manufactured by CGC Inc. Mississauga, Ontario or United States Gypsum Company (USG), Chicago, IL.

6.9.2.10(2) Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by CGC Inc. Mississauga, Ontario or United States Gypsum Company (USG), Chicago, IL.

6.9.2.10(3) Design for each type of GWB and related products is based on CGC Inc. products named. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

6.9.2.10(3)(a) GWB: ASTM C1396/C1396M

6.9.2.10.3.(a).1 Thickness: 15.9 mm (5/8'')

6.9.2.10.3.(a).2 Long edges: Tapered

6.9.2.10(3)(b) GWB, Type X: ASTM C1396/C1396M

6.9.2.10.3.(b).1 Thickness: 15.9 mm (5/8'') Type X, 15.9 mm (5/8'') Type C

6.9.2.10.3.(b).2 Long edges: Tapered

6.9.2.10(3)(c) Gypsum Ceiling Board: ASTM C1396/C1396M

6.9.2.10.3.(c).1 Thickness: 15.9 mm (5/8'')

6.9.2.10.3.(c).2 Long edges: Eased or tapered

6.9.2.10(3)(d) ARGWB: ASTM C1629/C1629M. Within ASTM C1629, scores a Level 1 for Hard Body Impact

6.9.2.10.3.(d).1 Thickness: 15.9 mm (5/8")

6.9.2.10.3.(d).2 Long edges: Tapered

6.9.2.10.3.(d).3 Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance

to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.2.10(3)(e) IRGWB: ASTM C1629/C1629M. Within ASTM C1629, scores a Level 2 for Hard Body Impact

6.9.2.10.3.(e).1 Thickness: 15.9 mm (5/8'')

6.9.2.10.3.(e).2 Long edges: Tapered

6.9.2.10.3.(e).3 Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.2.10(3)(f) MMRGWB ASTM C1658/C1658M. With moisture and mould-resistant core and fiberglass facers

6.9.2.10.3.(f).1 Thickness: 15.9 mm (5/8'') Type X

6.9.2.10.3.(f).2 Long edges: Tapered

6.9.2.10.3.(f).3 Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score 10

6.9.2.10(3)(g) Shaftwall systems

6.9.2.10.3.(g).1 Liner boards: ASTM C1658, with fiberglass mat laminated to both sides

6.9.2.10.3.(g).2 Thickness: 25.4 mm (1'')

6.9.2.10.3.(g).3 Edges: Double beveled

6.9.2.10.3.(g).4 Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.2.10(3)(h) Exterior GWB for ceilings and soffits

6.9.2.10.3.(h).1 Glass-mat gypsum sheathing board: ASTM C1177, with fiberglass mat laminated to both sides and with manufacturer's standard edges. This panel can be used for exterior ceilings and soffit applications

6.9.2.10.3.(h).2 Thickness: 15.9 mm (5/8'') Type X

6.9.2.10.3.(h).3 Edges: Square

6.9.2.10.3.(h).4 Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.2.10(3)(i) Tile backing panels

6.9.2.10.3.(i).1 Glass-mat, water-resistant backing board: ASTM C1178/C1178M, with manufacturer's standard edges

6.9.2.10.3.(i).2 Thickness: 15.9 mm (5/8'') Type X

6.9.2.10.3.(i).3 Long edges: Tapered

6.9.2.10.3.(i).4 Mould resistance: When tested in accordance with ASTM D3273, Standard

6.9.2.10.3.(i).5 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.2.10(3)(j) Cementitious backer units: ANSI A118.9 and ASTM C1325, with manufacturer's standard edges

6.9.2.10.3.(j).1 Thickness: 15.9 mm (5/8'')

6.9.2.10.3.(j).2 Edges: Tapered glass mat surfaced gypsum sheathing board will be used wherever exterior gypsum sheathing is required at exterior walls.

6.9.2.11 Fasteners

6.9.2.11(1) Fasteners for GWB: with corrosion resistant finish to ASTM C1002-01/ASTM C954 -04.

6.9.2.11(2) For cement board: with corrosion resistant polymer finish.

6.9.2.11(3) 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.

6.9.3 Acceptable Products and Materials

6.9.3.1 GWB and Accessories: Requirements set out below establish standard of quality.

6.9.3.1(1) GWB: ASTM C1396 / C1396M

6.9.3.1(1)(a) Thickness: 15.9 mm (5/8'')

6.9.3.1(1)(b) Long edges: Tapered

6.9.3.1(2) GWB, Type X: ASTM C1396 / C1396M

6.9.3.1(2)(a) Thickness: 15.9 mm Type X, 15.9 mm Type C

6.9.3.1(2)(b) Long edges: Tapered

6.9.3.1(3) GWB Ceiling: ASTM C1396 / C1396M

6.9.3.1(3)(a) Thickness:15.9 mm (5/8'')

6.9.3.1(3)(b) Long edges: Eased or tapered

6.9.3.1(4) Abuse-Resistant GWB: ASTM C1629 / C1629M. Within ASTM C1629, scores a Level 1 for Hard Body Impact

6.9.3.1(4)(a) Thickness: 15.9 mm

6.9.3.1(4)(b) Long edges: Tapered

6.9.3.1(4)(c) Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.3.1(5) Impact-Resistant GWB: ASTM C1629 / C1629M. Within ASTM C1629, scores a Level 2 for Hard Body Impact

6.9.3.1(5)(a) Thickness: 15.9 mm

6.9.3.1(5)(b) Long edges: Tapered

6.9.3.1(5)(c) Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.3.1(6) MMRGWB: ASTM C1658 / C1658M. With moisture and mould-resistant core and fibreglass facers

6.9.3.1(6)(a) Thickness: 15.9 mm (5/8”) Type X

6.9.3.1(6)(b) Long edges: Tapered

6.9.3.1(6)(c) Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score 10

6.9.3.1(7) Shaft wall systems

6.9.3.1(7)(a) Liner boards: ASTM C1658, with fibreglass mat laminated to both sides

6.9.3.1(7)(b) Thickness: 25.4 mm

6.9.3.1(7)(c) Edges: Double beveled

6.9.3.1(7)(d) Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.3.1(8) Exterior GWB for ceilings and soffits

6.9.3.1(8)(a) Glass-mat gypsum sheathing board: ASTM C1177, with fibreglass mat laminated to both sides and with manufacturer's standard edges. This panel can be used for exterior ceilings and soffit applications

6.9.3.1(8)(b) Thickness: 15.9 mm (5/8”) Type X

6.9.3.1(8)(c) Edges: Square

6.9.3.1(8)(d) Mould resistance: When tested in accordance with ASTM D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.3.1(9) Tile backing panels

6.9.3.1(9)(a) Glass-mat, water-resistant backing board: ASTM C1178/C1178M, with manufacturer's standard edges

6.9.3.1(9)(b) Thickness: 15.9 mm Type X

6.9.3.1(9)(c) Edges: Tapered

6.9.3.1(9)(d) Mould resistance: When tested in accordance with ASTM D3273, Standard

6.9.3.1(9)(e) Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, the panels score a 10

6.9.3.1(9)(f) Cementitious backer units: ANSI A118.9 and ASTM C1325, with manufacturer's standard edges

6.9.3.1(9)(g) Thickness: 12.7 mm

6.9.3.1(9)(h) Edges: Tapered glass-mat surfaced GWB sheathing will be used wherever exterior GWB sheathing is required at exterior walls

6.9.3.2 Ceilings

6.9.3.2(1) Ceiling finish for infection control purposes will comply with Section 5.10 and CSA Z8000-18, Section 12.2.5.4 Ceilings, including the requirements as defined for semi-restricted and restricted areas.

6.9.3.2(2) Architectural Ceilings

6.9.3.2(2)(a) Architectural ceilings will consist of decorative SACT, wood linear ceiling system or other architectural elements including lighting and GWB bulkheads as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.3.2(2)(b) Architectural ceilings will be used in the following areas:

6.9.3.2.2.(b).1 At public passenger elevator lobbies;

6.9.3.2.2.(b).2 I1.1 Main Entrance Lobby;

6.9.3.2.2.(b).3 L2.1.1 Reception;

6.9.3.2.2.(b).4 Foundation Reception Area;

6.9.3.2.2.(b).5 Foundation Donor Lounge and;

6.9.3.2.2.(b).6 L2.1.3 Lounge-Donor.

6.9.3.2(3) Acoustic tiles: Non-directional, fissured pattern, white ceiling panel, trim edge detail square to fit a standard T-bar grid panel size.

6.9.3.2(4) Install SACT in the suspension system to provide reverberation control (NRC rating) and sound isolation (CAC rating) as required to suit the intended function of the room. The minimum NRC rating and CAC will be 0.70 and 35, respectively, except for in the following conditions:

6.9.3.2(4)(a) Where washable tiles are required to meet infection control requirements set out in Section 5.10, provide minimum NRC 0.50; and

6.9.3.2(4)(b) For Multimedia Rooms provide minimum NRC 0.90 (CAC not applicable).

6.9.3.2(5) Provide minimum 600mm x 600mm accessibility to the ceiling spaces where access is required for maintenance to mechanical, electrical or other service systems.

6.9.3.2(6) Provide SACT for the normal occupancy condition range of 15°C–29°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.

6.9.3.2(7) In areas where SACT panels will be frequently removed for plenum access such as corridors, provide acoustic tiles with excellent resistance to surface scratching, scuffing or chipping in accordance with Hess Rake Test.

6.9.3.2(8) SACT in all food preparation and food storage areas such as Alcove, Dirty Tray Cart, Food Service – Pantry, and Alcove, Family Nourishment will be washable. Provide wash resistance without compromising panel finish integrity, using a washability tester in accordance with ATSM D4828 Standard Test Methods for Practical Washability of Organic Coatings.

6.9.3.2(9) Where required in restricted or semi restricted areas use SACT system that is monolithic, gasketed. Perforated or highly textured tiles will not be used in these areas.

6.9.3.2(10) GWB Ceilings

6.9.3.2(10)(a) Construct GWB ceilings of 16 mm GWB where fire rating is not required. In fire rated rooms the GWB will be fire rated and the thickness of the GWB is to be determined by the rating required by BCBC. Finish GWB ceilings in

accordance with the paint specifications outlined in Section 6.9.6.

6.9.3.2(10)(b) Provide GWB ceilings as indicated in Appendix 3B [Minimum Room Requirements], including the following:

6.9.3.2.10.(b).1 Areas where infection prevention and control are required in accordance with Section 5.10 and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.3.2(10)(c) Provide ARGWB and IRGWB ceilings as set out in Appendix 3B [Minimum Room Requirements].

6.9.3.2(10)(d) Pre-finished metal access hatch will match adjacent ceiling colour.

6.9.3.2(11) Suspended ceiling components: Provide either traditional framed suspension system components or manufactured direct-hung grid suspension system as set out below:

6.9.3.2(11)(a) Grid Suspension Assemblies:

6.9.3.2.11.(a).1 Tie wire: ASTM A641 / A641M
- (a).1.1.1 Diameter: minimum 1.291 mm;
- (a).1.1.2 Coating: Class 1 zinc; and
- (a).1.1.3 Temper: soft.

(a).1.2 Wire hangers: ASTM A641 / A641M
- (a).1.2.1 Diameter: minimum 3.26 mm;
- (a).1.2.2 Coating: Class 1 galvanized; and
- (a).1.2.3 Temper: soft.

(a).1.3 Furring anchorages: ASTM C754
- (a).1.3.1 Diameter: minimum 1.291 mm;
- (a).1.3.2 Coating: galvanized; and
- (a).1.3.3 Standard bolts, nails or screws.

(a).1.4 Hanger attachments:
- (a).1.4.1 Cast-in-place concrete anchors: fabricated from corrosion-resistant materials with holes or loops for attaching wire

hangers and capable of sustaining, without failure, a load equal to five (5) times that imposed by construction as determined by testing in accordance with ASTM E488 by an independent testing agency;

(a).1.4.2 Composite deck anchors: “X-CW Ceiling Wire Assembly” by Hilti or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

(a).1.4.3 Attachment to structural steel components: comply with ASTM C754.

(a).1.5 Carrying channels: ASTM C645, cold-rolled commercial-grade streel.

(a).1.5.1 Minimum base metal thickness: 0.455 mm, not painted;

(a).1.5.2 GWB thickness: 0.836 mm (white);

(a).1.5.3 Cement board thickness: 1.367 mm (green);

(a).1.5.4 Dimensions of primary carrying member in suspended ceilings and of horizontal stiffeners or bracing in metal stud systems: 38 mm in height with 19 mm flanges.

6.9.3.2(11)(b) Grid Suspension System for Ceilings:

6.9.3.2.11.(b).1 ASTM C645-compliant direct-hung system composed of commercial-quality, cold-rolled steel main beams and cross-furring members that interlock with the following characteristics:

(b).1.1.1 Main tees: fire-rated heavy-duty classification with integral reversible splice with knurled face;

(b).1.1.2 Cross members: fire-rated members with knurled face;

(b).1.1.3 Cross tees: 38 mm in height by 1220 mm nominal in length with 38 mm face;

(b).1.1.4 Accessory cross tees: complete with knurled faces;

(b).1.1.5 Wall mouldings: single web with knurled face;

(b).1.1.6 Accessories: transition clips, splice clips, wall attachment clips, splice plates and dome hubs for specific applications; and

(b).1.1.7 Finish: hot-dip galvanized.

6.9.3.2(12) Wood linear ceiling will be real wood. MDF, fibreboard or particle board core is not permitted and will not be open to the plenum.

6.9.4 Ceramic Tilework

6.9.4.1 Ceramic tilework will comply with all applicable standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

6.9.4.2 For installations on wet and exterior surfaces, use floor tiles that have the following dynamic coefficients of friction (DCOF) in accordance with ANSI A137.1 American National Standard Specifications for Ceramic Tile:

6.9.4.2(1) 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.

6.9.4.2(2) 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.

6.9.4.2(3) Ramp surfaces interior and exterior: Not less than 0.65 wet and dry conditions.

6.9.4.3 For exterior installations, provide frost-resistant exterior tiles with a moisture absorption rating of 3.0% or less.

6.9.4.4 Provide a waterproof membrane under ceramic floor and wall tile in wet areas. The membrane will be trowel-applied, built-up, liquid-applied or sheet-applied.

6.9.4.5 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.

6.9.4.6 Set ceramic tile with latex modified mortar and grout with epoxy grout.

6.9.4.7 Only use ceramic tilework in public areas as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.5 Ceilings

6.9.5.1 Ceiling reflectance will complement the lighting design.

6.9.5.2 Provide ceiling material as described in Appendix 3B [Minimum Room Requirements].

6.9.5.3 All ceiling systems and ceiling finishes will comply with the following:

6.9.5.3(1) Fire and smoke separation and fire resistance ratings will conform to the requirements of the BCBC;

6.9.5.3(2) Suspended ceilings will comply with seismic resistance as required by BCBC; and

6.9.5.3(3) Equivalent standards to the Specification Standards Manual as published by the Association of Wall and Ceiling Contractors of BC (AWCC).

6.9.5.4 Suspended Acoustic Ceiling Tile

6.9.5.4(1) SACT will be permitted in areas stated in Appendix 3B [Minimum Room Requirements].

6.9.5.4(2) SACT will be 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.

6.9.5.4(3) Provide the levels of sound attenuation required to suit the intended function of the room and as set out in Appendix 3C [Acoustic and Noise Control Measures].

6.9.5.4(4) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.9.5.4(5) 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.

6.9.5.4(6) 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.

6.9.5.4(7) Use tiles with scratch-resistant surfaces in any area where lay-in ceiling panels frequently need to be removed for plenum access.

6.9.5.5 Suspended Security Acoustic Ceiling Tile

6.9.5.5(1) Provide SSACT to meeting the following requirements:

6.9.5.5(1)(a) Tamper Resistant;

6.9.5.5(1)(b) 18-gauge galvanized steel panels;

6.9.5.5(1)(c) Point load tested to withstand up to 850 lbs and a minimum of 430 lbs;

6.9.5.5(1)(d) Concealed locking;

6.9.5.5(1)(e) Durable, washable, scrubbable, soil resistant, impact resistant;

6.9.5.5(1)(f) NRC (0.80) with perforated panels and acoustical infill;

6.9.5.5(1)(g) Sound blocking (CAC) up to 38;

6.9.5.5(1)(h) Light reflectance up to 77%;

6.9.5.5(1)(i) Fire performance: Class A (FM), Class A (UL);

6.9.5.5(1)(j) Installs on heavy-duty suspension system. System capable of withstanding 600 impacts with 200 foot-pounds of energy. Screw-in point load plank system tested to withstand 960 - 3,100 lbs of force; and

6.9.5.5(1)(k) Acceptable product will be Armstrong SecureLock or equal approved by with the Authority through the Review Procedure and user consultation review process.

6.9.5.6 GWB Ceilings

6.9.5.6(1) Provide GWB ceilings as described in Appendix 3B [Minimum Room Requirements].

6.9.5.6(2) In Secure Rooms:

6.9.5.6(2)(a) Ceiling Design will prevent Patients from being able to hide items in the ceiling or tamper with fixtures, even if standing on the toilet fixture or other fixed Furniture;

6.9.5.6(2)(b) Ceiling fixtures will not be within reach of a Patient standing on toilet or other fixed Furniture; and

6.9.5.6(2)(c) Provide ceilings that comply with the requirements of the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act.

6.9.5.7 Access Panels

6.9.5.7(1) Where GWB ceilings are used, provide min. 610mm x 610mm access panels to allow for mechanical and electrical servicing in the ceiling. Access panels to be located where Serviceable items above the ceiling will be reachable by maintenance Staff without entering ceiling space.

6.9.5.7(2) All access panels located on corridor walls in public and Patient accessible areas will be lockable and consistent in form, material, and detail with the rest of the adjacent corridor materials and finishes. Locks will be on the building master key system.

6.9.5.7(3) For the rooms and spaces described in Appendix 3A [Clinical Specifications and Functional Space Requirements] provide Vandal Resistant and Ligature Resistant access panels as required in the following:

6.9.5.7(3)(a) Spaces freely accessed and occupied by Patients. Sightlines are required into these spaces so Patients are observed and supervised by Staff from locations including: Care Station-MH and Reception/Care Station. Examples include: Lounge-Patient, Dining/Lounge-Patient and the connecting corridors;

6.9.5.7(3)(b) Spaces freely accessed and occupied by Patients. Staff can casually observe and provide supervision, but may not have direct sightlines into these spaces from locations such as; Care Station-MH and Reception/Care Station. Examples include; Laundry Room;

6.9.5.7(3)(c) Spaces will be accessed and occupied by Patients without continuous supervision and where Patient privacy is required. Examples include; Patient Room-MH, Ensuite-MH, and Washroom-Public;

6.9.5.7(3)(d) Spaces where access for Patients is controlled by clinical Staff. Examples include; Consult Room, Exam Room, Group Therapy Room-Large;

6.9.5.7(3)(e) Spaces will be accessed and occupied by Patients without continuous supervision and where Patient privacy is required. Examples include; Patient Room-MH, Ensuite-MH, and Washroom-Public; and

6.9.5.7(3)(f) Spaces where Patients are at risk to harm themselves or others. The intent for these spaces is to confine and protect the Patient. Examples include; Secure Room, Anteroom-Secure Room and Anteroom.

6.9.5.7(4) Project Co will provide Vandal Resistant and Ligature Resistant access panels in other areas such as corridors and other spaces not described in Appendix 3A [Clinical Specifications and Functional Space Requirements] as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.5.7(5) Ceiling access will be provided at maximum 2.0 m between openings.

6.9.5.8 Modular Ceiling Plates

6.9.5.8(1) For areas in MDRD as described in Appendix 3A [Clinical Specifications and Functional Space Requirements] as requiring modular ceiling plates, provide the following:

6.9.5.8(1)(a) Purpose built, dedicated modular ceiling plate panel above each workstation or packaging table;

6.9.5.8(1)(b) Each will be designed such that the cables and cords used do not impact circulation between workstations or span and drape between workstations;

6.9.5.8(1)(c) Medical gases above each workstation in the quantities described in this Schedule and Appendix 3B [Minimum Room Requirements]; and

6.9.5.8(1)(d) Power and data above each workstation in the quantities described in this Schedule.

6.9.5.8(1)(e) Modular ceiling plates will be sealed properly in order not to compromise space pressurization.

6.9.5.8(2) Ceiling plates will be stainless steel and sized to suit the T-bar grid panel size.

6.9.5.9 Secure Room

6.9.5.9(1) Floor will have a gradual slope to a floor drain in order to facilitate cleaning while ensuring that the Patient can lie relatively flat.

6.9.5.9(2) Floor will be constructed to comply with the requirements of the Provincial Quality, Health and Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act.

6.9.5.9(3) Floor finish will be resistant to damage and composed of a material that provides cushioning to decrease the risk of injury to the Patient in the event of body slamming or falling onto the floor.

6.9.6 Painting and Protective Coatings

6.9.6.1 Comply with LEED requirements for Low Emitting Materials Paints and Coatings. In particular:

6.9.6.1(1) architectural paints, coatings and primers: zero voc;

6.9.6.1(2) anti-corrosive and anti-rust: low voc; and

6.9.6.1(3) clear wood finishes, floor coatings, stains and shellacs: zero VOC.

6.9.6.1(4) The preferred paint manufacturer will be Benjamin Moore UltraSpec Scuff-X Interior Latex or equivalent as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.6.2 All paint materials to be rated under the Environmental Notation System (NTS) with acceptable VOC ranges as listed in the MPI Approved Products List under E ranges.

6.9.6.3 Use only materials having a minimum MPI 'Environmentally Friendly' E2 rating based on VOC (EPA Method 24) content levels.

6.9.6.4 One part water based epoxy paints will provide ease of maintenance, good chemical and abrasion resistance with long term durability in high traffic areas.

6.9.6.4(1) One part water based epoxy paints will be used in high traffic areas including Main Entrance, reception, waiting rooms, washrooms, care team stations, public corridors, lounge, clean supply rooms, patient ensuite, housekeeping rooms and in locations that will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]

6.9.6.5 If seamless epoxy wall coatings are used, provide a two component, high solids, zero or low VOC, solvent free, epoxy glaze wall coating that will be seamless, abrasion and chemical resistant, and UV resistant. Coatings will have been tested in accordance with ASTM D1308-Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

6.9.6.5(1) Two component epoxy coatings will be used in areas or rooms which requires high resistance to chemical or abrasive damage, where wall finishes will be free of fissures, open joints, or crevices that can retain or permit passage of dirt particles,

6.9.6.5(2) Rooms/areas include all operating rooms, airborne isolation rooms, MDRD (with the exception of administration areas), laboratories, exam rooms and procedure rooms in Emergency Department, Perioperative Services, Maternal/Child Unit and in locations that will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]

6.9.6.6 Walls, doors and shelving

6.9.6.6(1) Use eggshell enamel or epoxy paint (refer Clause 6.9.6.4 and Clause 6.9.6.5) for all walls and semi-gloss for painted shelving.

6.9.6.7 Door frames and metal doors

6.9.6.7(1) Use semi-gloss enamel or epoxy paint (where applies) for all door frames and metal doors.

6.9.6.8 Wood finish doors

6.9.6.8(1) All wood doors will be factory finished. Brush or roller application is not accepted;

6.9.6.8(2) Use semi-gloss clear coat interior varnish for all wood finish doors, applied with brush, roller or spray;

6.9.6.8(3) Seal all edges of wood doors with 2 coats semi-gloss varnish.

6.9.6.9 Paint Grade Doors

6.9.6.9(1) Use semi-gloss enamel or epoxy paint (where applies) for all paint grade doors and frames.

6.9.6.10 Ceilings

6.9.6.10(1) Use eggshell paint for all ceilings.

6.9.6.11 Floors, concrete

6.9.6.11(1) Use a two-component (base component A, curing agent B); and

6.9.6.11(2) Use a primer if part of coating system.

6.9.6.12 Floors, parking

6.9.6.12(1) Provide 50mm asphaltic wear layer over a rubberized asphalt waterproofing membrane. The waterproofing membrane will be fabric reinforced.

6.9.6.12(2) Provide additional strengthening of the asphalt wear layer at high wear areas such as corners and braking/acceleration points. Additional asphalt wear layer thickness will be provided to support the appropriate design loads from the anticipated vehicles.

Provide 50mm asphaltic wear layer waterproofing membrane.

6.9.6.13 Paint Patient care areas with an eggshell finish for wall and semi-gloss enamel for doors, door frames, painted shelving and other paint grade trim or woodwork.

6.9.6.14 Paint all exposed conduit and services in the parking level, and any electrical panelboards in Facility corridors. Electrical panels must be powder coated or electrostatically painted in specific colours to identify the power type.

6.9.6.14(1) Paint to match the adjoining surface for finished appearance.

6.9.6.15 Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) Architectural Painting Specification Manual. Provide the MPI Accredited Quality Assurance Association's two (2) year guarantee or a 100 percent two (2) year maintenance bond in accordance with MPI Painting Manual requirements. Maintenance bond to warrant that painting work has been performed in accordance with MPI Manual requirements.

6.9.6.16 Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

6.9.6.17 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.

6.9.6.18 Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

6.9.6.19 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.

6.9.6.20 Use interior paint materials of a quality to withstand regular or repeated cleaning with hospital grade disinfectants as the function of the area dictates.

6.9.6.21 Paint paint-grade wood doors and frames with a contrasting colour from walls in consideration of the visually impaired.

6.9.6.22 Do not use materials containing lead and mercury.

6.9.6.23 To be included to all O&M manuals, provide two (2) sets of paint colour drawdowns complete with tint codes for all paints assembled in 3-ring binders, identifying all areas where each colour was used.

6.9.7 Vinyl Acrylic Wall Covering

6.9.7.1 If vinyl/acrylic wall covering is used, provide vinyl/acrylic high impact rigid sheet suede texture, minimum 1.5mm (0.060") thickness with chemical and stain resistance to ASTM D543 with colour-matched vinyl/acrylic trim for joint/transitions.

6.9.7.2 Furnish complete packaged system containing all trims including top caps, inside corners, etc. and all primers and adhesive. Use water-based and non-hazardous primer and adhesive materials.

6.9.7.3 Dry Erase Wall Covering

6.9.7.3(1) Provide pigmented gloss vinyl wall covering presentation surfaces utilizing dry erase markers, including 0.61 kg/sq.m, non-woven backing, in backing, in Type 1 and Type 2 Multimedia Rooms, and Care Team Stations as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.7.3(2) Provide trim and other accessories including: wall covering trim of anodized aluminum, low profile trim, tray/storage for writing utensils, low odor dry erase markers (set of 4 colours), eraser, magnets, clearer and towels.

6.9.7.4 Wall Coverings in Food Services Areas

6.9.7.4(1) Wall covering in the Production Kitchen will be comprised of extruded semi-rigid PVCu sheets that create a heat-formable hygienic wall system that reduces the growth of harmful bacteria and microorganisms. Provide welded seams to prevent water and mould penetration. When integrated with a coved flooring system, wall covering will overlap the coved flooring system by a minimum 50mm (2") to create an impervious and water tight solution.

6.9.7.4(2) Wall covering in Nutrition Centres will be comprised of extruded semi-rigid PVCu sheets that create a heat-formable hygienic wall system that reduces the growth of harmful bacteria and microorganisms as for the production kitchen.

6.9.7.5 Padded Surfaces

6.9.7.5(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.

6.9.7.5(2) Door padding panels extending to the floor will be composed of a padded material system adhered to a 19-mm thick fire-resistant plywood backing board. OSB is not permitted.

6.9.7.5(3) Provide openings in door padding for glazed observation openings.

6.9.7.5(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.

6.9.7.6 Solid Surface wet wall/ceiling panel system

6.9.7.6(1) Provide in all showers of the Facility 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. Panels will extend a minimum 600mm past the spray area of the shower or the next logical wall junction. Extend flashing cove material minimum 50mm behind wall panel.

6.9.7.6(2) The minimum nominal thickness of the panel system will be 12 mm.

6.9.7.6(3) All panel seams and corners will be bonded with the manufacturer's approved products. Use manufacturer's wall substrate type and preparation of wall substrate type and preparation of wall substrate for adhering panels. Silicone sealant and other types of caulking are not permissible. Any deviations from manufacturer's installation methods and/or materials must be approved by the Authority through the Review Procedure.

6.9.7.7 Fibre Reinforced Laminates

6.9.7.7(1) Provide Fibre Reinforced Laminates (FRL) at locations as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] and conforming to the following:

6.9.7.7(1)(a) ASTM D5319 - Standard Specification for Glass-Fibre Reinforced Polyester Wall and Ceiling Panels;

6.9.7.7.1.(a).1 Thickness: 2.29mm (0.090") nominal;

6.9.7.7.1.(a).2 Width: 1220mm (4'-0") nominal;

6.9.7.7.1.(a).3 Length: As per design;

6.9.7.7(1)(b) Surface burning characteristics: ULC-S102 Class A;

6.9.7.7(1)(c) Sustainability, Indoor Air Quality: GREENGUARD Gold Certification;

6.9.7.7(1)(d) Chemical resistance compliant with SEFA 8 requirements;

6.9.7.7(1)(e) ASTM D 2583 - Barcol Hardness (scratch resistance): 35 55;

6.9.7.7(1)(f) ASTM D790 – Flexural Strength & Flexural Modulus;

6.9.7.7.1.(f).1 Flexural Strength: 7.0 kilogram-force/square millimeter;

6.9.7.7.1.(f).2 Flexural Modulus: 217.9 kilogram-force/square millimeter;

6.9.7.7(1)(g) ASTM D 638: Tensile Strength & Tensile Modulus;

6.9.7.7.1.(g).1 Tensile Strength: 4.9 kilogram-force/square millimeter;

6.9.7.7.1.(g).2 Tensile Modulus: 112.5 kilogram-force/square millimeter;

6.9.7.7(1)(h) ASTM D 256 Izod Impact Strength: 72 ft. lbs/in;

6.9.7.7(1)(i) ASTM D 570 - Water absorption: 0.72%.

6.9.7.7(1)(j) Use manufacturer specific trim details for joints. If caulking is required, use manufacturer supplied and/or specified caulking product or as approved in consultation with the Authority.

6.9.7.7(2) Use anodized aluminium trim molding profiles from same manufacturer for appropriate laminate thickness;

6.9.7.7(3) Use construction adhesives complying with ASTM C 557 and approved by manufacturer.

6.9.8 Flooring

6.9.8.1 Basic Requirements

6.9.8.1(1) Provide flooring that conforms with LEED Indoor Environmental Quality credit for Low Emitting Materials.

6.9.8.1(2) Use adhesive for resilient flooring that meets or exceeds the United States Environmental Protection Agency (EPA) Standards for acceptable VOC concentration and emission rates. Use water-

soluble, low-odour flooring adhesive, of types recommended by flooring manufacturer.

6.9.8.1(3) Provide flooring and floor finishes to meet the infection control requirements set out in Section 5.10. Do not use carpet or carpet tile products for flooring in the Facility other than to meet the requirements for multimedia rooms as set out in Section 7.10.15. Project Co is responsible to ensure that the materials used in the Facility are endorsed by the Infection Control Practitioner.

6.9.8.1(4) All preparation, materials, and workmanship will be in strict accordance with NFCA requirements and material manufacturer's written recommendations and detail requirements for conditions of work that apply, and guarantee / warranty periods noted herein. Comply with the NFCA Specification Standards Manual.

6.9.8.1(5) Any preparation, materials, and workmanship that do not meet NFCA requirements will be repaired or replaced in accordance with Quality Assurance requirements at no additional cost to the Authority.

6.9.8.1(6) Use heavy-duty materials for flooring on which wheeled, or service vehicle traffic is anticipated, and to which wear and damage may result.

6.9.8.1(7) Use permanent, heavy-duty integral materials for flooring in areas subject to moisture and heat over extended periods of time.

6.9.8.1(8) Use suitable flooring in Patient and Staff areas where cart traffic is expected or where cleaning on a regular basis is necessary.

6.9.8.1(9) Refer to Section 6.9.8.2 for Food Services flooring requirements.

6.9.8.1(10) Provide sloped transitions along joints between flooring materials of different thickness.

6.9.8.2 Performance Requirements

6.9.8.2(1) All Work will be done under the Quality Assurance (QA) Program and will be reviewed in strict accordance with NFCA QA requirements by a qualified inspection agency assigned by the Provincial Floor Covering Trade Association having jurisdiction.

6.9.8.2(1)(a) All floors will be buffed before handing over to the Authority.

6.9.8.2(1)(b) Provide training to Staff designated by the Authority regarding care and cleaning of flooring.

6.9.8.2(2) Vinyl Resilient Flooring

6.9.8.2(2)(a) Provide slip resistant homogeneous single layered, vinyl flooring to meet the following certification and classifications:

6.9.8.2.2.(a).1 Type I

6.9.8.2.2.(a).2 Commercial: 34

6.9.8.2.2.(a).3 Industrial: 43

6.9.8.2(2)(b) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms. Heat weld all seams. Provide a minimum 150 mm high integral cove base that extends minimum 50 mm up behind the wall finish at all locations.

6.9.8.2(2)(c) Provide slip-resistant flooring with a minimum DCOF AcuTest of 0.42 on level surfaces and 0.8 on ramps.

6.9.8.2(2)(d) If linoleum sheet flooring is used, provide with a homogenous core of primarily natural materials, consisting of linseed oil, wood flour, and resin binders mixed and calendared onto a natural jute backing. Weld all seams. Provide a minimum 150 mm high integral cove base at all locations. Linoleum sheet flooring will only be used as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.2(2)(e) Do not use products that require a sealer or wax. Finish flooring with high speed buffing in accordance with manufacturer's specification.

6.9.8.2(2)(f) Heat weld all seam joints.

6.9.8.2(2)(g) Provide anti-reflective finish.

6.9.8.2(2)(h) Ensure an Impact Sound Reduction of 6db when tested in accordance with ISO 717-2.e.

6.9.8.2(2)(i) Will have Group T wear rating in accordance with European Standard EN 660.

6.9.8.2(3) Rubber Resilient Flooring

6.9.8.2(3)(a) Provide 3.0-mm thick smooth homogeneous rubber flooring with vulcanized rubber compound and environmentally compatible colour pigments that are free of toxic heavy metals like lead, cadmium or mercury.

6.9.8.2(3)(b) Provide rubber flooring solid cushioned sheet or tile formulated with 100% virgin elastomers, reinforcing agents, soil-resisting agents, and migrating waxes compounded to create durability, routine cleaning characteristics, and slip resistance. Stud designs will have chamfered edges with a sharply-defined edge at the top to ensure higher slip resistance, routine cleaning, maintenance and low vibration.

6.9.8.2(3)(c) Rubber flooring will meet or exceed the following minimum technical requirements:

6.9.8.2.3.(c).1 Static Load Limit: ASTM F970, Residual compression of 0.003” with 800 lbs. achieved, ≤ 0.005” with 250 lbs. is required;

6.9.8.2.3.(c).2 Provide slip-resistant flooring with a minimum DCOF AcuTest of 0.42 on level surfaces and 0.8 on ramps;

6.9.8.2.3.(c).3 Flammability: ASTM E648; NFPA 253; NBSIR 75 950, 1.03 achieved, ≥ 0.45 watts/sq. cm for Class 1 is required;

6.9.8.2.3.(c).4 Smoke Density: ASTM E662; NFPA 258; NBS, 376 (flaming) and 256 (non-flaming) achieved, < 450 is required;

6.9.8.2.3.(c).5 Bacteria Resistance: ASTM E2180 and ASTM G21, resistant to bacteria, fungi, and micro-organism activity;

6.9.8.2.3.(c).6 Provide rubber flooring that meets LEED General Emissions Evaluation for Flooring;

6.9.8.2.3.(c).7 Sound Absorption: ASTM E2179 Δ IIC 11, ISO 140 Δ Lw 8 dB;

6.9.8.2.3.(c).8 Acceptable Products include; Massetto manufactured by Mondo Contract Flooring, or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.9.8.2.3.(c).9 All joints will be hot weld.

6.9.8.2(4) Wet Rooms

6.9.8.2(4)(a) Use non-skid, slip-resistant solid sheet flooring for all wet areas;

6.9.8.2(4)(b) Non-skid, slip resistant homogeneous single layered, rubber flooring to meet the following certification and classifications:

6.9.8.2.4.(b).1 Type I

6.9.8.2.4.(b).2 Commercial: 34

6.9.8.2.4.(b).3 Industrial: 43

6.9.8.2(4)(c) Non-skid slip resistance to meet ASTM D2047: Dry – 0.88 and Wet -1.03;

6.9.8.2(4)(d) Hot weld all joint seams;

6.9.8.2(4)(e) Floor substrate will slope to drain with no puddling of surface water;

6.9.8.2(4)(f) Provide integral wall base with butterfly outside corners;

6.9.8.2(4)(g) Use solvent-based, low-odour flooring adhesive, of types recommended by flooring manufacturer;

6.9.8.2(4)(h) Hot weld new flooring to existing floor product;

6.9.8.2(4)(i) Finish flooring in accordance with manufacturer's specification. Do not apply sealer or wax;

6.9.8.2(4)(j) Wet rooms requiring non-skid, slip-resistant solid sheet flooring include:

6.9.8.2.4.(j).1 All rooms and spaces requiring a floor drain;

6.9.8.2.4.(j).2 All rooms and spaces requiring Utility / process sinks as described in Appendix 3B [Minimum Room Requirements];

6.9.8.2.4.(j).3 All rooms with showers, emergency shower or an eyewash;

6.9.8.2.4.(j).4 Other spaces as identified with the Authority through the process

described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.2(4)(k) Washrooms and ensuite washrooms;

6.9.8.2.4.(k).1 Mop Wash & Drying

6.9.8.2.4.(k).2 Soiled Utility;

6.9.8.2.4.(k).3 Soiled holding rooms;

6.9.8.2.4.(k).4 Laundry rooms and areas;

6.9.8.2.4.(k).5 Housekeeping Closets;

6.9.8.2.4.(k).6 3 meters radius around filtered, chilled water bottle filler stations;

6.9.8.2.4.(k).7 Secure Rooms;

6.9.8.2.4.(k).8 Anteroom-Secure;

6.9.8.2.4.(k).9 Main Entrance Lobby; and

6.9.8.2.4.(k).10 Prep Kitchen Area.

6.9.8.2(4)(l) Floor will slope to drain without any puddles.

6.9.8.2(5) Stair Covering

6.9.8.2(5)(a) Use one-piece treads and sheet risers with carborundum strip, or an equivalent product as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.2.5.(a).1 Stair treads will be installed to manufacturer's specifications and will include epoxy stair tread nosing. Caulk will be applied to fill the void under the nosing to prevent nosing fatigue and cracking.

6.9.8.2(5)(b) On concrete finished stairs, use cast in place metal stair nosings with carbonundum strip;

6.9.8.2(5)(c) In all stairs provide tactile warning strips and stair nosings to assist the visually impaired.

6.9.8.3 Anti-Fatigue Flooring

6.9.8.3(1) Provide anti-fatigue flooring in areas where Staff are standing at workstations for prolonged periods. Acceptable products will include Mondo rubber flooring or approved equivalent to be used at locations as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.3(2) Provide anti-fatigue flooring will consist of the following minimum requirements:

6.9.8.3(2)(a) 25mm thick interlocking tiles which are secured and able to withstand repeated cleaning with hospital grade disinfectant;

6.9.8.3(2)(b) Size: custom fit to space;

6.9.8.3(2)(c) Composition: SBR/EPDM/NBR Rubber Polymer;

6.9.8.3(2)(d) Provide drain-through feature; and

6.9.8.3(2)(e) Finish / textures: factory poly coat and slip resistant texture.

6.9.8.4 Sports Flooring

6.9.8.4(1) Rubber Athletic Flooring

6.9.8.4(1)(a) Provide rubber athletic flooring In A1 HUB 3: Cardiac Rehabilitation in the following areas:

6.9.8.4.1.(a).1 A1.7.5 Gym Area; and

6.9.8.4.1.(a).2 A1.7.4 Exercise Room.

6.9.8.4(1)(b) Will be in conformance to:

6.9.8.4.1.(b).1 ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension;

6.9.8.4.1.(b).2 ASTM D2047: Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as measured by the James Machine;

6.9.8.4.1.(b).3 ASTM D2240: Standard Test Method for Rubber Property (Durometer Hardness);

6.9.8.4.1.(b).4 ASTM D3389: Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader);

6.9.8.4.1.(b).5 ASTM E648: Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source;

6.9.8.4.1.(b).6 ASTM F386: Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces;

6.9.8.4.1.(b).7 ASTM F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring;

6.9.8.4.1.(b).8 ASTM F925: Standard Test Method for Resistance to Chemicals of Resilient Flooring;

6.9.8.4.1.(b).9 ASTM F970: Standard Test Method for Static Load Limit; and

6.9.8.4.1.(b).10 ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

6.9.8.4(1)(c) Manufacturer must be certified ISO 9001;

6.9.8.4(1)(d) Product must have undergone a vulcanization process, with a base of natural and synthetic rubbers, stabilizing agents and pigmentation. Factory lamination is not accepted;

6.9.8.4(1)(e) Exceed coefficient of friction standards for athletic performance. Provide a coefficient of friction (COF) no less than 0.6 for level surfaces and 0.8 for incline surfaces in accordance with ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces;

6.9.8.4(1)(f) Thickness: 8mm;

6.9.8.4(1)(g) 2mm homogeneous wear layer;

6.9.8.4(1)(h) Colors: requires approval by Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.9.8.4(1)(i) Surface texture: smooth;

6.9.8.4(1)(j) Meet LEED's General Emissions Evaluation for flooring. Low Emitting Materials credit is mandatory;

6.9.8.4(1)(k) Excellent fungal, bacterial and microbial resistance;

6.9.8.4(1)(l) Easily maintained and cleaned as per manufacturer's specifications;

6.9.8.4(1)(m) Install underlayment for increased thermal insulation and sound absorption and decreases potential moisture problems;

6.9.8.4(1)(n) Project Co will prepare the subfloor surface with a depression to suit manufacturer's specifications. Top of resilient athletic flooring will be level with adjacent floor finish;

6.9.8.4(1)(o) Flooring will be warranted to be free from manufacturing defects for one (1) year from date of shipment, and ten (10) years against excessive wear under normal usage and

6.9.8.4(1)(p) Acceptable product: Mondo Advanced or equivalent approved by Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.5 Seamless Quartz Epoxy Flooring

6.9.8.5(1) Rooms requiring Seamless Quartz Epoxy Flooring include:

6.9.8.5(1)(a) FMO Workrooms.

6.9.8.5(2) 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.

6.9.8.5(3) Provide integral wall base.

6.9.8.5(4) Provide a coefficient of friction (COF) no less than 0.6 for level surfaces and 0.8 for incline surfaces in accordance with ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces.

6.9.8.6 Safety Flooring

6.9.8.6(1) Safety flooring in Alcove-Nourishment, Nourishment Station, and Dining/Lounge-Patient will be slip-resistant homogeneous single-layered, vinyl aggregate sheet flooring to meet the required criteria for the Food Services flooring set out in Section 6.9.8.2.

6.9.8.7 Concrete Stain

6.9.8.7(1) Contractors used to install/apply concrete stains will have minimum 10 years' verified experience in the installation of concrete floor treatment finishes.

6.9.8.7(2) Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer prior to applying.

6.9.8.7(3) The use of flocked flooring is not permitted, except in entry vestibules.

6.9.8.8 Static-Resistant Flooring

6.9.8.8(1) Water-based self-leveling epoxy electro-static dissipative coating.

6.9.8.8(2) Bond coat/prime coat and maintenance sealer: as required by manufacture of static dissipative coating.

6.9.8.8(3) Coating system thickness: minimum of 14 mils.

6.9.8.8(4) Provide a flooring system that meets or exceeds the listed minimum physical property requirements when tested according to the following standards:

6.9.8.8(4)(a) Electrical transmission properties (Point-to-point and point-to-ground resistance): ANSI/ESD STM 7.1 Static Dissipative: 1E6-1E9 ohms;

6.9.8.8(4)(b) Microbial-resistant ASTM G 21 Passes, Rating 1;

6.9.8.8(4)(c) Flexibility 1/8” mandrel ASTM D 522 Passes;

6.9.8.8(4)(d) Adhesion resistance ASTM D 4060 5B;

6.9.8.8(4)(e) Impact resistance (Direct/Reverse 160/160 in-lbs.) ASTM D 2794 Passes;

6.9.8.8(4)(f) Abrasion resistance (CS-17 wheels, 1 kg, 1000 cycles) ASTM D 4060 40 mg; and

6.9.8.8(4)(g) Chemical resistance ASTM C 868, ASTM C 267, ASTM D 1308 As listed by manufacturer.

6.9.8.8(4)(h) Bond ESD flooring to building grounding system.

6.9.8.8(4)(i) Commission and submit test results to Authority.

6.9.8.9 Stair Covering

6.9.8.9(1) Use one-piece treads and sheet risers with carborundum strip or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.8.9(2) Use water-soluble, low-odour adhesive, of types recommended by product manufacturer.

6.9.8.9(3) Comply with all applicable standards, including the National Floor Covering Association (NFCA) Specification Standards Manual. US Federal Specification RR-T-650d.

6.9.8.9(4) Select flooring materials that are suitable for:

6.9.8.9(4)(a) Ease of cleaning and maintenance;

6.9.8.9(4)(b) Pedestrian and rolling traffic;

6.9.8.9(4)(c) The acoustic requirements of the space;

6.9.8.9(4)(d) Infection prevention and control; and

6.9.8.9(4)(e) The aesthetics of the Facility.

6.9.8.9(5) Use an epoxy nose caulk to help prevent the stair tread nose from cracking.

6.9.8.10 Carpets and Carpet Tiles

6.9.8.10(1) Carpet finishes will only be used in to meet the requirements for multimedia rooms as set out in Section 7.10.15.

6.9.8.10(1)(a) Provide 150mm high rubber bases.

6.9.8.10(1)(b) Use carpeting that is certified under Canadian Carpet Institute / Canadian Rug Institute (CCI/CRI) Indoor Air Quality Program and having CRI/IAQ Label and number certifying that VOC emission rate of less than 0.6 mg/m2/h4 has been passed.

6.9.8.10(1)(c) Choose carpet that has a maintained static generation at less than 3.5 KV at 21ºC and 20% relative humidity throughout the product's life.

6.9.8.10(1)(d) Use non-solvent, non-toxic, odourless adhesive that, when installed, meets or exceeds EPA standards for acceptable VOC concentration and emission rate.

6.9.8.10(1)(e) Choose a carpet designed to accept wheelchair traffic.

6.9.9 Solid Surface Wet Wall Panel System and Accessories

6.9.9.1(1) At all showers in the Facility, provide a wet wall panel system of solid polymer components that include; panels, and outside finish trim. Bond sheets together for inside corners following manufacturer's specification and instructions. Wall panels will be full width and height and extend to cover the shower spray zone with seams occurring only at the inside corners of the shower area. Provide wet wall panel system at the ceilings above showers extending to protect the ceiling from moisture.

6.9.9.1(2) At all Soiled Utility Rooms in the Facility, provide a wet wall panel system on all walls extending 1.6 m AFF.

6.9.9.1(3) Panels will be formed from manufacturer's standard 6 mm thick sheet product.

6.9.9.1(4) Solid polymer will be a non-porous, homogeneous material maintaining the same composition throughout the part with a composition of polyester or acrylic polymer, aluminum trihydrate filler and pigment.

6.9.9.1(5) Provide outside finish trim to conceal corner sealant and provide transition from shower to adjacent wall finishes.

6.9.9.1(6) Provide matching cast recessed shampoo and soap holder.

6.9.9.1(7) Provide marine grade polyurethane sealant that is FDA compliant and 100% clear. Sealant will not be used as part of the waterproofing system. Sealant may be used at the junction of dissimilar materials.

6.9.9.1(8) Manufacture will be Avonite acrylic solid surface as manufactured by Aristech Surfaces LLC or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.9.9.1(9) Technical Requirements

6.9.9.1(9)(a) Minimum thickness: 6 mm;

6.9.9.1(9)(b) Barcol hardness: 59, when tested in accordance with ASTM D258;

6.9.9.1(9)(c) Elongation: 2.2%, when tested in accordance with ASTM D638;

6.9.9.1(9)(d) Tensile strength: 3,800 psi, when tested in accordance with ASTM D638;

6.9.9.1(9)(e) Tensile modulus: 11 x 105, when tested in accordance with ASTM D638;

6.9.9.1(9)(f) Water absorption after 24 hours: .07%, when tested in accordance with ASTM D570;

6.9.9.1(9)(g) Charpy impact (foot pounds/inch): 1.5, when tested in accordance with ASTM D6110;

6.9.9.1(9)(h) Impact resistance 1/2 pound: No Fracture, when tested in accordance with NEMA LD3-3.8;

6.9.9.1(9)(i) Linear thermal expansion: 2.0 x 10-5, when tested in accordance with ASTM D696;

6.9.9.1(9)(j) High temperature resistance: Slight Effect, when tested in accordance with NEMA LD3-3.6;

6.9.9.1(9)(k) Boiling water resistance: No Effect, when tested in accordance with ISFA 2-01;

6.9.9.1(9)(l) Stain resistance: No Effect, when tested in accordance with NEMA LD3-3.4; and

6.9.9.1(9)(m) Weight per sq. ft., 6 mm thickness: 2.2 pounds.

6.9.9.1(10) Provide a wet wall panel system at all hand hygiene sinks, lavatory sinks, Utility sinks, janitorial sinks, scrub stations sinks, as well as emergency showers and eyewash stations. Wet wall panel system will be provided behind all chemical dispensing systems in Housekeeping Closets. The wet wall panel will extend to include the area around the paper towel and soap dispensers in both hand hygiene and Patient/Staff/public washrooms.

6.9.9.1(11) Extend panels a minimum 600mm beyond spray area or to next logical junction.

6.9.9.1(12) Extend flashing cove material minimum 50mm behind wall panel.

6.9.9.1(13) Fasten/adhere to wall substrate only with manufacturer’s recommended methods and materials.

6.9.9.1(14) The wet wall panel system will extend to all three walls of a hand hygiene sink alcove.

## 6.10 Specialties (Division 10)

### 6.10.1 Magnetic Whiteboards

6.10.1.1 Provide and install magnetic whiteboards in locations described in Appendix 3B [Minimum Room Requirements] and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.1.2 Magnetic whiteboards will meet the following requirements:

6.10.1.2(1) Have surfaces designed for use with felt-type writing instruments as well as erasing with repeated cleaning with minimal effort;

6.10.1.2(2) Acrylic enameled steel, scratch and abrasion-resistant writing surface that resists ghosting or staining;

6.10.1.2(3) Continuous extruded aluminum frame, accessory holder tray with protective end caps, map rails and map hooks;

6.10.1.2(4) Uses non-toxic, water-based lamination adhesive; and

6.10.1.2(5) Requirements for whiteboards in Multimedia Rooms as described in Section 7.10.15.

6.10.1.3 In the locations listed above, provide magnetic whiteboards of the following sizes and quantities:

6.10.1.3(1) One (1) at 600mm x 915mm in all rooms or spaces equal to or less than 10 NSM;

6.10.1.3(2) One (1) at 1220mm x 1830mm in all rooms or spaces greater than 10 NSM but less than 25 NSM; and

6.10.1.3(3) Two (2) at 1220mm x 2400mm each in all rooms or spaces greater than 20 NSM.

6.10.2 Compartment and Cubicles

6.10.2.1 Design and construct compartments and cubicles to meet the following requirements:

6.10.2.1(1) For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access;

6.10.2.1(2) Provide a mirror in all change compartments; and

6.10.2.1(3) Curtain tracks in these spaces that are accessible to Patients will comply with the requirements of shower curtain tracks as indicated in this Schedule.

6.10.3 Coat Hooks, Hangers and Brackets

6.10.3.1 Provide coat hooks in in locations described in Appendix 3B [Minimum Room Requirements] and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.3.2 Provide a single coat hook where the areas listed above are equal to or less than 10 NSM in Appendix 3A [Clinical Specifications and Functional Space Requirements]. For all other instances, provide a hook strip with multiple hooks along a single strip. The number of hooks on a strip will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.3.3 Coat hooks and hook strips: back plate will be 2 mm, type 304, satin-finish stainless steel.

6.10.3.4 Coat hooks or hook strips applied to doors will not be accepted.

6.10.3.5 Provide Ligature Resistant stainless steel hooks that snap down for safety if excessively loaded complete with Tamper Resistant mounting fasteners in Mental Health Areas.

6.10.3.6 Provide hangers within each inpatient bedroom (excluding Mental Health Areas) to support Patient walkers and other mobility aids. Type and location of hangers to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.3.7 Provide two (2) laser goggles/eye protection hooks outside all Operating Rooms. Exact location to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.3.8 Provide mop and broom brackets with a minimum of five (5) holding positions in each Housekeeping Closet. Provide wet wall panels up to 2100mm AFF where mop hooks are installed. Final location and height will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.3.9 Provide coat hooks, as well as multiple wall-mounted hooks for all other miscellaneous items as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. Provide 1.5mm (0.060”) vinyl acrylic sheet wall protection up to minimum 2100mm or 200mm above hooks at all equipment hook locations.

6.10.4 Toilet Partitions

6.10.4.1 Galvannealed sheet metal will conform to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish in polyester, baked enamel or powder coating.

6.10.4.2 For stainless steel, use Type 304 conforming to ASTM A240 with No. 4 finish.

6.10.4.3 For plastic laminate, use Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to NEMA LD-3.

6.10.4.4 Use of particleboard core partitions is not acceptable.

6.10.4.5 For fibre-reinforced plastic (fibreglass), use a moisture resistant grade.

6.10.5 Washroom and Change Cubicle Partitions

6.10.5.1 Provide embossed stainless steel compartments and cubicles including toilet partitions, change cubicles and other compartments and cubicles requiring privacy and security. All washroom and change room partitions are to be made with full-height channels at all mounting locations. Privacy channels will be provided to eliminate gaps between all panels and doors.

6.10.5.2 Provide exposed surfaces that are permanent, water-resistant, corrosion-proof, and readily cleaned and maintained. Provide anti-graffiti coatings as required.

6.10.5.3 Secure partitions and stanchions from the ceiling structure in a manner to resist lateral loading, seismic forces and impact.

6.10.5.4 For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access.

6.10.5.5 For stainless steel, use Type 304 conforming to ASTM A240 embossed finish.

6.10.5.6 Plastic laminate is not acceptable.

6.10.5.7 Particleboard core partitions are not acceptable.

6.10.5.8 Fibre-reinforced plastic (fibreglass) is not acceptable.

6.10.5.9 Galvannealed sheet metal is acceptable if factory painted or powder coated, conforms to ASTM A653 with minimum ZF001 (A01) zinc coating and finished in polyester, baked enamel or powder coating.

6.10.5.10 Where not adjacent to showers, change cubicle partitions will comply with the above requirements for toilet partitions.

6.10.6 Typical Room Accessories

6.10.6.1 In addition to the room accessories listed in Appendix 3B [Minimum Room Requirements] provide the following:

6.10.6.1(1) A solid acrylic surface shelf for personal belongings (i.e. purse, handbag, toiletries) in all Staff locker areas and Staff washrooms;

6.10.6.1(2) Shoe racks or cubbies in all Staff locker or change areas, the quantity of which will correspond equally to the number of lockers or Staff indicated in Appendix 3A [Clinical Specifications and Functional Space Requirements];

6.10.6.1(3) Stainless steel coat rod and shelf in the Coat Closet and similar garment storage spaces;

6.10.6.1(4) Shoe racks, open stainless steel coat rod and shelf in all Staff locker areas;

6.10.6.1(5) Benches and seating (chairs), coat hooks, and shelf for personal belongings in all Patient lockers, Staff lockers, or Change Rooms/cubicles; and

6.10.6.1(6) Benches and/or seating, coat hooks, and shelf for personal belongings in Staff shower areas.

6.10.7 Corner Guards and Wall Protection, Handrails, Chair rails and Bed Bumpers and Door Frame Protection

6.10.7.1 Corner Guards and Handrail

6.10.7.1(1) Provide protection of walls and exposed wall corners to prevent damage due to impact from traffic such as wheelchairs, stretchers, equipment, and service vehicles including carts.

6.10.7.1(2) All corner guards in the Facility will be stainless steel unless otherwise noted. Provide 76 x 76 mm, 16 gauge stainless steel with radiused corner and smooth edges.

6.10.7.1(3) Provide corner guards that are flush-mounted, one-piece 90-degree corner guards with 90 mm legs constructed of 16 gauge type 304 stainless steel with wing edges crimped for continuous tight fit against the wall surface. Corner guards will be minimum height of 1220 mm above finished floor. Where wall corners at more acute than 90 degrees, the corner guard will match wall angle to ensure wings are tight to wall.

6.10.7.1(4) Provide heavy duty corner guards in all Back of House service corridors consisting of 16 gauge stainless steel with 125 mm legs. Back of House corner guards will extend a minimum 2400 mm above finished floor level. Heavy duty corner guards will be provided at other locations as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.7.1(5) Provide ‘U’ shape surface mounted end wall protectors at all such conditions.

6.10.7.1(6) All corner guards to be adhered with no visible fasteners. Secure wall and corner guards to reinforcing and backing in the walls; such backing to be sufficient to withstand expected impact loads.

6.10.7.1(7) Install minimum 19 mm X 19 mm stainless steel corner guards to Millwork corners exposed to mobile equipment movements including both sides of head wall.

6.10.7.1(8) For floor or wall-mounted sinks, the wet wall panel system will extend up to a minimum height of 1.60 m AFF and a minimum width of 600 mm on either side of the sink centreline. For counter mounted or integral sinks, the wet wall panel system will extend up 600 mm above the top of counter or in the case of upper cabinets, to underside of cabinets above. The minimum width will be 600 mm on either side of the sink centreline or as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. For emergency showers and eyewash stations, the wet wall panel system will extend full height of the wall and 200 mm beyond the curtain track or 600 mm beyond the spray area.

6.10.7.1(9) Secure wall protection to reinforcing and backing in the walls and ensure that such backing is sufficient to withstand expected impact loads.

6.10.7.1(10) Use sheet wall protection products that are high impact resistant, stain-resistant to pen marks, paint, and graffiti, and able to withstand hospital-grade repeated cleaning and disinfection. Use products containing anti-microbial additives to retard mildew and bacterial growth. Sheet wall protection will be a high impact wall covering with preformed rigid sheet and matching trims, internal and external corners, containing no PVC. Minimum thickness 1.5 mm (0.060”) with panel size 1.22 m x 2.44 m. Fiberglass reinforced plastic (FRP) is not acceptable. Provide welded or chemically bonded seams to form a seamless continuous covering.

6.10.7.1(11) The following rooms or areas will have corner guards and wall protection to a minimum height of 2.4 m AFF:

6.10.7.1(11)(a) Housekeeping Room;

6.10.7.1(11)(b) Housekeeping Closet;

6.10.7.1(12) The following rooms or areas will have full height, floor to ceiling, corner guards and wall protection:

6.10.7.1(12)(a) Throughout the following Components with the exception of administration areas;

6.10.7.1.12.(a).1 E1. Medical Device Reprocessing Department (MDRD);

6.10.7.1.12.(a).2 F2 – Morgue;

6.10.7.1.12.(a).3 G – Emergency Department;

6.10.7.1.12.(a).4 H1. Perioperative Services;

6.10.7.1.12.(a).5 K1 - FMO Operations; and

6.10.7.1.12.(a).6 K3 - Biomedical Engineering.

6.10.7.1(12)(b) Trauma/Resuscitation Suite;

6.10.7.1(12)(c) All Operating Rooms;

6.10.7.1(12)(d) All alcoves;

6.10.7.1(12)(e) All areas where equipment or supplies stored;

6.10.7.1(12)(f) All Workrooms;

6.10.7.1(12)(g) All rooms where clean supplies are stored; and

6.10.7.1(12)(h) Sterile Supply Core.

6.10.7.2 Handrails

6.10.7.2(1) Provide handrails on both sides of all corridors for support. All handrails to extend across adjacent sidelights at corresponding mid-rails. Provide 19mm (3/4") plywood backing as required.

6.10.7.2(2) Provide materials and shapes appropriate for Patient support, with continuous uninterrupted supports. Select hand rails easily cleanable without troughs that will collect dust and particles. All handrails in the Facility will be stainless steel or other materials whose surface is cleanable with bleach unless otherwise noted;

6.10.7.2(3) Provide handrails that meet the needs of the visually impaired and comply with elder-friendly principles, including:

6.10.7.2(3)(a) Handrails will be of a colour that contrasts with the floor and wall for ease of location and use;

6.10.7.2(3)(b) Provide a tactile signal, such as a notch, 100 mm from the endpoint or interruption of handrails, or have the rail curve and connect back to the wall;

6.10.7.2(3)(c) Handrails will be 40 to 45 mm in diameter with a non-slip texture;

6.10.7.2(3)(d) Curve the end of handrails down to 680 mm for easier detection by visually impaired adults using cane technique;

6.10.7.2(3)(e) Continue handrails through and around landings;

6.10.7.2(3)(f) Allow a minimum clearance of 1830 mm between handrails to allow two wheelchairs to pass; and

6.10.7.2(3)(g) In public-use elevators, provide handrails on both sides of the cabin at a height between 800 mm and 1m and whose ends will curve back to the wall

6.10.7.2(4) Provide handrails for all walkways, including those having a gradient of 5 percent or less.

6.10.7.2(5) All handrails will be able to withstand an applied force of 5 kN.

6.10.7.2(6) Provide handrails which are Ligature Resistant in Mental Health Areas.

6.10.7.2(7) Provide handrails in Clinical Spaces as required by the Authority.

6.10.7.3 Chair Rails and Bed Bumpers

6.10.7.3(1) Chair rails will be provided throughout the Facility in all offices, Multimedia Rooms, meeting rooms, breakout rooms, lounges, workstations and administrative areas. Locations will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. Width to be 260 mm; top of rail to be 980 mm AFF.

6.10.7.3(2) Bed bumper (bed locators) to be provided where movable gurneys, beds or stretchers are to be used and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.7.3(3) Bed bumper will be minimum 1.22 m wide X 900 mm high mounted 150 mm AFF made of phenolic core with plastic laminate finish coordinated with other finishes within the spaces such as Millwork.

6.10.7.3(4) Finish of the bed bumper will withstand hospital-grade repeated cleaning and disinfection.

6.10.7.3(5) Coordinate height and fit with gurney or stretcher model and all associated equipment. Coordinate bed bumper design with sheet wall protection system utilized for the Facility.

6.10.7.4 Door Edge and Door Frame Protection

6.10.7.4(1) Protect door edges and door frames in Clinical Spaces, Food Services and other high-traffic areas from damage such as impact caused by the regular movement of stretchers and other wheeled vehicles.

6.10.7.4(2) Provide full height door edge protection in high use areas. Height of all door, edge and frame protection will be of an adequate height to fully protect the door, edge and frame from damage.

6.10.7.4(3) Protect elevator frames from damage due to bed and cart movement.

6.10.7.4(4) Door protection including edge guards, kick plates, mop plates, armour plates and stretcher plates will be stainless steel and provided accordingly. Door protection plates and guards will not be installed overlapping each other. Fit pieces together with tight butt joints;

6.10.7.4(5) Provide kick plates for any doors with a self-closing device. Kick plates will have sufficient width to butt against astragals and door edge guards. Do not overlap hardware.

6.10.7.4(6) Door protection will be minimum height of 1350 mm above the finished floor.

6.10.7.4(7) For the door and frame protection types listed in Appendix 3B [Minimum Room Requirements], provide the following:

6.10.7.4(7)(a) Type 1 – Low;

6.10.7.4(7)(b) 1 Ea. Kickplate 80A 10” x door width less 2” 630 GS for single door;

6.10.7.4(7)(c) 2 Ea. Kickplate 80A 10” x door width less 1.5” 630 GS for double doors;

6.10.7.4(7)(d) Type 2- High;

6.10.7.4(7)(e) Single door -protection to 34” AFF:

6.10.7.4.7.(e).1 1 Ea. Armor plate 80A x door width less 2” 630 GS;

6.10.7.4.7.(e).2 2 Ea. Door Edge Guards GSH butted type to suit door 630 GS;

6.10.7.4.7.(e).3 2 Ea. Door Frame Guards GSH 50N 630 GS;

6.10.7.4.7.(e).4 Double door protection to 34” AFF;

6.10.7.4.7.(e).5 2 Ea. Armor plate 80A x door width less 1.5”” 630 GS;

6.10.7.4.7.(e).6 2 Ea. Door Edge Guards GSH butted type to suit door 630 GS; and

6.10.7.4.7.(e).7 2 Ea. Door Frame Guards GSH 50N 630 GS.

6.10.7.4(8) All door edge and door frame protection will not have sharp edges to prevent cutting injuries;

6.10.7.4(9) All door edge protection will be stainless steel and will wrap around both corners at a door edge. Hinge side will typically be protected by the stainless steel edge guard type continuous hinge. Door edge guards will be similar to GSH-47N Edge Guard.

6.10.7.5 Horizontal Surfaces

6.10.7.5(1) Provide a 12mm thick solid polymer fabricated surface with 32mm edges and 5mm radiused corners to protect the ledge continuously along all horizontal GWB surfaces, pony walls, window sills, or similar. Sub-surface material will be plywood; no particle board will be permitted.

6.10.8 Solid Phenolic Lockers

6.10.8.1 General Requirements

6.10.8.1(1) Provide full size, ‘Z’ or half size, and purse size solid phenolic lockers in the quantities and locations listed in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements].

6.10.8.1(2) For lockers used by the public/visitors, include number plates, hanging hooks, and a keyless mechanical combination cam lock with a key override – no wires, battery, nor card required. For Staff lockers, provide hasps for padlocks.

6.10.8.1(3) Locker number sequencing to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.8.1(4) Provide seismic restraints in accordance with the BCBC for all lockers.

6.10.8.1(5) Provide a sloped top at all locker locations.

6.10.8.1(6) Each individual locker will feature a recessed friction latch and hasp for use of a padlock, door pull handles, and 5-knuckle security hinge welded to door and frame.

6.10.8.2 Materials Requirements

6.10.8.2(1) Locked core or panel material will meet fire resistance per ASTM E84 Class A fire rating.

6.10.8.2(2) Door material will be 13mm thick solid phenolic composite material with rounded edges.

6.10.8.2(3) Doors will be attached to the hinge with through-bolting.

6.10.8.2(4) Locker bodies will have eased edges to remove sharpness, be machine polished and free from tooling imperfections and include:

6.10.8.2(4)(a) Tops, bottoms, and intermediate shelves consisting of 13mm solid phenolic composite material with ventilation holes;

6.10.8.2(4)(b) Locker backs consisting of 6mm solid composite material; and

6.10.8.2(4)(c) Locker sides consisting of 10mm thick solid phenolic composite material.

6.10.8.3 Hardware Requirements

6.10.8.3(1) Hinges will be 304-grade stainless steel. Provide minimum three (3) for full height doors and two (2) for multi-tier units.

6.10.8.3(2) Interior hooks will be stainless steel.

6.10.8.4 Ventilation Requirements

6.10.8.4(1) Interior vent: Provide six (6) minimum 10mm diameter ventilation holes on tops, bottoms, and intermediate shelves.

6.10.8.4(2) Provide three (3) 10mm diameter ventilation holes on “Z” type intermediary shelves.

6.10.8.4(3) Door vent: Provide minimum of 20 squares inches opening of front ventilation for full tier lockers. For other styles, provide front ventilation 1.43 square inches per lineal foot of door perimeter.

6.10.8.5 Locker Size Requirements

6.10.8.5(1) Full Size with 1 Tier:

6.10.8.5(1)(a) 1830mm H x 305mm W x 381mm D.

6.10.8.5(2) ‘Z’ with 2 Tier:

6.10.8.5(2)(a) 1067mm (1830mm Overall) H x 305mm W x 381mm D.

6.10.8.5(3) Purse or Multi-Tier:

6.10.8.5(3)(a) 349mm H x 305mm W x 381mm D.

6.10.9 Storage Shelving Systems

6.10.9.1 Provide storage systems for materials in designated storage areas subject to review and acceptance by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.9.2 Shelves will be adjustable and suitable for various storage requirements.

6.10.9.3 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.

6.10.9.4 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 to be either power assisted or to be easily operable without undue required strength by any person.

6.10.9.5 Provide storage shelving systems in accordance with the applicable requirements of the Fraser Health Recommendations for the Ergonomic Design of Storage, Shelving, and Racks.

6.10.9.6 Shelves will meet inflection control requirements and be cleanable with Authority approved detergents and disinfectants.

6.10.9.7 Shelving will be minimum 150mm above finished floor and 50mm from adjacent walls.

6.10.10 Washroom Accessories

6.10.10.1 Provide washroom accessories in all washrooms. Provide and install the type, size, and number of washroom accessories as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. All accessories will be compatible with Authority provided consumable supplies.

6.10.10.2 Washroom accessories and installation will be in conformance with BCBC requirements for Persons with Disabilities. Final locations of all devices will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.10.3 Provide fold-down infant change tables in the locations described in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements] that does not interfere with the use of any plumbing fixture. Acceptable model is Koala Kare KB200-01 Horizontal Wall Mounted Baby Changing Station or equivalent alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.10.3(1) Fold-down infant change tables will include:

6.10.10.3(1)(a) Safety straps to hold infant securely;

6.10.10.3(1)(b) Antimicrobial finish able to withstand repeated cleaning with hospital grade disinfectant;

6.10.10.3(1)(c) Minimum closed dimensions of 890mm L x 560mm H x 100mm W with minimum open width of 58cm;

6.10.10.3(1)(d) High-density polyethylene construction with stainless steel veneer front; and

6.10.10.3(1)(e) Integral compartment for disposable, biodegradable liners.

6.10.10.4 Provide washroom accessories in Mental Health Areas that comply with New York State Office of Mental Health, Patient Safety Standards – Materials and Systems Guidelines. Final selection of all devices will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.10.5 Unless otherwise noted, do not use recessed dispensers (such as those for paper towels, soap and waste receptacle).

6.10.10.6 Unless otherwise noted, use commercial and hospital grade accessories free from imperfections in manufacture and finish.

6.10.10.7 In all washrooms, use fasteners and fittings that are Tamper Resistant.

6.10.10.8 Provide the following washroom accessories, mounted as per CSA B651 and compatible with Authority provided consumable supplies in the public washrooms:

6.10.10.8(1) Soap dispenser;

6.10.10.8(2) Toilet paper dispenser;

6.10.10.8(3) Paper towel dispenser;

6.10.10.8(4) Paper towel / garbage disposal;

6.10.10.8(5) Mirror - adjustable for use by a person standing or Person with Disabilities;

6.10.10.8(6) Grab bar accessible to Persons with Disabilities, with integral tactile grip finish;

6.10.10.8(7) Coat hook;

6.10.10.8(8) Sanitary napkin dispensers in female & unisex washrooms only; the unit will not have any sharp edges and installed location will not impede the use of grab bars

6.10.10.8(9) Sanitary napkin disposals in female & unisex washrooms only; the unit will not have any sharp edges and installed location will not impede the use of grab bars and

6.10.10.8(10) Solid polymer surface Utility shelf.

6.10.10.9 Provide the following washroom accessories, mounted as per CSA B651 and compatible with Authority provided consumable supplies in the Patient washrooms:

6.10.10.9(1) Soap dispenser ;

6.10.10.9(2) Toilet paper dispenser;

6.10.10.9(3) Paper towel dispenser;

6.10.10.9(4) Paper towel / garbage disposal;

6.10.10.9(5) Mirror - adjustable for use by a person standing or Person with Disabilities;

6.10.10.9(6) Grab bar accessible to Persons with Disabilities, with integral tactile grip finish; mounted on either side of the toilet at 365mm from centre of bowl to centre of grab bar at 800mm AFF to the top of the grab bar; Grab bars in shower as per CSA B651;

6.10.10.9(7) Coat hook;

6.10.10.9(8) Shelf above or near the sink; and

6.10.10.9(9) Solid polymer surface shower shelf.

6.10.10.10 Provide the following washroom accessories compatible with Authority provided consumable supplies in Patient washrooms in Mental Health Areas and public washrooms within the Emergency Department:

6.10.10.10(1) Soap dispenser Ligature Resistant;

6.10.10.10(2) Ligature Resistant, wall-mounted paper towel waste bin;

6.10.10.10(3) Vandal Resistant mirrors that are unbreakable and securely fasten to the wall and do not distort the viewer's reflection, glass is not acceptable. Angled mirror as required;

6.10.10.10(4) Ligature Resistant grab bar with integral weep holes, wall-mounted on one side to allow Staff assist from the other side;

6.10.10.10(5) Ligature Resistant coat hook;

6.10.10.10(6) Vandal Resistant shelf above sink.; and

6.10.10.10(7) Ligature Resistant toilet paper dispenser.

6.10.10.11 Shower rooms or showers in washrooms within Mental Health Areas will include the following accessories:

6.10.10.11(1) Ligature Resistant shower curtain and breakaway track or breakaway rod as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.10.10.11(2) Ligature Resistant grab bar with integral weep holes;

6.10.10.11(3) a recessed combination shampoo and soap holder approximately 200mm x 380mm as part of a complete solid surface wet wall panel system; and

6.10.10.11(4) Ligature Resistant and Vandal Resistant shower fixtures and accessories.

6.10.10.12 Staff showers and Staff Change Rooms will include the following accessories:

6.10.10.12(1) Shower curtain track or rod as appropriate;

6.10.10.12(2) Grab bars (with integral tactile grip finish);

6.10.10.12(3) Mirror;

6.10.10.12(4) Shower curtain;

6.10.10.12(5) Utility shelf; and

6.10.10.12(6) Fold-down seat.

6.10.10.13 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 process described in Schedule 2 [Design and Construction Protocols].

6.10.10.14 Provide infant change tables in all Washroom-Public areas.

6.10.10.15 Provide 19mm plywood backing inside GWB walls to support all washroom accessories.

6.10.11 Mail Slots

6.10.11.1 Provide mail slots that are a minimum of 25mm wide, 350mm high and 400mm deep, in locations identified in the Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.10.12 Privacy Curtains, Shower Curtains, Tracks and IV Tracks

6.10.12.1 Provide privacy curtains in all areas and spaces as described in Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.10.12.2 In addition, provide privacy curtains in Clinical Spaces with the following door types as described in Appendix 3B [Minimum Room Requirements]:

6.10.12.2(1) Type G;

6.10.12.2(2) Type H; and

6.10.12.2(3) Type J.

6.10.12.3 Provide a hookless curtain system and tracks at all privacy curtain locations.

6.10.12.4 Provide attachments and cover escutcheons which are continuously sealed with silicone sealant in all wet areas.

6.10.12.5 In addition to those privacy curtains described in Appendix 3A [Clinical Specifications and Functional Space Requirements], provide 35% additional privacy curtains for the Facility (i.e.135%) for the Authority's use.

6.10.12.6 Curtain textiles will comply with all Authority requirements and CAN/CBSB-4.162 M, Hospital Textiles - Flammability Performance Requirements.

6.10.12.7 Privacy and shower curtains will be able to withstand laundering temperatures specified by the Authority.

6.10.12.8 Provide open mesh along the top of all curtains as required for sprinkler protection.

6.10.12.9 Provide curtain rod extenders or other devices as required to ensure that the ceiling lift systems will not interfere with curtains or be obstructed by curtains.

6.10.12.10 Provide IV tracks in locations as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.10.12.11 For IV tracks, use extruded aluminum, anodized finish and entirely enclosed except for slot in bottom. Provide IV carriers consisting of plated steel block supported from four nonconductive nylon ball-bearing wheels and equipped with 180-degree twist lock with nylon washer.

6.10.12.12 All tracks will be structurally supported from the concrete deck above the t-bar ceiling and must not be supported by the t-bar ceiling grid only. Attach the track assembly to the ceiling with solid wood blocking or sheet metal blocking, attached with pan head screws through the acoustic ceiling tile and into the blocking. Attach with toggle bolt assemblies through the GWB is not acceptable. Attaching to acoustic tile T-bar ceiling is not acceptable.

6.10.12.13 Metal grommets on textiles are not acceptable.

6.10.12.14 Provide shower curtains at all shower locations.

6.10.12.15 Shower curtain tracks in Patient accessible showers will meet the following requirements:

6.10.12.15(1) Be specially designed as Ligature-Resistant with tracks recessed into the ceiling surface;

6.10.12.15(2) Tracks will consist of one-piece extruded aluminum spanning from end point to end point and secured in place with Tamper Resistant fasteners; and

6.10.12.15(3) Tracks are not permitted to “break-away”.

6.10.12.16 Curtain textile, height of curtains, colour, fasteners and tracks to be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

## 6.11 Equipment (Division 11)

6.11.1 This section will be read in conjunction with Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment].

6.11.2 Equipment Supports

6.11.2.1 Provide supports for equipment outlined in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment] with proper backing and structural reinforcing as required.

6.11.3 Ceiling Lifts

6.11.3.1 Provide x-y gantry and single-track ceiling lift systems for the Facility at locations described in the Appendix 3A [Clinical Specifications and Functional Space Requirements] and in accordance to Fraser Health Standard: Patient Handling Equipment for Facility Design and Procurement.

6.11.3.2 Provide complete ceiling lift systems including all structural supports, ceiling lift rails, booms, anchors, backing and electrical power. Refer to Appendix 2E [Clinical Equipment and Furniture] for Authority-supplied components of the ceiling lift system.

6.11.3.3 Provide ceiling lift systems that do not contain proprietary features or components which would limit the Authority’s ability and flexibility to maintain and upgrade.

6.11.3.4 Ceiling lift system will be fully compatible with lift motors selected by Authority, without use of adapters.

6.11.3.5 Provide ceiling lifts with tracks recessed into the ceiling such that they are Ligature Resistant in Mental Health Patient Rooms or in OR.s if required.

6.11.3.6 Provide structural steel components, custom washroom doors and door frames as required to suit ceiling lift coverage into the washroom.

6.11.3.7 Coordinate x-y gantry ceiling lift system with other systems including equipment, privacy curtains, lights and sprinklers.

6.11.3.8 Ceiling-mounted equipment such as booms, televisions/infotainment, lights and ceiling lifts will be coordinated in the structural Design.

6.11.3.9 Coordinate the electrical system components of the x-y gantry ceiling lift system with all clinical and housekeeping activities in the Patient room or bay to allow for easy service access.

6.11.3.10 The ceiling lift system will electrically charge at any location along the support track. Provide the ability to disconnect the electrical power safely at the connect point, without Staff having to travel to an electrical panel.

6.11.3.11 The ceiling lift system rails and booms in Patient rooms will not obstruct, partially or completely, over-bed ceiling-mounted light fixtures or any cameras.

6.11.3.12 Provide access to ceiling lift system components above the ceiling through such means as ceiling access panels for periodic inspection purposes. Access panels will provide space for the Authority to access the connection points of the ceiling lift system for verification, quality control and regular maintenance.

6.11.3.13 Load Bearing Requirements

6.11.3.13(1) Provide ceiling lift systems to meet the following load bearing requirements:

6.11.3.13(1)(a) All ceiling lift systems will have a minimum load bearing capacity of 484 kg (1000 lbs), load-tested to a minimum of 150 percent of the X-Y gantry weight capacity in all locations; and

6.11.3.13(1)(b) Where the Authority coverage to two bed with one ceiling lift system, Project Co is to provide the following, but is not limited to, the curtain tracks to allow the motor to pass from bed space to the other.

6.11.3.14 The ceiling lift system will not contain proprietary features or components which would limit the Authority's ability and flexibility to maintain and upgrade.

6.11.3.15 The X-Y gantry will be fully compatible with lift motors selected by Authority, without the use of adapters.

6.11.3.16 Provide lockable millwork for storage of the ceiling lift motor in the ensuite of the Mental Health Patient Rooms.

6.11.3.17 The emergency lowering cord and handset cords must not exceed 1805 mm / 71 inches (5th percentile female) from the floor.

6.11.3.18 The ceiling lift system is to be installed to meet any and all applicable installation requirements including, WorkSafeBC OHS regulations and CSA standards.

6.11.3.19 Coverage Requirements

6.11.3.19(1) Provide a single x-y gantry ceiling lift system positioned to provide full coverage of the room, space or bay and the ensuite washroom to allow for in-bed or in-stretcher positioning, lateral transfers, and seated transfers. The system will provide coverage over the toilet and designed for the motor to park and charge in the bedroom.

6.11.3.19(2) Provide x-y gantry ceiling lift systems designed for multi-bed or multi-stretcher coverage in locations as described in Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.11.3.19(3) Provide x-y gantry ceiling lift systems for designed for complex coverage in locations as described in Appendix 3A [Clinical Specifications and Functional Space Requirements] such as in Operating Rooms.

6.11.3.19(4) Final ceiling lift coverage will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.11.3.20 Motor Requirements

6.11.3.20(1) The x-y gantry is to be installed to allow for the motor to be removed and replaced as required without removing the rail mounted boom or rails.

6.11.3.20(2) The motor will use manual traverse (not powered) for movement on the boom.

6.11.4 Headwalls

6.11.4.1 All headwalls are the responsibility of Project Co and will meet the functional requirements of the Authority as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] and the requirements set out in Appendix 3F [Equipment List IM/IT].

6.11.4.2 Project Co will provide headwalls at those locations where headwall outlets are indicated in Appendix 3B [Minimum Room Requirements] and Appendix 3F [Equipment List IM/IT].

6.11.4.3 Headwalls will be designed so that raising/lowering of the bed or stretchers will not catch/interfere the headwall or adjacent equipment and cause damage to the bed, the headwall or adjacent equipment.

6.11.4.4 If a prefabricated headwall is used, Project Co will have the manufacturer's representative present in person at all meetings required under the Agreement. If used, prefabricated headwalls will be provided by the following manufacturers or acceptable alternative approved by the Authority through the process described in Schedule 2 [Design and Construction Protocols]: Class 1, Amico, BeaconMedaes, and Hillrom.

6.11.4.5 At all headwalls, provide a multiple rails system or acceptable alternative as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure] for the installation of headwall accessories and the storage of a small quantity of medical surgical supplies for ease of access for direct Patient care.

6.11.4.6 Provide all rails, accessories, and backing required for mounting monitors, baskets and other equipment as required. Project Co to consult with the Authority for determining rails and accessories through the process described in Appendix 2C [User Consultation and Review Procedure].

6.11.4.7 Headwalls in Inpatient Care and Maternity Care will include:

6.11.4.7(1) Non-institutional and modern Design elements including finishes and colours that are coordinated with the interior design concept and as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.11.4.7(2) Services outlets, lighting and lighting controls as required per Appendix 3B [Minimum Room Requirements] and Appendix 3F [Equipment List IM/IT];

6.11.4.7(3) Wood-grain plastic laminate to all exposed surfaces or has wood-look components in prefabricated system;

6.11.4.7(4) Opportunity for artwork above the bed head;

6.11.4.7(5) Minimum 600mm x 600mm counter with drawers including recessed pull for flowers and personal belongings at the non-nursing side of the bed;

6.11.4.7(6) Reveals and joints that align and are coordinated with other features in the room such as; bed bumpers and sheet wall protection; and

6.11.4.7(7) Area for clean supply storage and computer charting workstation for Staff.

6.11.4.8 Provide a counter in the LDRP Patient room with upper and lower cupboards adjacent to the infant headwall, for storage of consumable medical supplies, refer to Appendix 3B [Minimum Room Requirements].

6.11.4.9 Provide storage at the nursing side for fetal monitor and non-nursing side for consumable medical supplies, refer to Appendix 3B [Minimum Room Requirements].

6.11.4.10 Headwalls in Mental Health Areas will:

6.11.4.10(1) Be specifically designed for behavioural health environment and prohibit Patient access to devices such as electrical receptacles, medical gas outlets, and nurse call equipment;

6.11.4.10(2) Feature a protective cover to absorb high impact forces without breaking or permanently deforming and include an image that is digitally printed on the inside to create a more calming, less clinical, environment; and

6.11.4.10(3) Be shaped to prevent ligature points with Tamper Resistant fasteners and fittings;

6.11.5 Safe Boxes

6.11.5.1 Provide a safe box in the locations indicated in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements].

6.11.5.2 Provide a safe box at all wardrobe locations, refer to Appendix 3B [Minimum Room Requirements].

6.11.5.3 Safe boxes will be integrated and securely fastened to the Millwork piece they are required to be placed in.

6.11.5.4 Provide Millwork or Modular Casework to conceal all safe boxes from public view.

6.11.5.5 Safe boxes will have the following features:

6.11.5.5(1) LED display;

6.11.5.5(2) 3 to 6-digit PIN code options;

6.11.5.5(3) Mechanical key override – single key for all safe boxes;

6.11.5.5(4) On hold time after 4 wrong consecutive attempts;

6.11.5.5(5) Anti-drill rotating bolts;

6.11.5.5(6) Battery powered;

6.11.5.5(7) Power status display on screen;

6.11.5.5(8) ADA compliant keyboard;

6.11.5.5(9) “Code to close” technology;

6.11.5.5(10) Approximate external dimensions: 190 mm in height, 430 mm in width, and 460 mm in depth; and

6.11.5.5(11) Approximate volume: 38 L.

6.11.6 Fall Protection and Window Washing Access

6.11.6.1 Provide fall protection and window washing access in accordance with Part 11 of WSBC guidelines.

6.11.6.2 Provide a complete system with safety tie-back, life line anchors, horizontal life line system and associated equipment for the Authority's 24/7 safe building maintenance operations including window-washing.

6.11.6.3 Provide roof anchors with sufficient capacity to support the use of a window washing platform suspended from the roof level. Window washing by a worker suspended by a vertical lifeline or bosun chair from a roof anchor is not permissible.

6.11.7 Fully Integrated Modular Diffuser System

6.11.7.1 Project Co may provide a fully integrated modular diffuser system for Perioperative Services Component. The system will include:

6.11.7.1(1) Air supply from a single large diffuser system of modular construction consisting of a continuous ceiling grid with an aluminum air frame HEPA filter grid channel;

6.11.7.1(2) An integrated LED lighting system;

6.11.7.1(3) Integrated boom mounts;

6.11.7.1(4) Guillotine style, room side adjustable dampers; and

6.11.7.1(5) Laminar air diffusers.

6.11.7.2 Basic Requirements

6.11.7.2(1) The fully integrated modular diffuser system will be required to completely seal off the interstitial ceiling space from the room.

6.11.7.2(2) The diffuser system will include a steel air delivery duct that is an integrated part of the ceiling system. The steel duct is required to pressurize the system for distribution through each individual supply air opening in the ceiling.

6.11.7.2(3) The steel duct will have a powder coating to ensure all exterior and interior surfaces are protected.

6.11.7.2(4) The ceiling system will accept equipment boom loads directly as part of an engineered system. Provide signed and sealed drawings from Project Co's Structural Engineer-of-Record.

6.11.7.3 Acceptable manufacturers include AirFrame as manufactured by SLD Technologies, Inc. or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.11.7.4 Performance Requirements

6.11.7.4(1) The fully integrated modular diffuser system will utilize an LED lighted grid and powder-coated steel HEPA filtered air frame.

6.11.7.4(2) HEPA filters, diffusers, guillotine style balancing dampers and blank pans will be capable of being loaded from the bottom of the system directly into the grid opening.

6.11.7.4(3) All lighting components will be accessible from the room side.

6.11.7.4(4) The system will incorporate a hinged damper/diffuser assembly capable of being independently opened for repeated cleaning as well as access for HEPA filter installation. The system will utilize a damper/diffuser assembly that is room side adjustable.

6.11.7.4(5) The damper/diffuser assembly will incorporate Tamper Resistant fasteners for access to the guillotine style damper adjustment mechanism.

6.11.7.4(6) Systems that utilize balancing dampers located upstream of the HEPA are not permitted.

6.11.7.4(7) Systems that utilize balancing dampers that are not room side adjustable are not permitted.

6.11.7.4(8) Grid members will be formed together into modules. Grid will be caulked with an appropriate sealant as necessary.

6.11.7.4(9) The ceiling support grid will be structurally designed so as to remain dimensional stability.

6.11.7.4(10) The lighted grid system will have integrated LED lighting within the grid channel.

6.11.7.4(11) Light fixtures that block the airflow within the supply air, such as recessed light troffers, are not permitted.

6.11.7.4(12) All lighting components will be pre-installed. Systems that require field installation of lighting components are not permitted. Lighting circuits will utilize quick connect fittings for module to module connection.

6.11.7.4(13) The complete lighting system consisting of LED assemblies, drivers, wireway, lenses, and wiring will be an integral part of the lighted grid. The LED lighted grid will be CSA approved (or equivalent) and so identified:

6.11.7.4(13)(a) The drivers will be housed within the grid channel and accessible from the room side. Drivers will be CSA approved (or equivalent) and so identified. Drivers may be remote mounted in an enclosure attached to the side of the system and accessible through an access panel in the perimeter ceiling. The access panel size will be a minimum of 610 mm x 610 mm;

6.11.7.4(13)(b) Wiring within the grid for the lighting circuit will be contained within and protected by the grid system. The system will have the ability to handle circuits from two different power branches (UPS and vital). The system will have the ability to handle line voltage and low voltage control wiring circuits. The light lens will sit flush with the bottom of the air frame grid channel. Light lens covers will be clear acrylic or polycarbonate ribbed diffusers that snap flush to the grid channel without external fasteners;

6.11.7.4(13)(c) LED lighting components will be able to easily snap into the grid without the use of rivets, nuts, bolts or other hardware fasteners;

6.11.7.4(13)(d) The system will use Indigo-Clean™ LED technology with two operational modes: white disinfection mode and indigo disinfection mode. White disinfection mode is a white LED array for ambient lighting plus simultaneous low power 405nm indigo array for low-level continuous environmental disinfection. Indigo disinfection mode is a high power 405nm indigo LED array for continuous environmental disinfection. The operational mode will be determined via an internal low-voltage device based upon input provided by an external IC100 room control system. The system will include the following features:

6.11.7.4.13.(d).1 Serviceable composite-bodied mid-power white LED array and high-power 405 nm indigo LED array;

6.11.7.4.13.(d).2 3700K colour temperature with maximum 3-step MacAdam variation allowance;

6.11.7.4.13.(d).3 Minimum 90 CRI;

6.11.7.4.13.(d).4 120/277VAC, 50/60Hz electrical input with Serviceable high-power factor electronic, constant-current drivers (<10% THD, >0.90 PF), compatible with the Facility's addressable lighting control system. Minimum 85% driver efficiency; and

6.11.7.4.13.(d).5 Standard addressable dimming with 1-100% range with dim-to-dark capabilities in white disinfection mode. 700 µA maximum source current.

6.11.7.4(14) The HEPA filtered air frame system will incorporate air passages on all sides to jet air underneath the lighted grid so as to wash the area below the lights of particles. The top duct, steel structures and air frame channels will be protected with a powder-coat finish. All hardware will be stainless steel.

6.11.7.4(15) The lighted grid system will be capable of attaching clips for suspending ceiling lifts, equipment supports, and other components as required.

6.11.7.4(16) Solid blank filler panels will be constructed of powder coated steel or aluminum with welded corners, an upward facing trough and designed to affect an airtight seal in the channel grid. The finish of the panel will match the ceiling grid finish.

6.11.7.5 Air Supply Integrated to Ceiling Grid

6.11.7.5(1) Provide an air delivery duct attached to the ceiling grid as an integral part of the ceiling grid diffuser system. Modules will be supplied completely pre-assembled with the lighting grid, HEPA filtered air frame and duct as one piece.

6.11.7.5(2) Modules will be welded or rivet style construction using steel roof panels welded to HSS framing or steel side panels. System will be sized so as to meet structural load requirements. Holes will be provided at the perimeter of the module roof for suspension. The entire ceiling grid module will be coated with a baked-on powder coating.

6.11.7.5(3) Units will be manufactured to dimensional tolerance of +/- 1/8" on width and length and diagonal dimensions or squareness of +/-1/8".

6.11.7.5(4) The HSS framed modules will be capable of accepting equipment boom loads directly as part of an engineered structural system.

## 6.12 Furniture, Clinical Systems Furniture and Systems Furniture (Division 12)

### 6.12.1 Basic Requirements

6.12.1.1 This section is to be read in conjunction with Appendix 3A [Clinical Specifications and Functional Space Requirements], Appendix 3B [Minimum Room Requirements] and Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

6.12.1.2 Provide Furniture, Clinical Systems Furniture and Systems Furniture and accessories as required to support the programs and functions described in Appendix 3A [Clinical Specifications and Functional Space Requirements] and to support the operation of the Facility. Refer to Appendix 2E [Clinical Equipment and Furniture] for Authority supplied items.

6.12.1.3 Provide all grommets, mounting brackets, height adjustability, storage, work surfaces, charting counters and Care Team Stations to meet the needs of each department.

6.12.1.4 Provide locks and keyboard trays and all items required to support the programs and functions described in this Schedule. Locks will use the WTSR keyway and on the building master key system.

6.12.1.5 Provide power and data in accordance with the manufacturer's specifications and requirements. Refer to Section 7.9 Electrical (Division 26) and Section 7.10 Communications (Division 27) for additional requirements.

6.12.1.6 Project Co will be responsible to coordinate all elements of a room's design, architectural, electrical and IM/IT, with the Authority supplied items listed in Appendix 2E [Clinical Equipment and Furniture].This includes pathways, junction boxes, receptacles and the specific routing of electrical and data cabling to and through the wire ways.

6.12.1.7 Casework and Clinical Systems Furniture will be coordinated with equipment and Furniture that will be provided by Authority, as described in Appendix 2E [Clinical Equipment and Furniture].

6.12.1.8 Clinical Systems Furniture installed in lieu of Millwork will be plywood core construction. No particleboard, MDF or fibreboard allowed.

### 6.12.2 Performance Requirements

6.12.2.1 All Furniture, Clinical Systems Furniture and Systems Furniture supplied by Project Co will:

6.12.2.1(1) Be ergonomically designed and functional for multiple work heights, including sitting, stool-height sitting and standing;

6.12.2.1(2) Be height adjustable where described as required in Appendix 3B [Minimum Room Requirements];

6.12.2.1(3) Have sealed surfaces and be covered in upholstery material that is inert and will not support microbial growth and is cleanable with hospital-grade disinfectant;

6.12.2.1(4) Be cleanable and able to withstand frequent cleaning and routine hospital disinfection;

6.12.2.1(5) If upholstered, be of a material that is impermeable and non-shedding when located in Patient accessible areas and any area where Staff goes after providing direct Patient care (including Care Team Station, Staff Lounge, conference rooms and office within Patient care areas). The material will be non-textured and free of crevices/seams that can trap dust and dirt. Polyurethane fabrics are preferred, if they meet the requirements of the application;

6.12.2.1(6) Be provided with locks to secure all cabinets and drawers whether in a locked room or not; Locks will use the Schlage WTSR keyway and on the building master key system. Keyway will be oriented vertically; and

6.12.2.1(7) Be provided with valance lighting underneath all upper cabinets including above workstations, work surfaces or countertops.

6.12.2.2 Additional requirements for any Project Co provided Furniture, Modular Casework, Clinical Systems Furniture and Systems Furniture include the following:

6.12.2.2(1) Flexibility

6.12.2.2(1)(a) Provide products that enable flexibility.

6.12.2.2(1)(b) Allow for individualization.

6.12.2.2(1)(c) Possess the ability to be used in different applications or flex easily for future use.

6.12.2.2(1)(d) Use non-handed solutions that work in multiple configurations, wherever possible.

6.12.2.2(2) Durability

6.12.2.2(2)(a) Provide products engineered for high traffic use, where required.

6.12.2.2(3) Construction

6.12.2.2(3)(a) Products with replaceable components are preferred.

6.12.2.2(3)(b) Wood will be avoided in Clinical Spaces and conference rooms. Where utilized, wood pieces will be constructed of:

6.12.2.2.3.(b).1 Solid wood frames of kiln dried wood for added strength and long-term durability;

6.12.2.2.3.(b).2 A frame capable of supporting varying weights and body types and offering ease and reassurance to both Patients and Staff;

6.12.2.2.3.(b).3 Plastic laminates may be used in place of real wood when a wood-look is desired;

6.12.2.2.3.(b).4 The material will be smooth, non-porous, non-shedding and able to withstand repeated hospital-grade cleaning and disinfection; and

6.12.2.2.3.(b).5 All cores will be plywood or laminated wood. No fibreboard, MDF or particle board cores allowed.

6.12.2.2(4) Seating

6.12.2.2(4)(a) Seating will consist of steel tube and spring-seat construction.

6.12.2.2(4)(b) Provide seating with wall-saver legs or a wall-saver back design.

6.12.2.2(4)(c) Provide seating with arms that include polyurethane arm caps, upholstered arm caps will not be acceptable.

6.12.2.2(5) Tables

6.12.2.2(5)(a) Provide solid surface horizontal table surfaces.

6.12.2.2(5)(b) Front edges will feature a profile for user comfort and be of durable material composition and construction.

6.12.2.2(6) Workstations and Desks

6.12.2.2(6)(a) When installed, two adjoining end panels of work surfaces will be leveled so work surfaces sit at the same height.

6.12.2.2(7) Filing / Storage

6.12.2.2(7)(a) Filing will be provided for letter filing, unless specified otherwise. In order to maximize filing capacity, files will be set up for side-to-side filing.

6.12.2.2(7)(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.

6.12.2.2(7)(c) At a minimum, two-drawer files will include a counter-balance package as recommended by the product manufacturer.

6.12.2.2(7)(d) Lockable storage will be keyed as per the Facility keying system. Keying schedule to be determined with the Authority.

6.12.2.2(7)(e) Filing of Patient charts at Care Team Stations to meet the needs of each department.

6.12.2.2(8) Cleaning and Ease of Maintenance

6.12.2.2(8)(a) The size, shape, and design will allow easy access for cleaning.

6.12.2.2(8)(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.

6.12.2.2(8)(c) 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).

6.12.2.2(8)(d) Project Co will request that manufacturers provide detailed cleaning and disinfection guidelines prior to purchase along with a thorough listing of which cleaning products will be used on their products.

6.12.2.2(8)(e) Project Co will review instructions to ensure they are clear and cleanable with Authority-approved detergents and disinfectants.

6.12.2.2(8)(f) Other upholstered soft furnishings will have the following characteristics:

6.12.2.2.8.(f).1 Be seamless where possible or have double stitched seams located on the non-contact areas of the Furniture or sealed;

6.12.2.2.8.(f).2 Limited pleating;

| | | |
|---|---|---|
| | 6.12.2.2.8.(f).3 | Upholstered Furniture in Clinical Spaces will be covered with fabrics that are fluid-resistant, non-porous and will withstand cleaning with hospital grade disinfectants; |
| | 6.12.2.2.8.(f).4 | Seating will have removable seat cushions for cleaning between the seat and back for lounge seating applications; |
| | 6.12.2.2.8.(f).5 | Seating will have removable upholstery covers for both the seat and back, if applicable; and |
| | 6.12.2.2.8.(f).6 | Have high-destiny foam cores with a moisture barrier and resistance to mold. |
| 6.12.2.2(8)(g) | Upholstery will: | |
| | 6.12.2.2.8.(g).1 | Be impermeable to water and quick-drying; |
| | 6.12.2.2.8.(g).2 | Be anti-microbial, and/or have anti-microbial inhibitor technology; |
| | 6.12.2.2.8.(g).3 | Have an abrasion rating for high-use areas (with a minimum of 100,000 DR (ASTM D4157-02 Wyzenbeek Test Method); |
| | 6.12.2.2.8.(g).4 | Have a high-rating for colour-fastness, exceeding 40 hours (AATCC Method 16A); |
| | 6.12.2.2.8.(g).5 | Be stain-resistant; |
| | 6.12.2.2.8.(g).6 | Be latex-free; |
| | 6.12.2.2.8.(g).7 | Be compliant to LEED’s Low Emitting Furniture Evaluation criteria; |
| | 6.12.2.2.8.(g).8 | Contain no heavy metals; and |
| | 6.12.2.2.8.(g).9 | Have no halogenated flame-retardant materials or perfluorinated chemicals (PFCS). |

6.12.2.2(9) Comfort, Efficiency, and Safety

6.12.2.2(9)(a) Seating will have the stability to assist the Patient or visitor in entering and exiting the chair.

6.12.2.2(9)(b) All items of Furniture (including tables) will be stable and will not move or tip over when touched by a person requiring support.

6.12.2.2(10) Furniture will not be placed near railings and constitute a hazard for persons who have visual limitations and will be usable by Persons with Disabilities.

6.12.2.2(11) 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.

6.12.2.3 Furniture

6.12.2.3(1) Furniture means loose or unattached items that can be rearranged to suit various activities and includes:

6.12.2.3(1)(a) Coffee tables and side tables;

6.12.2.3(1)(b) Unattached seating (such as chairs and stools); and

6.12.2.3(1)(c) Office desks.

6.12.2.3(2) Refer to Appendix 2E [Clinical Equipment and Furniture] for Authority provided Furniture to be incorporated into the design and coordinated by Project Co.

6.12.2.4 Clinical Systems Furniture

6.12.2.4(1) Clinical Systems Furniture means factory-produced component system designed to be replaceable, reconfigurable, and interchangeable, and designed for specific use in health care facilities including Mental Health Areas.

6.12.2.4(2) The Authority will consider Clinical Systems Furniture in lieu of Millwork and Modular Casework solutions provided it meets the functional requirements of Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.12.2.4(3) Clinical Systems Furniture will include all accessories, storage, cabinetry, upper and lower shelving, and counters necessary to meet the functional requirements.

6.12.2.4(4) Staff workstations in Clinical Spaces where the Authority will consider Millwork and Modular Casework solutions include:

6.12.2.4(4)(a) Reception/Information Desks;

6.12.2.4(4)(b) Medication Rooms;

6.12.2.4(4)(c) Business Centres;

6.12.2.4(4)(d) Assessment rooms;

6.12.2.4(4)(e) Breakout rooms;

6.12.2.4(4)(f) Dictation booths;

6.12.2.4(4)(g) Alcove-Touchdown/Charting;

6.12.2.4(4)(h) Care Team Stations; and

6.12.2.4(4)(i) Registration/Triage.

6.12.2.4(5) Clinical Systems Furniture could be considered for Staff workstations in the following areas:

6.12.2.4(5)(a) Exam Rooms;

6.12.2.4(5)(b) Trauma/Resuscitation Suite; and

6.12.2.4(5)(c) Clinical Workrooms;

6.12.2.4(6) Clinical Systems Furniture will be capable of being easily rearranged to change the configuration or to include additional modules and accessories.

6.12.2.5 Systems Furniture

6.12.2.5(1) Systems Furniture means a composition of factory-produced panels, work surfaces and shelves produced by a single manufacturer that are reconfigurable and interchangeable.

6.12.2.5(2) Systems Furniture is designed for administrative or educational use and includes accessories and attachments that complete its functionality.

6.12.2.5(3) The Authority will consider Systems Furniture in lieu of Millwork and Modular Casework solutions provided:

6.12.2.5(3)(a) It meets the functional requirements of Appendix 3A [Clinical Specifications and Functional Space Requirements]; and

6.12.2.5(3)(b) Systems furniture will be plywood core construction and does not contain any particleboard, MDF or fibreboard in its construction.

6.12.2.5(4) Systems Furniture will include all accessories, storage, cabinetry, upper and lower shelving, and counters necessary to meet the functional requirements.

6.12.2.5(5) Staff workstations are areas in particular where the Authority will consider Systems Furniture in lieu of Millwork and Modular Casework solutions and include:

6.12.2.5(5)(a) Office workstations;

6.12.2.5(5)(b) Touchdown workstations; and

6.12.2.5(5)(c) Non clinical workrooms.

6.12.2.5(6) Provide low height moveable walls in waiting areas sub-divide the space, as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.12.3 Window Coverings

6.12.3.1 Basic Requirements

6.12.3.1(1) Project Co will provide window coverings:

6.12.3.1(1)(a) On all exterior windows for 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);

6.12.3.1(1)(b) On all interior windows where privacy is a concern as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.12.3.1(1)(c) In Multimedia Rooms and all other rooms where video conferencing is required.

6.12.3.1(2) Window coverings will allow control of exterior light entering the room during daylight hours and provide privacy during daylight and non-daylight hours.

6.12.3.1(3) Use window coverings manufactured from materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control, refer to Section 5.10 for additional requirements.

6.12.3.1(4) Window covering controls will be Ligature Resistant type with no loops or chains in Clinical Spaces. Where window treatments controls are difficult to reach, motor operated blinds will be provided.

6.12.3.1(5) Manual roller shade chain drive window shade in non-clinical use spaces will meet the following requirements:

6.12.3.1(5)(a) Tension activated lifting mechanism with multi-layer concentric constant tension;

6.12.3.1(5)(b) Lifting mechanism with a memory tension lock;

6.12.3.1(5)(c) Shades will not require re-tensioning after removal for cleaning; and

6.12.3.1(5)(d) Internally free-floating mechanism along grooved non-corrosive shaft, and reversible for future alterations and maintenance by the Authority.

6.12.3.1(6) Provide laser blocking blinds in ORs and other spaces where lasers would be in use, as described in Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.12.3.2 Roller Shades

6.12.3.2(1) Project Co will provide roller shades or vertical blinds at all exterior windows, or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.12.3.2(2) Provide a factory assembled shade unit consisting of fabric, shade roller tube, hem bar, removable extruded aluminum fascia, mounting brackets, end caps, and drive assembly and miscellaneous hardware.

6.12.3.2(3) Provide roller shades consisting of PVC shading fabric, vinyl-coated polyester or fibreglass yarn that:

6.12.3.2(3)(a) 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, monolithic and not divided into more than one sheet per window panel;

6.12.3.2(3)(b) Non-textured/smooth and able to withstand hospital-grade cleaning/disinfection;

6.12.3.2(3)(c) Conforms to CAN/CBSB-4.162 M, Hospital Textiles - Flammability Performance Requirements; and

6.12.3.2(3)(d) Is tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21

6.12.3.2(4) Roller shades systems in Patient bedrooms will be recessed into the ceiling to protect the roller blind when not in use, keep it clear when windows are cleaned, and protect the roller shade from dust collection.

6.12.3.2(5) Roller shades will have foil or silver finish on the exterior facing side only to reflect solar heat;

6.12.3.2(6) Coordinate size and finish of roller shade valence to account for all access and maintenance requirements of roller shade box assembly.

6.12.3.3 Blackout Blinds

6.12.3.3(1) Project Co will provide blackout blinds in windows and doors in the following locations:

6.12.3.3(1)(a) Oncall Suites;

6.12.3.3(1)(b) NICU Patient rooms;

6.12.3.3(1)(c) Patient room-Ante/Post Partum rooms; and

6.12.3.3(1)(d) In multimedia rooms with external glazing as described in Section 7.10.15.10.

6.12.3.3(2) Provide blackout blinds which meet the following requirements:

6.12.3.3(2)(a) Flammability per NFPA 701: Pass;

6.12.3.3(2)(b) Fungal resistance: No growth when tested per ASTM G21;

6.12.3.3(2)(c) Room-darkening channels: Extruded aluminum side and centre channels with brush pile edge seals, mounting base and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control; and

6.12.3.3(2)(d) Openness factor equal to 0% to block all light or as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.12.3.4 Integral Blinds (Venetian-type blinds between glass)

6.12.3.4(1) Provide integral blinds in the following locations:

6.12.3.4(1)(a) In door glazing as described in Appendix 3B [Minimum Room Requirements];

6.12.3.4(1)(b) In all interior windows in Mental Health Areas;

6.12.3.4(2) Provide integral blinds with the widest blades available.

6.12.3.4(3) Integral blind will:

6.12.3.4(3)(a) Consist of tempered aluminum alloy slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape;

6.12.3.4(3)(b) Use tapes with no special end rails required to attach the suspension members from the window opening to the blind;

6.12.3.4(3)(c) Be laser ready in all locations where laser equipment will be used; refer to Appendix 2E [Clinical Equipment and Furniture]. Laser ready means providing all required filter or barriers to reduce any transmitted laser radiation to levels below the applicable MPE (maximum permissible exposure) level; and

6.12.3.4(3)(d) Not allow air movement from any room to adjacent rooms. Openings in the glazing plane are not acceptable.

6.12.3.4(4) Integral blind glazing units will be a hermetically sealed consisting of glass panes on both sides of an airspace, fitted with integral interlocking louver blades. Provide 10-year warranty for glazing units with integral blinds.

6.12.3.4(5) Control of Integral Blinds

6.12.3.4(5)(a) Provide an operator specially constructed with a permanent magnet capable of moving the blind assembly from a closed position in one direction to a closed position in the opposite direction.

6.12.3.4(5)(b) Provide fully adjustable positioning allowing 180-degree rotation in a continuous cycle, allowing a full range of privacy position options.

6.12.3.4(5)(c) Chain, pull down cords or rod type controls will not be permitted.

6.12.3.4(5)(d) Controls for integral blinds in the Secure Rooms will be located in the Secure Room Anteroom.

6.12.3.4(5)(e) Controls for integral blinds in Patient bedroom doors will be lockable and located on the corridor side, and tamper resistant and anti-ligature on the Patient bedroom side;

6.12.3.4(5)(f) All other control locations will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.12.3.5 TV Housing

6.12.3.5(1) Where TV are required in Mental Health Areas:

6.12.3.5(1)(a) Provide a secure, transparent, Ligature Resistant, Tamper Resistant, and impact resistant housing sized to encapsulating the device. Final sizing and location of TV housings will be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]; and

6.12.3.5(1)(b) TV housing to consist of minimum 12mm clear tempered laminated glass consisting of 3mm clear tempered, 6mm polycarbonate lexan and 3mm clear tempered glass.

6.13 Special Construction (Division 13)

6.13.1 Radiation Shielding System

6.13.1.1 Provide radiation shielding system in walls, doors, floors, Millwork, Modular Casework, ceilings and windows as required and appropriate to protect Staff and Patients from x-ray, imaging digitizing, radiology, and other rooms in the radiation protection shield.

6.13.1.2 Unless otherwise noted, provide a radiation shielding system where required by Appendix 3A [Clinical Specifications and Functional Space Requirements] and the equipment listed in Appendix 2E [Clinical Equipment and Furniture]; and:

6.13.1.2(1) The following rooms in Emergency Department Component:

6.13.1.2(1)(a) Trauma/Resuscitation Suite.

6.13.1.2(2) The following rooms in Perioperative Services Component:

6.13.1.2(2)(a) Operating Room;

6.13.1.2(2)(b) Workroom-Biomed

6.13.1.2(3) The following rooms in Diagnostic Cardiology Clinic Component:

6.13.1.2(3)(a) Laboratory-Stress Testing Room;

6.13.1.2(3)(b) Alcove-Viewing.

6.13.1.2(4) The following rooms in Biomedical Engineering Component:

6.13.1.2(4)(a) Workroom-Biomed-CT

6.13.1.3 Provide lead sheet of appropriate weight and thickness into wall and door assemblies and leaded glass manufactured for radiation shielding purposes into window assemblies.

6.13.1.4 Provide radiation shielded doors that meet or exceed;

6.13.1.4(1) American National Standards Institute/ National Woodworkers Manufacturers Association (ANSI/NWMA) Industry Standard for wood doors, NCRP Report No. 147 and NCRP Report #49.

6.13.1.5 Fabricate radiation-shielded doors using a single layer of sheet lead with wood core laminated on each side of the lead. Bond cores using poured lead dowels at edges. Other option is to fabricate doors with two layers of sheet lead, one at each side of central core with veneer cover each side. For double shielded doors, a shielded astragal is required.

6.13.1.6 Fabricate radiation-shielded door frames with lead-lining. Ensure that proper overlap of lead shielding is provided at all interfaces with radiation shielded doors.

6.13.1.7 Provide lead glass or lead louvers occurring in radiation shielded doors that is equivalent rated to sheet lead in doors, meet or exceed Federal Specification DD-G-451.

6.13.1.8 For cassette transfer cabinets, provide radiation shielding that meets or exceeds MIL-C-3673 (DM). CR cassette storage is required to be protected from scatter radiation to reduce baseline ‘radioactive fog’ and to meet requirements as specified in Safety Code 35 and NCRP.

6.13.1.9 Provide sheet lead that meets or exceeds the Federal Specification QQL-201F Chemical Analysis, Grade C.

6.13.1.10 Radiation shielding system will comply with Diagnostic Accreditation Program, WSBC, and applicable Health Canada Safety Code (i.e. 35 and 36). X-ray radiation safety measures will ensure that Staff and public receive < 1 mSv/yr from medical radiation.

6.13.1.11 Project Co will provide a full quality control, inspection, and testing program for all installations and provide verification reports assuring compliance to all requirements.

6.13.1.12 All radiation shielding systems will be designed and installed under the supervision of an independent physicist certified by the CCPM in diagnostic radiological physics engaged by Project Co and to be in attendance during the process described in Appendix 2C [User Consultation and Review Procedure].

6.13.1.13 Maintain a full record of lead installation on site including written reports and complete photo documentation of entire installation.

6.13.1.14 For sheet lead applied directly to partition steel studs, provide a continuous and complete protective shield that forms an unbroken barrier around the room.

6.13.1.15 Lead-laminated GWB is not acceptable.

6.13.1.16 Modular Radiation Shielding Barriers

6.13.1.16(1) Provide full body modular radiation shielding barriers as required and appropriate to protect Staff and Patients from x-ray, imaging digitizing, radiology, and other rooms in the radiation protection shield.

6.13.1.16(1)(a) All modular radiation shielding barriers will be minimum 2140mm high and provided with view panels using distortion free safety lead glass.

6.13.1.16(1)(b) Provide scratch resistant safety lead glass with compatible lead equivalencies, providing radiation shielding, high light transmission that will not discolour due to radiation or cleaning chemicals.

## 6.14 Conveying Equipment (Division 14)

### 6.14.1 Elevators – General

6.14.1.1 Project Co will retain a vertical transportation consultant that is a professional engineering firm specializing in vertical transportation as part of the Project team. The vertical transportation consultant will provide comprehensive vertical transportation study and analysis of the Facility design to determine the number, size and speed of the elevators for proposed plan. The requirements set out in a prescriptive manner herein are based on the Indicative Design and will be considered minimums.

6.14.1.2 Submit analysis conforming to performance requirements to demonstrate suitable Design for a contemporary hospital facility of this nature. Submit analysis report to the Authority for review, with report clearly defining all assumptions and basis of analysis.

6.14.1.3 Refer to LMFM Division 14 - Vertical Transportation Technical Guidelines and Compliance Log, that have been provided, as a guideline of requirements for this Project. Project Co will complete the Compliance Log and submit to the Authority for review and acceptance under the Review Procedure. Where contradictions exist between the Statement of Requirements and the Technical Guidelines, the most stringent requirement as determined by the Authority will be met.

6.14.1.4 Elevator service in a hospital is evaluated based on demands placed on the system during a typical, five-minute, heavy, two-way traffic period, (i.e., considerable traffic is being handled in both the UP and DOWN directions), with passenger and vehicles entering and exiting the cars at various floors throughout the elevator round trip.

6.14.1.5 Elevator analysis, to provide service excellence in health care facilities, is predicated on the projected peak population, of visitors, Patients, and Staff counts, in the Facility and the projected vehicle traffic.

6.14.1.6 Handling Capacity

6.14.1.6(1) The public passenger elevators will be capable of providing vertical transportation of the entire public population plus 10% of the Staff population and up to a possible maximum of 20% population migration from the existing Nursing Tower public passengers.

6.14.1.6(2) Public passenger elevators will have a handling capacity of at least 12% of the public and staff population utilizing these elevators, for a peak 5-minute period.

6.14.1.6(3) Patient transfer/Staff service elevators will have a handling capacity of at least 4% of total number of beds and 12% of total Staff and Patient population utilizing the Patient Transfer/Staff service elevators for a peak 5-minute period.

6.14.1.6(4) Handling capacity refers to the number of passengers that are transported by the elevator for a prescribed peak 5-minute period.

6.14.1.7 Interval

6.14.1.7(1) Interval-based calculations will be used for the public and service elevators; the average interval for adequate elevator service will be between 30 and 50 seconds.

6.14.1.7(2) The interval is defined as the average time between elevator departures from the ground floor.

6.14.1.8 Load factor: Passenger elevators will provide adequate service with a load factor below 40%. Patient transfer/staff service elevators will provide adequate service with a load factor below 40% or a minimum of one (1) bariatric bed inclusive of four Staff. Load factor refers to the number of passengers transported by each elevator during one trip expressed as a percentage of the maximum number of passengers permitted by CSA B44 – Safety Code for Elevators and Escalators.

6.14.1.9 Separation of traffic: provide distinct separation of traffic types, public passenger elevators for public and Staff use, Patient transfer/staff service elevators for Patient traffic, and MDRD Elevators for materials traffic.

6.14.1.10 Elevator locations: elevators will be located to provide separation of traffic types as well as to minimize walking distances.

6.14.1.11 Elevator grouping: grouping elevators rather than providing single units or small groupings at various locations gains the best elevator service. In consolidating elevator service, Project Co will take into account traffic congestion and walking distance.

6.14.1.12 Migration: when more than one elevator group is available, a person or vehicle's origin does not necessarily dictate which vertical transport element will be used. A certain percentage of the population will migrate to other areas of a building and may not use the same elevator throughout the day. Elevator design will accommodate up to a maximum migration of 20% from the existing Nursing Tower.

6.14.1.13 Staff/Patient service elevator cabs: non-public elevators used to transport Patients will be able to accommodate a bariatric bed, up to four Staff, four IV pumps, extra corporeal life support equipment, portable ventilator, oxygen tanks and monitors; and have enough space to allow for Staff to carry out emergency procedures within the elevator and will be capable of transporting at least 12% of the Staff population for a peak 5 minute period.

6.14.1.14 Scope of Work

6.14.1.14(1) Provide passenger and service elevators as required to satisfy the equipment and performance specifications as herein described.

6.14.1.14(2) Provide separate groups of elevators for:

6.14.1.14(2)(a) Public Passenger;

6.14.1.14(2)(b) Patient Transfer/Staff Service; and

6.14.1.14(2)(c) Clean/Dirty MDRD.

6.14.1.14(3) Provide heavy duty equipment engineered and designed to provide long term reliable operation and performance based on the needs of the Facility.

6.14.1.14(4) Design and perform the elevator work in accordance with the latest revision of the LMFM Technical Guidelines (Division 14 Vertical Transportation) and the LMFM Baseline Technical Requirements, which are in effect.

6.14.1.14(5) Provide equipment and perform elevator work in accordance with the requirements of the most recent applicable edition of the following standards and any other codes or regulations that are in effect, at the time of award.

6.14.1.14(5)(a) CSA/B44 Safety Code for Elevators and Escalators;

6.14.1.14(5)(b) CSA/B44 Safety Code for Elevators and Escalators (Appendix E);

6.14.1.14(5)(c) Maintenance Requirements and Intervals for Elevators, Dumbwaiters, Escalators and Moving Walks, CAN/CSAB44.2-16;

6.14.1.14(5)(d) Requirements of the Elevating Devices Safety Regulation and the Safety Standards Act of BC;

6.14.1.14(5)(e) WorkSafeBC Occupational Health and Safety Regulation;

6.14.1.14(5)(f) CSA Z8000 – Canadian Health Care Facilities – Planning, Design and Construction section 12.2.6 – Elevators;

6.14.1.14(5)(g) CSA Z317.13 – Infection control during construction, renovation and maintenance of Healthcare Facilities;

6.14.1.14(5)(h) Fire Tests of Door Assemblies, CAN/ULC-S104-10;

6.14.1.14(5)(i) Canadian Electrical Code C22.1 – 06 Part 1; and

6.14.1.14(5)(j) British Columbia Building Code, 2018.

6.14.1.14(6) Include all work required for registration, testing and licensing of elevators by jurisdictional authorities.

6.14.1.14(7) Unless otherwise indicated, all stainless steel finishes will be manufacturer's standard ASTM type 304, brushed #4 finish.

6.14.1.14(8) Provide wrap-around stainless steel door jamb protection up to 1350 mm above finish floor for all elevators.

6.14.1.14(9) Use Good Industry Practice taking into consideration infection prevention and efficient flow, while also addressing movement control requirements.

6.14.1.15 Quality Assurance

6.14.1.15(1) All systems will conform to the non-proprietary requirements of the LMFM Technical Guidelines, and components will have a demonstrated record of reliable performance, in similar applications, for a minimum of five years.

6.14.1.15(2) Provide equipment capable of maintaining the Authority's 24/7 operations with power fluctuations up to 10% of normal supply voltage and machine / controller / hoistway temperatures of 0–40 degrees Celsius.

6.14.1.16 Trademarks

6.14.1.16(1) Manufacturer / elevator contractor trademarks or logos will not be visible to the public.

6.14.1.17 Maintainability

6.14.1.17(1) Provide elevator equipment that will not restrict the ability to engage a competent elevator maintenance contractor other than the original

manufacturer / installer for the provision of all maintenance, diagnostic, repair and replacement services. Where microprocessor-based control systems are supplied, provide on-board diagnostic tools and associated manuals containing all set-up parameters, code references and troubleshooting instructions required for routine maintenance, repairs, replacement, refurbishment and operating adjustment procedures.

6.14.1.17(2) Elevator equipment will not include any software, counters, timers, or other devices that will automatically shut down, alter, or otherwise effect normal equipment operation.

6.14.1.18 Non-proprietary

6.14.1.18(1) Non-proprietary will refer to all elevator systems and equipment meeting established standards for universal serviceability and maintainability. These standards will include the following elements:

6.14.1.18(1)(a) Parts and equipment can be purchased, installed and maintained by any elevator company;

6.14.1.18(1)(b) Repairs, upgrades, parts integration, replacement, diagnostic and programming information, tooling at sale or upon request, technical support and training where required to support the products will be readily available for not less than 25 years;

6.14.1.18(1)(c) Control systems will include diagnostic tool functions, either onboard or in a separate device provided that such maintenance, adjustment and troubleshooting device or system provides unrestricted access to all parameters, levels of adjustment, and provides alerts for necessary maintenance of the equipment;

6.14.1.18(1)(d) A proprietary tool will not be required for any reason. Any lost or damaged tool must be promptly replaced or repaired at reasonable market cost;

6.14.1.18(1)(e) Manuals, engineering drawings, circuit diagrams and prints will be provided with the equipment at time of delivery. All documentation will be available for replacement purchase, at reasonable cost, by any installing or maintaining elevator contractor or persons so designated by the Authority;

6.14.1.18(1)(f) Software or software keys will not expire;

6.14.1.18(1)(g) Software operation will not degrade, and all service updates to the original software will be provided by the

control manufacturer free of charge to the Authority for not less than 25 years; and

6.14.1.18(1)(h) The control manufacturer will provide direct support and diagnostic information to the Authority and their designated maintenance company. Factory and/or on-site training regarding installation, adjustment, maintenance and troubleshooting of the equipment will be available from the original equipment manufacturer for not less than 25 years. Training fees will be reasonable and appropriate to the market.

6.14.1.18(2) Include a standard 2 (two)-years parts and labour warranty of the elevator equipment from the date of Substantial Completion. Refer to the Authority's Elevator Maintenance – Services Agreement.

6.14.1.18(3) Project Co will enter into a separate contract for a 1 (one)-year Elevator Maintenance – Service Agreement as outlined in the LMFM Elevator Contract Template which will be assigned to the Authority at Substantial Completion. Costs associated with the 1-year Elevator Maintenance – Service Agreement will be included in the Contract Price.

6.14.1.18(4) Elevators will be designed to ensure maintenance can be carried out only on floors that do not contain Clinical Spaces.

6.14.2 Elevators – Products

6.14.2.1 Patient Transfer/Staff Service Elevators

6.14.2.1(1) Provide, as a minimum, a total of two (2) overhead traction type Patient Transfer/Staff Service Elevators servicing all occupied floors that contain program space as required by the Facility.

6.14.2.1(2) Elevators will have rated capacity of 3640 kg (8000 lb.), rated speed of 1.78 mps (350fpm). Elevators will be engineered to accommodate Class C3 concentrated loads equivalent to 75% of the rated capacity with nickel silver sills.

6.14.2.1(3) Provide entrances at each floor served with 1830 mm (72") wide x 2438 mm (8'-0") high horizontal sliding, two speed, centre-opening doors and finished in stainless steel.

6.14.2.1(4) Provide car enclosure with minimum nominal clear inside (finished panel to panel) dimensions of 2134 mm (7'-0") wide, 3050 mm (10'-0") deep, minimum overall height of 3050 mm (10'-0"), with 2896 mm (9'-6") to underside of suspended ceiling or lighting coves. Provide car enclosure with flat handrails and bumper rails.

6.14.2.1(5) Provide car enclosure with stainless steel fronts, a minimum of two (2) car operating panels and durable finishes appropriate to the Facility. Provide nominal 100 mm wide stainless steel hand rail and 155 mm wide stainless-steel bumper rail, bar type, with turned back ends.

6.14.2.1(6) Configure elevators as conventional overhead traction machine type. Locate the machine room directly above the elevator hoistway. Machine room-less type elevators are not acceptable. In addition to the entry/exit door for the machine room, a Utility access opening with two side by side fire rated doors will be included into the machine room design to facilitate the removal of machines and other machine room equipment from the Facility. Minimum size for such openings will be 6'-0" wide x 6'-8" high.

6.14.2.2 Public Passenger Elevators

6.14.2.2(1) Provide, as a minimum, a total of two (2) overhead traction type public passenger elevators servicing all floors as required by the Facility.

6.14.2.2(2) Elevators will have rated capacity of 1820 kg (4000 lb), minimum rated speed of 2.54 mps (500 fpm).

6.14.2.2(3) Provide entrances at each floor served, with 1220 mm (48") wide x 2135 (7'-0") high clear horizontal sliding, centre-opening doors and finished in stainless steel.

6.14.2.2(4) Provide cab configuration to accommodate front openings only. Configurations using both front and rear openings can be confusing to the public and will be avoided. Car enclosure will have nominal clear inside dimensions of 2340 mm (7'-8") wide, 1650 mm (5'-5") deep and a minimum overall height of 2745 mm (9'-0"), with 2590 mm (8'-6") to underside of suspended ceiling.

6.14.2.2(5) Provide car enclosure with stainless steel fronts, two (2) car operating panels and durable finishes.

6.14.2.2(6) Configure elevators as conventional overhead traction machine type. Locate the machine room directly above the elevator hoistway. Machine room-less type elevators are not acceptable. In addition to the entry/exit door for the machine room, a Utility access opening with two side by side fire rated doors will be included into the machine room design to facilitate the removal of machines and other machine room equipment from the Facility. Minimum size for such openings will be 6'-0" wide x 6'-8" high.

6.14.2.2(7) Place elevator call buttons in accordance with CSA-B44 Appendix E and in appropriate colour combinations, as set out in Section 5.12 Wayfinding and Signage.

6.14.2.2(8) Inside elevator cabs, provide floor designation buttons in contrasting colours with numbers at least 4 mm high and raised 1 mm, on both sides of the doors, located between 900 mm and 1.5 m above finished floor.

6.14.2.3 Clean and Dirty MDRD Elevators

6.14.2.3(1) Provide separate, dedicated clean and soiled MDRD elevators (total of two (2) elevators), each located in its own shaft. Equipment will be holeless hydraulic type. The dedicated clean MDRD elevator will require the construction of a new hoistway and machine room. Decommission and remove the existing clean MDRD elevator and all its equipment and hoistway, after the new clean MDRD elevator is commissioned and in use. Salvage/preserve elevator equipment that can be re-used by the Authority, in particular the controller equipment.

6.14.2.3(2) The dedicated soiled MDRD elevator will be installed in an existing hoistway. The elevator in this existing hoistway will be removed, and the new soiled MDRD elevator will be designed to fit within this existing hoistway.

6.14.2.3(3) Clean and soiled MDRD elevators will be dedicated and serve only the perioperative services and the MDRD department within the Facility. Provided cab configuration to accommodate front openings only and will be determined based on the proponent's design.

6.14.2.3(4) Clean and Dirty MDRD Elevators will have rated capacity of 1360 kg (3000 lbs). A minimum rated speed of 0.76 mps (150 fpm) will be utilized for MDRD Elevators that require no more than two (2) elevator stops.

6.14.2.3(5) Car enclosure size will be maximized based on available hoistway and will have minimum nominal clear inside dimensions of 2032 mm (6'-8") wide, 1448 mm (4'-9") deep and a minimum overall height of 2745 mm (9'-0"), with 2590 mm (8'-6") clear to underside of ceiling. The cabs will be provided with flat handrails and bumper rails.

6.14.2.3(6) Provide entrances at each floor served with 1067 mm (3'-6") wide x 2134 mm (7'-0") high heavy-duty, horizontally-sliding, single-speed side-opening doors and finished in stainless steel.

6.14.2.3(7) Provide each car enclosure with stainless steel finish on the access wall elevations. Elevators with a single opening are to be provided with one (1) car operating panel. Provide 100 mm high stainless

steel hand rail and 155 mm high stainless steel foot / bumper rail, flat type, with turned back ends.

6.14.2.3(8) Provide visual and audible indicator to notify Staff that the elevator car has arrived.

6.14.2.3(9) In conformance with the latest version of the LMFM Technical Guidelines – Division 14 Vertical Transportation, ensure that pit floors and interior wall surfaces for the height of the respective Clean and Dirty MDRD Elevator hoistways are treated with a white high-gloss, anti-microbial, durable paint.

6.14.2.4 Traction Elevator Equipment

6.14.2.4(1) All equipment supplied will include a design and supply life of a minimum of 25 years.

6.14.2.4(2) Provide sound and vibration isolation pads such that there is no direct contact between the machine and the Facility structure.

6.14.2.4(3) Elevator machinery and switchgear will be adequately isolated from the Facility structure to prevent noise intrusion into occupied spaces that are not directly serviced by the elevators, i.e., all occupied spaces with the exception of elevator lobbies. Elevator noise in occupied spaces must be at least 10 dB less than the background noise levels.

6.14.2.4(4) Provide an emergency brake to stop the elevator if it overspeeds or if unintended motion is detected in accordance with CSA B44 code.

6.14.2.4(5) Provide digital encoders to provide closed loop feedback to the controller on car speed and position.

6.14.2.4(6) All major components, including controllers, door operators, drives and machines will be non-proprietary to allow for comprehensive maintenance, diagnostics and on-site programming without the use of special tools or proprietary software. Acceptable controller manufacturers are MCE 4000 or equivalent non-proprietary equipment as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.14.2.4(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.

6.14.2.4(8) Equipment will be rated for high usage, based on 240 starts per hour.

6.14.2.4(9) Including for guarding of equipment consistent with requirements of CSA B44 and local standards and regulations.

6.14.2.5 Hydraulic Elevator Equipment

6.14.2.5(1) All equipment supplied will include a design and supply life of a minimum of 25 years.

6.14.2.5(2) Provide sound and vibration isolation pads such that there is no direct contact between the power unit and the structure of the Facility.

6.14.2.5(3) All major components, including controllers, door operators, valves and pumps will be non-proprietary to allow for comprehensive maintenance, diagnostics and on-site programming without the use of special tools or proprietary software. Acceptable controller manufacturers are MCE 2000 or equivalent MCE manufactured equipment as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.14.2.5(4) Provide a microprocessor-based controller consisting of relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, wiring terminal strips, and related components all enclosed in a cabinet with hinged door panels.

6.14.2.5(5) For hydraulic elevators not equipped with safeties, a pipe rupture down overspeed pit valve will be provided at the input to the cylinder(s), to stop the elevator in the event of an overspeed condition caused by a broken supply line or an abnormally high rate of flow from cylinder to tank.

6.14.2.5(6) Provide heat exchangers as follows:

6.14.2.5(6)(a) The heat exchanger will be sized to accommodate constant use of the elevator while maintaining a maximum oil temperature of 40 degrees Celsius;

6.14.2.5(6)(b) The heat exchanger will include a temperature-controlled pump and fan; and

6.14.2.5(6)(c) The heat exchanger will be mounted outside of the machine room, unless site constraints require installation in the machine room.

6.14.2.6 Hoistway Equipment

6.14.2.6(1) Provide entrances consisting of heavy-duty commercial-grade 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.

6.14.2.6(2) Provide standard ‘T'-section steel guide rails for the car and counterweight. Install guide rails using brackets fastened to the Facility 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.

6.14.2.6(3) For traction-type elevators, provide hoist ropes/belts 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.

6.14.2.6(4) For traction-type 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 45 and 50 percent of the rated capacity.

6.14.2.6(5) For hydraulic type elevators, provide jack and cylinder as follows:

6.14.2.6(5)(a) Hole-less single-stage and two-stage telescopic hydraulic elevators are acceptable. Holed hydraulic elevators and roped hydraulic elevators are not acceptable;

6.14.2.6(5)(b) Supply will include a complete twin jack unit consisting of cylinders, pistons, piston stop rings, guide bearings and packing, all designed to suit the service, the speed, and the rated capacity;

6.14.2.6(5)(c) Means will be provided to automatically maintain the synchronization between the twin jacks (e.g. lower elevators to bottom landing and synchronize jacks, once daily);

6.14.2.6(5)(d) Project Co will coordinate with the elevator contractor to assume responsibility for all traction and hydraulic equipment, including the cylinders, under the terms of both the guaranteed and full-service maintenance agreements;

6.14.2.6(5)(e) The pistons will be sized to suit the travel without requiring intermediate support;

6.14.2.6(5)(f) Supporting machine beams will be included as required; and

6.14.2.6(5)(g) Hydraulic jacks will be installed plumb to within 1/32 inch (0.8 mm) over the length of the cylinder casing and will be parallel with the guiderails to within 1/16 inch (1.6 mm) over the length of the fully extended pistons.

6.14.2.6(6) Provide for the car, and counterweight, spring mounted roller guides located at the top and the bottom of the car, and counterweight frame if applicable.

6.14.2.6(7) Provide fascias from each hall sill to the entrance header below. Include express zones. Extend the fascias into the pit and the overhead. Alternatively provide a CSA B44-certified car door interlock if fascias are not provided.

6.14.2.6(8) Provide sound-isolated car platform.

6.14.2.6(9) Provide a car frame constructed of steel channels and a platform constructed of steel channels with a 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.

6.14.2.6(10) Install the elevator cabs with a running clearance of 3/4” to 1” maximum between the car sill and hall sills to allow for smoother movement of wheeled equipment in and out of the elevators.

6.14.2.6(11) Details of vibration isolation will show the method of isolation as well as isolation material proposed and will meet the specification prepared by the Authority’s Acoustic and Vibration Consultant. It is the elevator contractor’s responsibility to obtain the Elevator Vibration Isolation Guidance document and ensure compliance.

6.14.2.6(12) Paint all elevator pits up to the sill. Paint Clean and Dirty MDRD Elevator hoistways in their entirety.

6.14.2.7 Cab Equipment

6.14.2.7(1) Provide a heavy-duty closed-loop door operator to open and close the car and hoistway doors simultaneously. The door operator will be manufactured by GAL or an acceptable alternative as approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. For all elevators provide the Unitec model ABA6940CD folding door restrictor or an acceptable alternative as approved by the Authority through the process

described in Appendix 2C [User Consultation and Review Procedure].

6.14.2.7(2) Provide an infra-red multiple beam door protective device, Panachrome 3d door detector, that protects the full width and up to 1830 mm (6'-0") from the floor of the door opening.

6.14.2.7(3) Provide durable cab finishes which are consistent with other Facility components, or as specified elsewhere. All finishes and cab design will be reviewed with and accepted by the Authority, under the Review Procedure, prior to manufacturing. Design will limit reveals, ledges, or gaps that are difficult to clean. All surfaces will be able to withstand disinfection chemicals used by housekeeping.

6.14.2.7(4) The Patient Staff/Transfer and MDRD Elevators will be equipped with a durable rubber flooring surface suitable for health care facilities, including a minimum thickness of 3 mm. Products will be slip-resistant, resilient flooring with anti-microbial properties and installed without joints. Flooring installation will permit the complete flooring to be removed independently of other elevator components.

6.14.2.7(5) The public passenger elevators will be equipped with a durable flooring surface suitable for healthcare facilities and approved by the Authority through the Review Procedure.

6.14.2.7(6) For each elevator with centre-opening doors provide two (2) car operating panels. Otherwise, provide one (1) car operating panel per elevator.

6.14.2.7(7) For front and rear opening elevators, car operating panels will be provided at both ends of the cabs.

6.14.2.7(8) Include, as part of the car equipment, the following:

6.14.2.7(8)(a) Provide access control doors and door alarms for the following, but not limited to: All elevators (both hall call and inside the cab), with floor by floor control;

6.14.2.7(8)(b) Stainless steel car fronts, including doors, return panels, transom panels;

6.14.2.7(8)(c) For passenger elevators, provide ceiling, lighting and durable cab interior finishes consistent with requirements of the LMFM Technical Guidelines. Provide cylindrical type, stainless steel handrails (38 – 50 mm in diameter) that are easily grasped;

6.14.2.7(8)(d) For all Patient transfer/Staff service elevators, provide ceilings and indirect LED cab interior lighting consistent

with the LMFM Technical Guidelines. Include raised panels with 5WL textured stainless steel cladding on all non-access walls. Provide a 120 V duplex receptacle in all cabs. Provide flat-type 6 mm thick solid stainless steel hand (100 mm) and bumper (155 mm) rails with turned back ends;

6.14.2.7(8)(e) For all Clean and Dirty MDRD Elevators, provide ceilings and cab interior lighting consistent with the LMFM Technical Guidelines. Include raised panels with 5WL textured stainless steel cladding on all non-access walls. Provide flat-type 6 mm thick solid stainless steel hand (100 mm) and bumper (155 mm) rails with turned back ends;

6.14.2.7(8)(f) Car operating panel(s), including LED illuminating floor buttons with audible call registration tone;

6.14.2.7(8)(g) In each car operating panel provide a digital (dot matrix or segmented) car position indicator with a minimum 50 mm (2") high display that will show the current elevator location and direction of travel. Additional display panels are to be provided in the car operating panel, the position indicator will be integrated into the programming of the display panel. Display screen will be capable of displaying emergency messages such as medical emergency, fire recall, wandering Patient, out of service, under maintenance as required by the Facility. Provide a locally or remotely programmable 15” (381 mm) LCD monitor inside each public passenger elevator as part of the car operating panel;

6.14.2.7(8)(h) Jumbo car operating panel buttons are to be provided for all elevators. The elevator contractor will submit details of these fixtures to the Authority for approval through the Review Procedure;

6.14.2.7(8)(i) Voice synthesizer with automatic verbal announcement of each floor;

6.14.2.7(8)(j) Emergency battery-powered lighting;

6.14.2.7(8)(k) Variable speed ventilation fan complete with HEPA air filtration system to ensure that air distributed through the elevator cabs has first passed through a filter. Filter will be configured to permit access and replacement from inside the elevator cab by non-elevator personnel, yet not be visible at other times;

6.14.2.7(8)(l) Firefighters' emergency operation panel;

6.14.2.7(8)(m) Service cabinet and switches;

6.14.2.7(8)(n) Provision for Wi-Fi access point installation within each elevator cab; and

6.14.2.7(8)(o) Other features required for normal operation.

6.14.2.7(9) Provide one set of cab protective pads for each group of elevators that cover all walls and the cab front return panel along with pad hooks. Provide pad hooks in all elevators.

6.14.2.7(10) Provide heavy duty folding door restrictor.

6.14.2.7(11) Elevator must be constructed to accommodate MEO operation.

6.14.2.7(12) All elevators will be equipped with voice communication system as follows:

6.14.2.7(12)(a) Hands-free, one button, two-way voice intercommunication / telephone system with a lobby station and remote handset;

6.14.2.7(12)(b) One (1) dedicated phone line must be provided for each elevator cab. Coupling or combination of phone lines is not acceptable;

6.14.2.7(12)(c) CPC-1 Return to Dial Relay on all elevator phones is preferred to allow the phone to immediately disconnect when the operator hangs up, permitting the cab occupants to place an additional call. The CPC-1 must be installed directly on the elevator phone or in the communication/telecom area. Alternatives to a CPC-1 may be installed if approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.14.2.7(12)(d) Provide communication from each car enclosure to designated CACF in the Facility and to a remote off-site monitoring station;

6.14.2.7(12)(e) Elevator phones must have the capability of being programmed to auto-dial to an internal number or outside monitoring station. The phone must attempt to redial appropriate numbers within 15 second intervals if a call is not answered or if a call is dropped without receiving a hang up signal; and

6.14.2.7(12)(f) Provide electromagnetic interference (EMI) filter for each elevator phone.

6.14.2.8 Hall Signals and Equipment

6.14.2.8(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 car speed or floor-to-floor height for safe access to the car top and pit areas.

6.14.2.8(2) Provide hoistway doors on all levels with standard landing door unlocking devices.

6.14.2.8(3) For single car or two (2) car elevator groups, provide one riser of hall station located between adjacent elevators.

6.14.2.8(4) Provide in each hall station illuminating up and down oversized push buttons (at terminal floors, provide only one button located with their centreline 1070 mm ± 25 mm (42" ± 1") above the floor

6.14.2.8(5) Hall call buttons to be selected from manufacturer top of line or third-party series as determined with the Authority. All car and hall call button illuminations to be LED type with oversized button style and stainless steel finish.

6.14.2.8(6) For each elevator, provide a digital (dot matrix or segmented) hall position indicator located above the main floor entrances with a minimum 50 mm (2") high display. Position indicators will indicate at a minimum, MEO, Independent Service, Out of Service, and Fire Recall.

6.14.2.8(7) Provide hall lanterns with dual stroke electronic tones and adjustable volume control above each main floor entrance and above each entrance at all other levels served. Hall lanterns will be designed to allow 180 degree viewing of direction indicators.

6.14.2.8(8) For each group of elevators, provide a properly labelled fire recall key switch and keybox in one hall station at the main floor level. Activation of the key switch will initiate phase one of firefighters' operation.

6.14.2.8(9) For each group of elevators, provide an emergency power selection switch and LED indicator, labelled "Elevator Emergency Power", in a separate emergency feature hall fixture at the main floor. Indicator will illuminate when elevators are operating on emergency power.

6.14.2.8(10) For each elevator group, with the exception of the MDRD elevators, provide one covered hall button at each hall station for "MEO"

operation. Pressing the button will initiate stage 1 of “MEO” and illuminate an LED to confirm that demand is registered.

6.14.2.8(11) For the MDRD Elevators, provide each elevator with a remote combination type fixture containing a directional arrow, position indicator and electronic arrival chime (complete with adjustable volume control). Fixture faceplate will be finished in stainless steel and configured as either a surface or flush mounted fixture to suit the mounting location. Display characters for the directional arrow and position indicator will have a minimum height of 60 mm. Provide hardware, conduit and conductors required to support the remote mounting of each fixture allowing for these fixtures to be up to 25 metres from the associated elevator hoistway.

6.14.2.8(12) Provide elevator control panels within the Facility CACF and provide a lobby panel for the elevators including car position indicators, elevator lobby telephone handset and remote firefighter’s emergency operation key switch and indicators, and any other elements required by the specification or governing codes and regulations. For each elevator, provide an electronic indicator to indicate when the elevator is out of service.

6.14.2.8(13) Designated CACF is located in the Facility.

6.14.2.9 Electric Wiring

6.14.2.9(1) Provide copper wiring to connect the equipment.

6.14.2.9(2) Run all wire in metal conduit, duct or electrical metallic tubing.

6.14.2.9(3) Run travelling cable between car stations and the controller in the machine room, without use of mid-way junction boxes. All travelling cables will be round, as flat travelling cables are not permitted.

6.14.2.9(4) In addition to the wiring required for elevator operations, provide special wiring to support installation of two-way voice communication, wireless access points, security card readers, security CCTV camera, video display screen within each car enclosure. If not used at the time of initial installation, label the unused special wires and provide a neat coil of at least five (5) feet of cable within an interface box mounted on side of each controller.

6.14.2.9(5) Project Co will coordinate with the elevator contractor to ensure that wireless access points mounted in the elevator cabs will not interfere with the operation of the elevator. See LMFM Technical Guidelines – Division 14 Vertical Transportation Guidelines and Compliance Log, part 18 travelling cables, for identification of minimum spare cabling required and further requirements.

6.14.2.9(6) Provide adjacent each controller a separate junction box or boxes for non-elevator devices such as telephones, cameras, wireless access points, video display screens and security systems.

6.14.2.10 Accessory Systems

6.14.2.10(1) Provide a two-way voice communication system and integrate with existing elevator communication systems a hands-free, two-way voice communication system in each elevator, with a central CACF lobby rescue station. One (1) dedicated phone line per elevator car. Provide system that will permit two-way communication between any station location and each car enclosure, remote CACF and control/machine room(s).

6.14.2.10(2) Stations inside each machine room will be configured to communicate with master stations, remote stations, other machine room stations and as a minimum with elevators with equipment contained inside the respective room. System features will include a CPC-1 Return to Dial Relay at the lobby phone if not available on the elevator phone to allow the phone to immediately disconnect when the operator hangs up, permitting the cab occupants to place an additional call. All elevator phone wiring will be to FHA / PHSA telecom standards.

6.14.2.11 Operational Features

6.14.2.11(1) For all elevators provide:

6.14.2.11(1)(a) Group supervisory, full selective collective operation;

6.14.2.11(1)(b) AC VVVF motion control (traction elevators only);

6.14.2.11(1)(c) Independent service operation (green collar);

6.14.2.11(1)(d) Firefighters' emergency operation phase 1 and 2;

6.14.2.11(1)(e) Emergency power operation with automatic sequencing;

6.14.2.11(1)(f) Inspection operation; and

6.14.2.11(1)(g) Hoistway access operation.

6.14.2.11(2) Provide "MEO" for all elevators with the exception of the MDRD Elevators. Provide stage 1 push button and indicator in hall stations at each floor level and stage 2 key switch (On X4004 key) and indicator in each elevator car operating panel. Push buttons will match the existing MEO buttons at the BH.

6.14.2.11(3) For all elevators, provide a personnel card reader in each car operating panel. For Patient transfer/Staff service elevators and

MDRD Elevators, the personnel card will be swiped to activate the elevator to go to that floor. For public passenger elevators, no personnel card swipe will be required during normal hours of operation other than to restrict access to mechanical or other non-public levels. After-hours access to any of the floors will require personnel card swipe to activate the elevator.

6.14.2.11(4) Provide restricted access to mechanical level. Both key and card swipe will be provided.

6.14.2.11(5) Key switches will be keyed and colour coded in accordance with requirements of LMFM Technical Guidelines or as otherwise directed.

6.14.2.11(6) For elevators providing access to Clinical Spaces, provide Patient wandering system operation, and lock down elevator when activated.

6.14.2.11(7) Horizontal threshold gap between car and landing sills will be set between 19mm (¾") and 25mm (1") to mitigate risk of wheeled equipment from getting stuck between the sills.

6.14.2.12 Medical Emergency Operation features

6.14.2.12(1) Definitions

6.14.2.12(1)(a) MEO stage 1 operation occurs when an elevator is recalled directly to the level requested by Staff.

6.14.2.12(1)(b) MEO stage 2 operation occurs once stage 1 is complete and MEO has been initiated from inside the elevator, and the elevator travels non-stop to the designated stop.

6.14.2.12(2) MEO will be pre-wired and fully installed on all elevators which require priority access by medical emergency Staff. Controller platforms will be configured to permit this feature to be activated.

6.14.2.12(3) MEO will be installed to enable medical Staff to provide the most rapid care possible in an emergency on as near to all elevators as possible to account for elevator use changing over time.

6.14.2.12(4) MEO stage 1 will be initiated by a hall push button and stage 2 will be initiated by an in-car key switch (On X4004 key) in all instances. MEO buttons will have a blue collar, and a blue cover (to be provided by the Authority).

6.14.2.12(5) MEO Stage 1 will be initiated at all hall entrances.

6.14.2.12(6) During stage 1, an illuminating indicator and voice synthesizer will indicate that passengers will exit the cab at the floor at which MEO was initiated.

6.14.2.12(7) During stage 1 and 2, the hall MEO button will illuminate and flash to indicate when an elevator has been called for a MEO.

6.14.2.12(8) During stage 1 and 2, all position indicators in the car and hall will indicate that the elevator has been called for a MEO.

6.14.2.12(9) Remote call locations including Care Team Stations and emergency rooms, must be enabled to initiate MEO for the convenience of emergency Staff.

6.14.2.12(9)(a) Other locations that potentially expedite MEO operation to ensure faster elevator response times must be considered;

6.14.2.12(9)(b) Design considerations will be included to preclude false MEO initiations from these remote locations.

6.14.2.12(10) MEO operation will be terminated automatically after a pre-determined amount, field programmable between 0 and 60 seconds, of time following the elevator arriving at its designated stop.

6.14.2.12(11) If firefighter's emergency operation (FFEO) is initiated when MEO stage 2 is in effect, the elevator effected will not respond to the FFEO signal until MEO stage 2 has terminated.

6.14.2.13 Elevator Management System

6.14.2.13(1) Provide an interactive, network based, non-proprietary EMS consistent with requirements of the LMFM Technical Guidelines. System will be MCE iControl or alternative approved by the Authority through the Review Procedure. This single system will be interfaced with all elevators and will be capable of sending data through the Facility BMS or alternative cabling system provided by Project Co.

6.14.2.13(2) If BMS terminations are not available in the machine room or within an acceptable distance, include one (1) campus area network (CAN) ethernet data ports inside each elevator machine room and a single CAN ethernet data port in the final mounting location for both EMS terminals.

6.14.2.13(3) As part of EMS, provide two dedicated terminals including one in the BH Energy Centre control room. Final mounting location of the remaining terminal will be confirmed during the Design.

6.14.2.13(4) Provide complete training of EMS features to FHA Staff and demonstrate operation of the system for all elevators and associated monitoring points.

6.14.2.13(5) Configure system to automatically trigger fault alarms at the EMS terminals when an elevator shuts down.

6.14.2.14 Cabinets and Spare Parts

6.14.2.14(1) Provide a metal cabinet located in each of the machine rooms. The cabinet will be capable of holding:

6.14.2.14(1)(a) Spare parts, including boards that need to be kept protected;

6.14.2.14(1)(b) Manuals; and

6.14.2.14(1)(c) Aerosols / lubes.

6.14.2.14(2) Spare parts are to be provided for each elevator installation, and shall include:

6.14.2.14(2)(a) One (1) duplicate of each board in the controller;

6.14.2.14(2)(b) One (1) complete safety edge or proximity edge;

6.14.2.14(2)(c) Four (4) Door hanger rollers;

6.14.2.14(2)(d) Four (4) Door Gibbs;

6.14.2.14(2)(e) Four (4) complete interlock;

6.14.2.14(2)(f) One (1) hall push button assembly; and

6.14.2.14(2)(g) One (1) car push button assembly.

6.14.3 Execution

6.14.3.1 Performance

6.14.3.1(1) Levelling – Arrange that the car stops within 3 mm of the floor level. Ensure that levelling accuracy is not influenced by load inside the car with the same levelling accuracy achieved at no load and full load and any load in between.

6.14.3.1(2) Adjust the door equipment so that the noise level is less than 63 decibels during a full door open and door close operation. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

6.14.3.1(3) 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.

6.14.4 Equipment Lift

6.14.4.1 Provide an industrial grade, low headroom, ceiling-mounted manual trolley hoist from a reputable manufacturer, for the following areas:

6.14.4.1(1) K1. Facilities Maintenance and Operations (FMO); and

6.14.4.1(2) K3. Biomedical Engineering.

6.14.4.2 The ceiling hoist will comply with the latest edition of the following reference documents:

6.14.4.2(1) Certified CSA C22 No. 14 Industrial Control Equipment;

6.14.4.2(2) ASME B30.16 Overhead Underhung and Stationary Hoists; and

6.14.4.2(3) ASME HST-2 Performance Standard for Hand Chain Manually Operated Chain Hoists.

6.14.4.3 Ceiling lift will be complete with a suitable steel beam track and any associated structural support fastened to Facility structure above, design and installed by the manufacturer, complete with seismic design in compliance with the BCBC and other local codes.

6.14.4.4 The manual chain hoist will have a loading capacity of 2000 kg to a lifting height of 6096mm above finished floor level.

6.14.4.5 The geared trolley will have integrated brake system with double enclosed brake cover.

6.14.4.6 Acceptable manufacturer will be Acklands Grainger model SHB020-20 or acceptable alternative approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.14.4.7 The trolley hoist will have a warranty for 2 years from Substantial Completion.

6.15 Pneumatic Tube System

6.15.1 The PTS will be designed to accommodate the requirements of the Facility in a manner that contributes to the overall efficiency and effectiveness of the Authority's 24/7 operations.

6.15.2 The placement of each of the pneumatic tube station will allow Convenient Access for Staff, have adequate counter space and storage for preparing and receiving material, and proper lighting for all times of day. Pneumatic tube stations are not permitted in public areas or to have public access.

6.15.3 Pneumatic tubing will never be installed directly above, in or through Communications Rooms or electrical rooms. This includes the adjoining walls and the floor and ceiling slab.

6.15.4 Project Co will provide a computerized PTS that interconnects and serves the departments as described in Appendix 3A [Clinical Specifications and Functional Space Requirements] with automated secure on-demand transport of light materials and health care products.

6.15.5 The PTS will be a 150 mm diameter tube send/down receive system.

6.15.6 The PTS is considered a BH wide system. Project Co will ensure the seamless integration of the system across the Facility and the Existing Hospital.

6.15.7 Project Co will be responsible for providing pneumatic tube stations in all locations noted in Appendix 3A [Clinical Specifications and Functional Space Requirements]. All pneumatic tube stations will be equipped with a control panel that includes a touch-screen display allowing carrier dispatch requests and must be compatible to existing system.

6.15.8 The PTS will be designed and constructed such that it can be expanded in the future to:

6.15.8.1 Allow the Authority to install additional pneumatic tube stations, diverters and blowers with minimal disruption, and connect to pneumatic tube stations located within the Facility and Existing Hospital.

6.15.9 The location of the PTS blowers will be located within component FMO as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.15.10 The system will be capable of collecting a minimum of 30 days of historical traffic data to include 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.

6.15.11 Provide ten (10) leak-resistant carriers for every new station with replaceable rubbing bands and foam liners with a secure, lockable integral seal to transport fluid containers, including IV bags, blood products, bodily fluid samples and pharmaceutical products. Provide ten (10) tube cleaning devices / carriers for the Facility.

6.15.12 Provide a pneumatic tube station study that outlines the capacity, anticipated wait times, anticipated transit times, and anticipated daily transactions of the PTS. Pneumatic tube station will include speed and temperature evaluations and audits.

6.15.13 PTS control wiring will be run in conduit.

6.15.14 The PTS will:

6.15.14.1 Be a computer-controlled pneumatic tube materials distribution system with RFID technology for tracking and status updates, consisting of tubing, stations, transfer units, blower packages, carriers, and a control system;

6.15.14.2 Be integrated into the BMS with wireless mobile technology for demand maintenance;

6.15.14.3 Utilize ethernet data communications between pneumatic tube stations and controllers installed to meet the PHSA Communications Infrastructure Standards and Specifications;

6.15.14.4 Include all necessary transfer units, user stations and carriers through a strategically designed tubing network in a configuration that is optimized for overall PTS performance;

6.15.14.5 Have recessed type stations; no virtual stations will be allowed;

6.15.14.6 Have stations located to minimize Staff travel distance;

6.15.14.7 Include no more than ten (10) stations per zone;

6.15.14.8 Provide each zone with its own blower and to allow it to function independently;

6.15.14.9 Include a minimum one (1) spare port at each transfer unit;

6.15.14.10 Contain receiving bin liners at each station to contain any spills;

6.15.14.11 Have a modular design of system components that will permit changes in the number of stations and/or zones as Authority requirements change in the future;

6.15.14.12 Locate transfer stations to be accessible for maintenance purposes in non-clinical areas;

6.15.14.13 Each transfer station will be equipped with panel door with magnetic lock with integrated keypad.

6.15.14.14 Have directly adjacent a dedicated, standing-height Millwork countertop with two deep drawers below for storage as outlined in Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements];

6.15.14.15 Provide remote arrival indication through a system of audio and visual devices that notify users that a carrier has arrived at the station. Locate the arrival indicator adjacent to a station or in a remote location as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

6.15.14.16 Consider and reduce all aspects of potential noise as outlined in Appendix 3C [Acoustic and Noise Control Measures]; and

6.15.14.17 Be designed in accordance with Appendix 3C [Acoustic and Noise Control Measures] and include noise reduction features such as:

6.15.14.17(1) Energy-absorbing carrier-receiving ramps consisting of padded, liquid-resistant nylon; and

6.15.14.17(2) Impact-absorbing receiving cushions made of similar material to absorb the shock of the carrier arrival in the station bins.

6.15.14.18 Provide complete directories and update existing directories as required to accommodate new stations.

## 6.16 Food Services and Equipment

### 6.16.1 Scope of Service

6.16.1.1 Include detailed design, manufacturer, supply, installation, inspection and testing of:

6.16.1.1(1) Food service equipment;

6.16.1.1(2) Refrigerated and frozen storage room assemblies;

6.16.1.1(3) Mechanical refrigeration systems for refrigerated and frozen storage room assemblies;

6.16.1.1(4) Conveyors;

6.16.1.1(5) Waste handling equipment; and

6.16.1.1(6) Warewashing equipment.

### 6.16.2 LEAN Planning Principles

6.16.2.1 Food service areas will be designed in a forward work flow forward workflow whereby product moves from receiving, storage, preparation, production and assembly.

6.16.2.2 A separate and non-crossing flow will be provided waste and soiled carts and service wares.

6.16.2.3 Complementary functional areas will be adjacent to one another to allow for easy and direct movement of Staff and product.

6.16.2.4 Individual food service functional areas will be designed to ensure the individual work spaces are functional and can be easily navigated by Staff.

6.16.2.5 Layout of preparation and production areas will include capability of storing products needed and/or adjacent to storage rooms to easily access ingredients.

6.16.2.6 To the extent possible, standardize room layouts, configurations and services for maximum flexibility in use and ease of orientation.

6.16.2.7 Equipment configuration will be positioned to ensure complementary items such as kettles and cook tanks are adjacent to one another.

6.16.2.8 Flexible lean pods / cells will be utilized to assembly meals (in place of traditional belt lines).

6.16.2.9 Additional and separate refrigeration will be place adjacent to the assembly area so as to ensure pre-portioned products needed are easily accessible.

### 6.16.3 Emergency Power

6.16.3.1 At minimum, delayed vital power will be provided to all walk in refrigerated and frozen storage rooms, diet office dietary software and IT system and 50% of the cooking equipment (such as ovens, steamers and kettles), chilling equipment and retherm units.

6.16.3.2 Specific items requiring delayed vital power have been identified in Appendix 2L [Food Services Equipment] included in Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

6.16.3.3 Lighting within the kitchen will also be on emergency power.

6.16.4 Flexibility and Adaptability

6.16.4.1 To the extent possible, mobile equipment will be used so as to allow for movement and repositioning in the future, easy replacement and ease of cleaning.

6.16.4.2 A variety of mechanical and electrical sources will be provided.

6.16.4.3 Architectural provisions will be required to enable removal and replacement of any large food service equipment following the end of its useful life.

6.16.5 General Instructions

6.16.5.1 Electrical Work Provided by Electrical Division

6.16.5.1(1) In liquid tight flexible conduit and concealed within building walls and/or ceilings wherever possible.

6.16.5.1(2) From the building source or distribution point of power, through disconnect switches or starters to the terminals, connection box, circuit breaker panel or plug receptacles located on the equipment as per applicable codes.

6.16.5.1(3) Inter-wiring of the kitchen ventilation and fire suppression system components including but not necessarily limited to the following; exhaust ventilator(s) (hood), water wash pane(s), gas valve(s), gas valve resets, surface fire suppression detector(s) in each hood, remote water wash solenoid valve(s), fire suppression building alarm fire and trouble interlocks as required, exhaust fans, makeup air units, cooking equipment shut down devices, and interlocks to building management controls.

6.16.5.1(4) All electrical control wiring required for the mechanical refrigeration systems including inter-connections from remote condensing units, compressors or compressor parallel pack as specified, to the walk-in refrigerators and freezers.

6.16.5.1(5) Electrical wiring for the walk-in refrigerator and freezer including power supply to interior lights, light switches, door heaters,

temperature alarms, evaporator coils, drain line heaters, electric defrost and solenoid valves.

6.16.5.1(6) Electrical inter-wiring of all walk-in refrigerator and freezer temperature alarms to a central refrigeration monitoring system.

6.16.5.1(7) Electrical wiring for exhaust ventilator, control panel, exhaust and make-up air fans.

6.16.5.1(8) Electrical inter-wiring between exhaust and make-up air fans, exhaust ventilator control panel, magnetic contractors and shunt trips etc. so as to shut down power to electric cooking equipment in the event of a fire condition in conjunction with the fire suppression system.

6.16.5.1(9) Emergency power supply to selected food service equipment (as identified in the Food Service Equipment List Appendix 2L [Food Services Equipment] to maintain food services during a power outage.

6.16.5.1(10) Electrical inter-wiring of electric gas solenoid valve (if used). Supply and install the reset relay or shunt trip to shut down gas and electricity to the cooking equipment in the event of activation of the surface fire suppression system.

6.16.5.1(11) Inter-wiring of the fire suppression system to the maintenance annunciator panel or building security system as required including building fire and trouble annunciation.

6.16.5.1(12) Electrical wiring and inter-wiring of multiple food service equipment components such as waste pulpers or hydra extractors, hose reels, etc.

6.16.5.1(13) Supply and installation of all electrical receptacles located in floors, ceilings or walls.

6.16.5.1(14) Supply and installation of all electrical receptacles, junction boxes or sub-panels in Millwork service counters.

6.16.5.1(15) Supply and installation of low water cut-off devices for any equipment in which immersion type electric heating elements are utilized.

6.16.5.1(16) Supply and installation of all motors integral with equipment complete with starters, internal thermal overload protection and disconnect switches.

6.16.5.1(17) Supply and installation of all internal wiring on custom fabricated items in a concealed and well supported manner and terminated inside circuit breaker panels or junction boxes ready for final

connection by the electrical trades. All equipment will be inspected by the local hydro authority and carry CSA and ULC approval.

6.16.5.1(18) Tag each multiple electrical wire or cable used in any custom fabricated piece of equipment to indicate the item serviced. When circuit breaker panels are used, identify each circuit.

6.16.5.1(19) Supply and installation of all cords and plugs on equipment as required and match the plug with the respective receptacle.

6.16.5.2 Mechanical Work Provided by Mechanical Plumbing Division

6.16.5.2(1) Concealed within the Facility walls and/or ceilings wherever possible.

6.16.5.2(2) Supply, installation, rough-in, and connection of all domestic hot and cold water, drains, vents, gas supply lines, steam supply and condensate return lines as per code from building supply to the point of connection required for the complete operation of equipment.

6.16.5.2(3) Supply and installation of shut off valves, back flow preventers, line strainers, shock absorbers, pressure, temperature and pressure gauges and control valves or devices.

6.16.5.2(4) Supply and installation of chilled glycol water supply and return piping if required for the refrigeration systems.

6.16.5.2(5) Supply and interconnection of hot and/or cold water lines to multiple components of food service equipment including exhaust ventilator/water wash control, dishwashers and booster heaters, waste handling and dishtabling, hose reels etc.

6.16.5.2(6) Supply and installation of drain lines, traps, vent piping, clean outs and grease traps, sediment interceptors, drains for floor pans, connected drains for equipment, floor drains with funnels for open drains on equipment and exhaust ventilators, floor drains with funnels and drain lines for evaporator coils.

6.16.5.2(7) Supply and installation of all floor drains for general drainage purpose, maintenance and cleaning, throughout the Facility.

6.16.5.2(8) Supply and installation of all hand hygiene sinks, slop sinks, janitorial sinks, bottle filler stations, grease traps and general sanitizing stations.

6.16.5.2(9) Supply and installation of all base building water heating equipment capable of supplying the volume, pressure and temperature of hot water required to properly operate all food equipment.

6.16.5.2(10) Installation of mechanical or automatic electrically controlled solenoid gas shut off valve(s) to shut down fuel to gas cooking

equipment in conjunction with the fire suppression system in the event of a fire condition.

6.16.5.2(11) Supply and installation of steam supply and condensate return lines from building boiler to the connection point on equipment complete with shut-off valves, line strainers, steam traps, pressure regulating valves or devices, back flow preventers, temperature and pressure gauges and any other necessary equipment or devices to form a complete operating system.

6.16.5.2(12) Supply and installation of gas lines with manifolds to each piece of gas fired foodservice equipment complete with shut off valves.

6.16.5.2(13) Installation of mechanical or automatic solenoid gas valve(s), in conjunction with the fire suppression system.

6.16.5.2(14) Supply and installation of gas main pressure regulating valve(s) to ensure adequate volume and pressure of gas for food service equipment.

6.16.5.2(15) Testing of all gas connections to appliances as required by local authority having jurisdiction.

6.16.5.2(16) Connection of all equipment designated as "Authority Supplied".

6.16.5.2(17) Disconnection, moving of and later reconnection of any equipment designated as “Existing Equipment to Be Relocated”.

6.16.5.2(18) Testing and Commissioning of all “Authority Supplied” and “Existing Equipment to be Relocated”

6.16.5.2(19) Roughing-in and capping off of mechanical services required for any equipment designated as "Future".

6.16.5.2(20) Use chrome plated piping wherever exposed.

6.16.5.2(21) Provision and installation of all faucets complete with replaceable seats, ready for connection by appropriate contractor.

6.16.5.2(22) Supply and installation of chrome plated overflow assemblies, drain fittings and traps with tail pieces for all sink type assemblies.

6.16.5.2(23) Supply and installation of chrome plated blowdown piping from items with relief or safety valves, extend piping to nearest hub or floor drain approximately 4" (100mm) above drain.

6.16.5.2(24) Gas pressure regulating valves for gas fired cooking equipment must be factory pre-mounted on the appliance by the manufacturer.

6.16.5.2(25) Gas fired cooking equipment included as part of a cooking equipment battery must be set in place and leveled. Ensure that all pieces fit properly and complete/test final gas connections between individual pieces of gas fired cooking equipment as required by local authorities having jurisdiction.

6.16.5.2(26) Gas fired cooking equipment with casters must be installed with positioning docks constructed of flame retardant thermo plastic resin capable of withstanding 500 psi of direct force, Posi-set or equal, to ensure proper positioning of equipment.

6.16.5.2(27) Inter-piping of all hot food well drains to one common 1 1/2" (38mm) chrome manifold and extend to 4" (100mm) above floor drain or funnel floor drain. The drain(s) will be trapped as required by local codes complete with clean out. Provide a separate extended shut off valve for each well.

6.16.5.3 Mechanical Work Provided by Mechanical HVAC Division

6.16.5.3(1) Supply, installation and connection of all exhaust ductwork from exhaust fan(s) to foodservice equipment, exhaust ventilator(s) hood(s) or dishwashing and cart washing equipment per the current edition of the NFPA-96 as recognized by building codes, and per the requirements of Technical Safety BC Gas Utilization Code.

6.16.5.3(2) Supply and installation of all exhaust s.s. duct work leading to exhaust ventilator(s) hood(s) take-off collars and connect to collars. Use watertight duct work and weld all joints as per the current edition of NFPA Code - 96.

6.16.5.3(3) Supply and installation of make-up air system including fan, s.s. duct work, distribution grills and/or connection to make-up air plenum on exhaust ventilator(s) (hoods), if specified.

6.16.5.4 Work Provided by Other Trades

6.16.5.4(1) Supply and installation of floors, floor leveling materials and floor finishes throughout the foodservice areas as well as those required for prefabricated insulated walk-in type refrigerated and frozen room assemblies.

6.16.5.4(2) Provision of all floor depressions required for foodservice equipment.

6.16.5.4(3) Provision of concrete curbs and bases around and under foodservice equipment (as applicable).

6.16.5.4(4) Provision of sleepers with vibration isolation for refrigeration systems.

6.16.5.4(5) Provision of all building floor slab depressions, slab insulation, flexcell expansion joints and slab ventilation system(s) for prefabricated, insulated walk-in refrigerated or frozen room assemblies where specified.

6.16.5.4(6) Supply and installation of extruded styrofoam - Foamular 1000 or equal insulation in floor depressions or under concrete slab for all prefabricated, insulated walk-in type refrigerated and frozen room assemblies.

6.16.5.4(7) Supply and installation of in-fill concrete topping inside prefabricated, insulated walk-in refrigerated and frozen room assemblies which have depressed prefabricated insulated floor panels or extruded styrofoam so as to make floor level with outside floors (allowing for floor finish thickness). Walk in coolers and freezer will be level entry without ramps.

6.16.5.4(8) Supply and installation of all floor tile or other specified flooring finishes inside prefabricated, insulated walk in type refrigerated and frozen room assemblies including coving up inside and outside of prefab walls.

6.16.5.4(9) Supply and setting of sleeves in floors, walls and ceiling (as well as any related core drilling) for electrical, mechanical refrigeration, plumbing, gas and beverage lines, etc.

6.16.5.4(10) Where required, provide housekeeping pads to protect pipes, conduits and to enable waterproofing of penetration.

6.16.5.4(11) Supply and installation of structural supports or sleepers for roof top condensing units, condensers or evaporative condensers, exhaust and make-up air units, etc. as specified.

6.16.5.4(12) Supply and installation of structural support beams to anchor hanging rods for roof panels of all prefabricated, insulated walk-in refrigerated and frozen room assemblies and exhaust hoods.

6.16.5.5 Work Related to the Pre-Fabricated Walk-in Refrigerated and Frozen Storage Room Assemblies and Mechanical Refrigeration Systems

6.16.5.5(1) Supply, installation and erection of all prefabricated insulated panels required to insulate the Facility’s structural columns that occur within walk-in type refrigerated and frozen room assemblies.

6.16.5.5(2) Supply and installation of internal and external bumpers as required.

6.16.5.5(3) Supply and installation of low temperature LED lights with quick start.

6.16.5.5(4) Supply and installation of stainless steel flashings as required to conceal openings in prefabricated insulated walk-in type panels.

6.16.5.5(5) Supply and installation of stainless steel corner guards at all interior and exterior outside corners and insulated panels around the Facility's structural columns.

6.16.5.5(6) Supply and installation of viewing windows (heated for freezers) on sliding and hinged doors.

6.16.5.5(7) Supply and installation of removable enclosure panels from top of insulated walk in type refrigerated and frozen storage room assemblies to finished ceiling. Color and finish to match color and finish of room assemblies.

6.16.5.5(8) Supply and installation of insulated liquid refrigerant supply, hot gas and suction return lines required to interconnect mechanical refrigeration system components including piping runs from indoor and/or outdoor air cooled condensing units, compressors, compressor parallel packs to evaporator coils within prefabricated, insulated walk-in type refrigerated and frozen room assembly required in order to form a complete operating mechanical refrigeration system.

6.16.5.6 Work Related to the Kitchen Exhaust and Fire Suppression System:

6.16.5.6(1) Supply, set-into-place and suspension of all exhaust ventilators, integral make-up air plenums supplied and installed with exhaust ventilator(s) or (hoods).

6.16.5.6(2) Supply, and set-into-place exhaust ventilator(s) control panels complete with control relays as required for interlock to the Facility central alarm panel.

6.16.5.6(3) Supply and installation of fire suppression systems complete with piping, bottles, thermostatic detection devices or fusible links as specified, release mechanisms and all other necessary accessories and components to form a complete operational and NFPA and ULC approved system.

6.16.5.6(4) Supply and installation of remote fire pull stations for the exhaust ventilator/fire suppression system.

6.16.5.6(5) The supply and installation of remote fire suppression system will be in accordance with all requirements and regulations of Underwriters' Laboratories of Canada, "N.F.P.A. Code 96", BC Building Code and other local municipal authority having jurisdiction.

6.16.5.6(6) Supply and installation of removable s.s. panels from the top of exhaust hoods to the underside of the finished ceiling.

6.16.5.7 Codes and Compliance

6.16.5.7(1) Conform to all laws, bylaws, rules, regulations and requirements of Authorities Having Jurisdiction as it relates to commercial food service equipment.

6.16.5.7(2) All electrical equipment must conform to the BC Electrical Standards, the Electrical Inspection Department Bulletins, BCBC CEC, Technical Safety BC and the Canadian Standards Association. All equipment must have a CSA approval label. Equipment that is not CSA approved will be rejected, removed from the Site and substituted at no additional cost to the Authority.

6.16.5.7(3) Gas equipment will conform to the Canadian Gas Association, the Gas Utilization Code of the Department of Energy and Resources Management, BC and Canadian Standard Association.

6.16.5.7(4) Any plumbing or drainage systems will conform to the Plumbing Code and Water Protection Act except as modified by regulations and bylaws of authorities having jurisdiction.

6.16.5.7(5) Steam equipment will conform to interprovincial codes covering such equipment as well as the rules, regulations and by-laws of authorities having jurisdiction.

6.16.5.7(6) Each piece of equipment will be accompanied by a label or certificate of approval.

6.16.5.7(7) All mechanical refrigeration system will be supplied with safety relief valves, shut-off valves for each piece of equipment, refrigerant leak detectors and all other items as required by local regulations.

6.16.5.7(8) All welded pressure vessels will be constructed to ASME Code. The vessels will bear the stamp and certificates framed under glass and hung adjacent to the vessel.

6.16.5.7(9) Equipment design and fabrication must conform with the National Sanitation Foundation and provincial as well as local municipal health department regulations.

6.16.6 Design and Performance Requirements

6.16.6.1 Delivery and Storage of Equipment

6.16.6.1(1) Coordinate deliveries of equipment in conjunction with Construction activity and progress at the Site and as dictated by the Authority.

6.16.6.1(2) Obtain and/or hold Equipment Ready for delivery in accordance with an agreed schedule which will permit completion of the work at the specific date.

6.16.6.1(3) Deliver, unpack and set in place all equipment in the designated position, ready for final connection of services, for units with electrical or mechanical connections.

6.16.6.1(4) Supply to the Authority, in sufficient time, any information or items of service, articles, components or equipment which requires building in or which may overlap or impede the work of others.

6.16.6.1(5) Provide all necessary information within adequate time and in proper sequence regarding the exact location of openings, chases and any attachments or other fittings required for foodservice equipment.

6.16.6.1(6) Supply and deliver to the Site in sufficient time all inserts, anchors, bolts, sleeves, ferrules and similar items for attaching to, or building into, masonry, concrete and other work for the proper anchorage and fixing of the equipment. Include necessary templates, instructions, directions and/or assistance in the location and installation of all items by other Subcontractors.

6.16.6.2 Installation

6.16.6.2(1) Caulk and seal equipment to walls, base pads, curbs, and adjacent equipment where required. Utilize food grade polyurethane caulking.

6.16.6.2(2) Leave installed work neat, cleaned and polished, well fitted into position, level, and in proper operating condition.

6.16.6.2(3) Promptly remove all rubbish and debris from the Facility and site as the work proceeds and on completion.

6.16.6.2(4) Activate, test and adjust all equipment and apparatus installed under this Agreement. Refinish and repair any painted and finished surfaces damaged during erection and installation. Hand over the completed installation in first class condition and working order.

6.16.6.2(5) Electrical equipment must be accompanied by label or certification of approval by Canadian Standards Association. Equipment may also be accompanied by label or certification of approval by Technical Safety BC or local authority.

6.16.6.2(6) Ensure steam pressure equipment is accompanied by a "Certificate of Boiler" to satisfy Federal and Provincial requirements.

6.16.6.2(7) Finished work must be perfectly true and plumb with no warping, buckling or open seams. All edges, hidden or exposed must be

ground smooth and rounded. Rivet heads, weld marks, or other imperfections are not acceptable.

6.16.6.2(8) Cutting and repairs for the proper installation of services are part of the work in this Agreement.

6.16.6.2(9) Obtain Permits or special inspections.

6.16.6.2(10) Identify equipment with metal plates or labels permanently secured which include, where applicable:

6.16.6.2(10)(a) Manufacturer's name or recognized trademark;

6.16.6.2(10)(b) Complete model identification;

6.16.6.2(10)(c) Model, serial number and CSA U.L.C. and NSF identifications;

6.16.6.2(10)(d) Electrical characteristics;

6.16.6.2(10)(e) Direction of drive;

6.16.6.2(10)(f) Controls;

6.16.6.2(10)(g) Circuits, lines, etc.; and

6.16.6.2(10)(h) Specific operating instructions.

6.16.6.2(11) Identify equipment with temporary labels showing location and item number per Specifications.

6.16.6.2(12) After installation has been completed and all items checked and adjusted where necessary for satisfactory operation, arrange for inspection of equipment. If items are found unsatisfactory, make necessary corrections and adjustments.

6.16.6.2(13) The foodservices subcontractor will coordinate the removal, storage, relocation and installation of all foodservice equipment as required according to the program and/or project schedule as outlined by the Architect, Authority and/or Project Co.

6.16.6.3 Protection and Cleaning

6.16.6.3(1) Protect properly and efficiently all work against any damage. Repair any damage to equipment and/or building. Cooperate at all times to keep the area clean and free of all rubbish and debris. At the end, clean all equipment to permit immediate use by the Authority without further cleaning. Final clean for use is performed by the Authority’s food sevice operator prior to health inspection.

6.16.6.3(2) In areas where quarry tile is applied as a floor finish, ensure that no stainless steel is present if muriatic acid is being used to clean the tiles.

6.16.6.4 Maintenance Manuals

6.16.6.4(1) Supply two (2) sets of manuals, bound and labeled, each manual incorporating operating and maintenance instructions, including spare parts list and optional accessories for all items specified.

6.16.6.4(2) Identify each item, arrange in proper sequence and ensure that the numbers correspond to the specifications and drawings.

6.16.6.4(3) Provide an itemized lead sheet at the front of the manual with a list of the contents and the name and phone number of the service company.

6.16.6.5 Demonstrations

6.16.6.5(1) After completion of installation, cleaning, testing and final inspection, instruct the Authority or their authorized personnel in the correct operation and maintenance of the equipment.

6.16.6.5(2) A demonstration will be made of each piece of equipment requested, and such demonstration will be carried out by a competent representative of the manufacturer's equipment.

6.16.6.5(3) Project Co will co-ordinate the schedule for equipment demonstrations with the Authority representative, with adequate time allowed for each demonstration. A minimum of two (2) training sessions on each equipment items will be provided (to accommodate staffing working on different shifts).

6.16.6.5(4) Submit three (3) weeks prior to completion of the installation, cleaning, final inspection and testing, a schedule of demonstration by the suppliers of purchased equipment. Indicate clearly the timing for each supplier to start up and demonstrate the proper use and maintenance of their equipment to the Authority.

6.16.7 Products and Design Criteria

6.16.7.1 Materials

6.16.7.1(1) Materials for fixed surfaces will be impervious to moisture, corrosion resistant, smooth and able to withstand regular cleaning and sanitizing.

6.16.7.1(2) Stainless steel, denoted by the abbreviation "s.s." in this specification will be ASTM-A167-81A, (18-8 Analysis) type 304 cold rolled and annealed, No. 4 finish one side, 180 grit finish free of

buckles, pits, warps and imperfections. Ensure that direction of grain matches throughout units.

6.16.7.1(3) Stainless steel tubing will be 304, seamless and welded, No. 4 finish, 38mm sq. for all legs and bracing.

6.16.7.1(4) Nuts, bolts, screws, washers and other fastenings will be type 304 stainless steel.

6.16.7.1(5) Galvanized steel sheet, generally referred to as satincoat; zinc coated, 380 gms/sq. m. Where such material is used as an exposed surface, it will be finished with one (1) coat of primer and two (2) coats of air dry enamel, silver gray unless otherwise specified.

6.16.7.1(6) Structural steel will be new material, hot dipped galvanized, conforming to recognized standards, grade 300W, cleaned and primed.

6.16.7.1(7) Gauges of material refer to U.S. Standard Gauges.

6.16.7.1(7)(a) Gauges are as follows:

6.16.7.1.7.(a).1 1.0mm – 20 ga;

6.16.7.1.7.(a).2 1.2mm – 18 ga;

6.16.7.1.7.(a).3 1.6mm – 16 ga;

6.16.7.1.7.(a).4 2.0mm – 14 ga; and

6.16.7.1.7.(a).5 3.0mm – 12 ga.

6.16.7.1(8) Plywood to be Douglas fir, minimum 5 ply construction conforming to CSA 0121, good two (2) sides, waterproof where required. Where waterproofing is required use marine grade birch plywood.

6.16.7.1(9) Laminated plastic sheet and decorative materials used to clad surfaces of wood or metal will be arborite, formica or nevamar, 1.0mm thick or such other materials as may be specified or indicated on the Drawings. Where plywood are being clad, apply laminate manufacturer's backing sheet wherever necessary to obtain a balanced construction and prevent warpage. All panels will be 19mm thick before plastic laminate is applied. Finish all exposed edges.

6.16.7.1(10) Sound deadening, 3mm thick rigid waterproof insulation, Component Hardware M75-1366 applied under working surfaces.

6.16.7.2 Electrical Components

6.16.7.2(1) Electrical parts supplied under this Section will be compatible with materials specified for use on this Project. Receptacles will be waterproof and have cover plates and screws. Cords and caps will be approved type, matching the receptacles for which they are intended, whether or not such receptacles are supplied by the foodservice or refrigeration subcontractors.

6.16.7.2(2) Make receptacles, junction boxes and breaker panels easily accessible without dismantling equipment.

6.16.7.2(3) Terminate wiring within equipment at load centre or junction boxes with wires identified by item no. and load.

6.16.7.2(4) Properly rate and ground all receptacles.

6.16.7.2(5) Supply load centres with bolt on "qwik-gard" type circuit breakers properly rated and identified. Include two (2) 20 amp spare breakers. Face of panel will be easily accessible behind stainless steel hinged door of a compartment which must be insulated from local heat.

6.16.7.2(6) Equip 3-phase motors with magnetic starters with thermal overload protection on each of the three phases.

6.16.7.2(7) Equip single-phase motors of fractional horsepower rating and those ranging up to and including .746 Kw with manual starters with overload protection. Motors rated over .746 Kw must have magnetic starter with overload protection.

6.16.7.2(8) Terminate wiring for motors in fused disconnect within 900mm of equipment to be controlled, between 1500mm and 1800mm above floor unless otherwise specified.

6.16.7.2(9) Control circuits to be 120 V maximum.

6.16.7.2(10) Provide all lighting fixtures for designated equipment with colour corrected lamps and controls or switches wired to an easily accessible common junction box for power connection.

6.16.7.2(11) Fit all portable and mobile electrical equipment with cord and plug suited for the electrical characteristics and outlets specified for the equipment. Include grounding conductor in the cord.

6.16.7.3 Plumbing Components

6.16.7.3(1) Plumbing components supplied under this section will be compatible with materials specified for use on this Project.

6.16.7.3(2) All control valves and faucets, pipe fittings, waste and tail pieces etc., must be brass chrome plated, bright finish, new, best quality and comply with applicable codes.

6.16.7.3(3) Valve handles must be of non-conductive materials.

6.16.7.3(4) Faucets, Fisher or Encore, Inlet Size 12mm IPS.

6.16.7.3(4)(a) Deck Mount, Encore Model K57-4006, Inlet Centres 102mm, Spout 152mm;

6.16.7.3(4)(b) Deck Mount, Fisher Model 3500, Inlet centres 102mm, Spout 152mm;

6.16.7.3(4)(c) Deck Mount, Encore Model K61-8008 or Encore Model K61-8012, Inlet centres 203mm, or Gooseneck;

6.16.7.3(4)(d) Deck Mount, Fisher Model 3300, Inlet centres 203mm, Spout 203mm, 279mm, or Gooseneck;

6.16.7.3(4)(e) Splash Mount, Encore K54-8008 or Encore Model K54-8012, Inlet centres 203mm, Spout 203mm or 279mm;

6.16.7.3(4)(f) Splash Mount, Fisher Model 3200, Inlet centres 203 mm, Spout 203mm or 279mm; and

6.16.7.3(4)(g) Provide wrist action handle on all faucets unless specified otherwise, Encore Model K50-001.

6.16.7.3(5) Pre-Rinse units, Pot Sink, 19mm IPS Encore Model KN53-5026-12, complete with K50Y-500 swivel arm support, K55-7012 add-on faucet and all attachments including wall brackets for splash mount units.

6.16.7.3(6) Wastes, 38mm or 51mm IPS.

6.16.7.3(7) Centre type, with removable basket strainers and tailpiece, Specialty Hardware model P1.

6.16.7.3(8) Rotary type stainless steel, Specialty Hardware DSS8000 with strainer.

6.16.7.3(9) Corner type, with stainless steel overflow, removable strainer and tailpiece.

6.16.7.4 Miscellaneous

6.16.7.4(1) Casters to be black neoprene non-marking rubber tired, 60 shore hardness, doughnut shaped, ball bearing, equipped with brakes as noted, sized to suit specific usage, zinc finished. Plate type will be securely bolted to frame. Shank casters will be threaded type c/w bushing. Bushing will be welded and upright. Bolts, nuts and lock washers will be stainless steel. All casters supplied will be made by the same manufacturer. Casters will be supplied on each unit to suit

its particular application so that it runs freely and handles easily, minimum of 4" diameter and 200 lbs. capacity per caster.

6.16.7.4(2) Bumpers will be Colson #6915 for wrap around type set into stainless steel channel and #6927 for corner type c/w a 1.6mm s.s. exterior casing. Secure bumpers on equipment at identical height and seal any exposed gap.

6.16.7.4(3) Garbage containers will be black Rubbermaid #2620 complete with lid and #2623 Dolly.

6.16.7.4(4) Towel rack will be K-Venience type.

6.16.7.4(5) Cutting boards will be white thermoplastic polyethylene, with a hardness of 65-70 durometer and all surfaces polished, as supplied by Rubbermaid Products Inc., Johnson Plastics or approved equal.

6.16.7.4(6) All sealants to align with LEED Low Emitting Materials General Emissions Evaluation and VOC content requirements for web applied products. Sealant must not significantly alter its properties when set.

6.16.7.4(6)(a) Align with LEED Low Emitting Materials General Emissions Evaluation and VOC content requirements for wed applied products.

6.16.7.4(7) Sealant to remain flexible and resistant to damage from all normal environments of a commercial kitchen. It must not support the growth of bacteria, mould or fungi or discolor.

6.16.7.4(8) Sealant to be clear or as required to suit colour of surrounding materials.

6.16.7.5 Hardware

6.16.7.5(1) Handles that are an integral part of doors will be Component Hardware Model P44-1010 full grip stainless steel pulls.

6.16.7.5(2) Handles that are an integral part of drawers will be Component Hardware Model P44-1010 full grip stainless steel pulls.

6.16.7.5(3) Catches will be Component Hardware Model M32-2401, concealed magnetic catch with a 30 lb. pull.

6.16.7.5(4) Door track hardware will be Component Hardware Model B57-0144.

6.16.7.5(5) Door guides will be Component Hardware Model B62-1093 or equal.

6.16.7.5(6) Door stops will be Component Hardware Model B60-1086 or equal.

6.16.7.5(7) Front door by-passing door locks will be Component Hardware Model B58-5513 for non-heated cabinets and B58-5511 for heated cabinets.

6.16.7.5(8) Back door by-passing door locks will be Component Hardware Model B58-5523 for non-heated cabinets and B58-5521 for heated cabinets.

6.16.7.5(9) Swing door hinge for refrigerator doors will be Component Hardware Model R42-2840.

6.16.7.5(10) Refrigerator door hardware: Self closing, heavy-duty stainless steel offset pivot hinges with magnetic gaskets and 430 stainless steel door frame and tamper proof cylinder locks and two (2) keys per lock.

6.16.7.5(11) Stainless steel drawer slides: Component Hardware Model S52 series for standard and refrigerated units.

6.16.7.5(12) Drawer locks: Component Hardware Model P30 series, stainless steel face (drawers within the same room will be keyed alike). Supply two (2) keys per lock and hand over to the Authority.

6.16.7.5(13) Casters will be cadmium plated, steel disc cushion non-marking rubber-tired wheels with adjustable cup and cone ball bearings. Caster swivel with two rows of ball bearings running in hardened raceways. Capacity per caster, minimum 100 kg. All stem casters with expanding type fittings of size to suit tube. Plate casters mounted with stainless steel bolts and lock washers for easy replacement. All casters on mobile equipment lubricated for efficient use in varied temperatures of kitchen, walk-in refrigerators and freezers. Casters on mobile equipment equipped with cart-washable casters with grease nipples to assure adequate watertight lubrication.

6.16.7.5(14) Pilaster strips, stainless steel 20mm wide with 13mm adjustment.

6.16.7.5(15) Clips for shelves will be die formed stainless steel.

6.16.7.6 Welding

6.16.7.6(1) All welding will conform to the requirements of CSA specifications and be performed by fabricators who are approved by the Canadian Welding Bureau and CSA specifications. Exposed welds will be filed or ground smooth and flush and polished to match surfaces. All exposed welds will be continuous.

6.16.7.6(2) Electric seamless welding will utilize low carbon filler rod, coated with non-carbonaceous flux, with sufficient chromium and nickel so that

the deposited metal and the original metal have the same composition.

6.16.7.6(3) Welds will be free from pits, cracks, discolouration and other imperfections.

6.16.7.6(4) Welded joints will be butt fitted, properly jigged, continuous, ground smooth and polished for both exposed conditions as well as unexposed welds on underside of equipment.

6.16.7.6(5) Where soldering is desirable, it will be made with lead free solder. In no case will soldering be relied upon for the stability of the seam or joint. Soldering will serve only as a filler to prevent leakage and will not be considered as a replacement for welding or brazing.

6.16.7.6(6) Butt joints made by spot welding or riveting straps under seams and filling with solder, puddled welds and exposed screws are not acceptable.

6.16.7.7 Fabrication

6.16.7.7(1) Before fabrication commences, check all dimensions and conditions at the building site, including means of access into and through the building to the area where equipment is to be set in place, for all conditions affecting the delivery and installation of the equipment.

6.16.7.7(2) Fix and assemble work in the shop wherever possible. Execute the work in accordance with details and Shop Drawings which have been reviewed and approved by the Authority through the Review Procedure. Where complete or final shop fabrication is not possible, make a trial assembly in the shop prior to delivery.

6.16.7.7(3) Workmanship will be of the best grade modern shop and field practice for the manufacturers who specialize in this work.

6.16.7.7(4) Fabricate and erect work square, plumb, straight and accurately fitted. Provide adequate reinforcing and anchorage in all places.

6.16.7.7(5) Insulate where necessary to prevent electrolysis.

6.16.7.7(6) All drillings to be reamed and exposed edges left clean and smooth.

6.16.7.7(7) All straight lengths will be one piece throughout, with all seams, including field joints, continuously welded. Radiused corners must be welded and polished to match original finish.

6.16.7.7(8) Conceal joints and connections wherever possible. Intermediate joints between supports are not acceptable.

6.16.7.7(9) Machine dressed work and finished work will be free from drag, feathers or roughness of any kind. Remove machine marks by sanding

6.16.7.7(10) Pop rivets will not be used unless clearly noted on Shop Drawings, and then only if such drawings have been reviewed and accepted by the Authority.

6.16.7.7(11) The methods of construction, reinforcement and anchorage, as well as details of finish, fitting and jointing, and other data indicated on Shop Drawings will be accurately followed. No deviations from Shop Drawings which have been reviewed and accepted will be permitted during the construction of equipment or installation.

6.16.7.7(12) The gauge of metal and methods of construction will in all cases be adequate for the various conditions to be met, with the requirements of the design details and Specifications considered as minimum. Finished equipment will be rigid when assembled and installed.

6.16.7.7(13) All fastenings and fittings will be stainless steel, type 302 or 304 unless otherwise specified. All bolts and screws will have truss heads or flat heads which are properly countersunk, at exterior and interior surfaces which are normally visible. Concealed fastenings will be used throughout, unless otherwise approved by the Authority through the Review Procedure.

6.16.7.7(14) Sheet material for counter tops, tables, shelves and similar forms will be straight lengths, in one continuous sheet if not over 3 metres long.

6.16.7.7(15) Make provisions in the equipment for proper installation of services and connections. Cut and patch only when necessary. The completed installation will be properly finished without rough edges or exposed openings.

6.16.7.7(16) Allow for expansion and contraction of materials.

6.16.7.7(17) Obtain samples and confirm sizes of trays, racks, pans and china to determine the exact requirements for openings in equipment.

6.16.7.8 Millwork

6.16.7.8(1) All fixtures are to be made by one manufacturer and assembled in single and complete units, as the dimensions will permit shipment to and installation at the building. Large pieces requiring sectional construction are to have their parts accurately fitted and aligned with each other, and provided with ample screws, glue and bolt blocks, tongues, grooves and splines, dowels, mortises and tenons, screws,

bolts or substantial, rigid and permanently secured in proper position to each related section.

6.16.7.8(2) Sufficient additional material is to be provided to permit accurate scribing to walls (tolerance up to 4mm), floors and related work, and allowance made wherever possible for shrinkage that may develop after installation. All units are to be provided with adequate cleating, blocking, crating and other forms of protection as necessary to prevent damage during shipping and handling.

6.16.7.8(3) All fixtures are to be assembled without face screws or nails, except where it may be necessary to attach trim items. All face screws or nails that are necessary are to be countersunk and plastic wood or wood plugs used to cover heads, and the plug neatly touched up. The heads of all screws used in any assembly are to be countersunk below the surface.

6.16.7.8(4) Joints – Mortise and tenon, spline, dowel and/or pin block and glue work to avoid use of nails wherever practical. Make butt joints with an approved device for prevention of separation of members. Blind nail and conceal.

6.16.7.8(5) Plastic laminate is to be bonded to all exposed surfaces with contact cement fast bond EC2166 as manufactured by 3-M Products Company, or equal, to minimum ¾" (19MM) fir faced plywood applied under high pressure. All edges will be carefully sanded to smooth finish, removing burns, nicks and cut marks. Plastic laminate joints are to be finished without wavy and unsightly joints.

6.16.7.8(6) Where solid core/monolithic tops are specified i.e. Nevamar Fountainhead or equivalent, such materials are to be installed by factory certified installers only.

6.16.7.8(7) Hinged doors are to be fabricated of ¾" (19mm) thick plywood with hardwood full perimeter edging with plastic laminate on face and self-edging on exposed sides. Door hinges, pulls and catches will be supplied and installed as specified. Door hinges to be a minimum 170 degree opening.

6.16.7.8(8) Sliding doors are to be fabricated of solid core plywood with hardwood edges and constructed similar to hinged doors. Doors are to be mounted on E-Z Glides track, and to be removable without the use of tools. Rubber stops are to be provided concealed in end stile or mullion.

6.16.7.8(9) Tambour sliding doors are to be fabricated of individual hardwood slats, 3/8" x 3/4" (10 x 20mm), round on 2 edges and glued to 20-ounce duck canvas or reject elastic vinyl plastic or equal and be provided with hardwood end stile with integral door pull. Track to be

lined with laminated plastic or equally smooth surface and guides at top and bottom to be fabricated hardwood. Provide lock-pin for sliding doors.

6.16.7.8(10) Any access panel is to be fabricated of ¾" (19mm) nominal thick hardwood and fabricated as a door. Each access panel to be provided with two (2) magnetic catches at top and two (2) 3/16" (5mm) positioning pins at bottom.

6.16.7.8(11) Drawer sides and backs are to be constructed of 5/8" (16mm) thick solid hardwood such as ash, oak or maple, or 5/8" (16mm) finished birch interior plywood without plugs or defects. Sides to be French dovetailed into fronts, with backs lock-shouldered into sides. Drawer bottoms to be 1/4" (6mm) tempered hardboard, dadoed into sides. Provide pulls as specified. The inside surfaces of all drawers will receive one coat of penetrating primer and one coat of glass lacquer.

6.16.7.8(12) Drawer fronts to be 3/4" (19mm) thick, 5-ply veneer core construction, with veneer banded top edge to match face. Ends to be puttied, sanded and glazed to match top edge. All drawers to be provided with full extension glides.

6.16.7.8(13) Painted finishes to have exposed surfaces free from defects and blemished that would show after being finished, regardless of grade specified. All surfaces specified to receive a paint or enamel finish are to receive one cross-coat of lacquer type undercoat. After the undercoat has been thoroughly dried, surfaces are to be sanded smooth and two coats of enamel is to be applied. Back painting is to be provided for all cabinet and woodwork prior to installation.

6.16.7.8(14) Interior shelves are to be laminated and provided with self-edging on all sides.

6.16.7.8(15) Where required by code, all required materials are to be treated with fire retardant chemicals to achieve the required flame spreading performance rating. Retardant chemicals must be a type approved by local authorities.

6.16.7.9 Solid Surfaces

6.16.7.9(1) Material: Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 and .6, Type Six, and federally inspected WW-P-541E/GEN.

6.16.7.9(2) Superficial damage to a depth of .25mm will be repairable by sanding and polishing.

6.16.7.9(3) Fabrication to be performed by a certified corian or equivalent fabricator/installer.

6.16.7.9(4) Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and manufacturer requirements.

6.16.7.9(5) Solid surface tops to be 19mm thick, adhesively joined with inconspicuous seams; edge details as specified.

6.16.7.9(6) Backsplashes to be 19mm thick.

6.16.7.9(7) Tray slide to be 19mm thick, adhesively joined with inconspicuous seams; edge details as specified. Tray slide to include 6mm deep grooves to accept tray slide inserts.

6.16.7.9(8) Tray slide inserts to be 13mm x 13mm set into 6mm deep grooves with silicone sealant.

6.16.7.9(9) Make cut-outs to templates furnished by cold or hot appliance manufacturer. Reinforce joints and cut-outs as recommended by the surfacing manufacturer.

6.16.7.9(10) Provide insulation between solid surface and adjacent cold pans or hot appliances.

6.16.7.9(11) Thermally isolate hot applications from cold.

6.16.7.9(12) Provide venting of cabinets.

6.16.7.9(13) Sinks to be seamed undermount “S” type sink.

6.16.7.9(14) Single sink bowls to be 445mm wide x 496mm long x 206mm deep complete with drain holes.

6.16.7.9(15) Double bowl sinks to be 783mm wide x 471mm long x 210mm deep complete with drain holes.

6.16.7.10 Stainless Steel Work Tables and Counters

6.16.7.10(1) 2.0mm stainless steel continuous sheets all welded.

6.16.7.10(2) Reinforcing will be a minimum 3.0mm satincoat subtop arranged so that forms are concealed from normal view. Secure reinforcing to tops with stud welding and appropriate silicone.

6.16.7.10(3) Table or counters up to 1800mm in length will have a minimum of 4 legs.

6.16.7.10(4) Tables with sinks will have a marine edge unless otherwise specified.

6.16.7.10(5) Worktable and counters with sink, work tops to slope towards sinks at a slope of 20mm per metre. For dish tables 8mm per metre toward dishwashing machine. Front edge level over full length.

6.16.7.10(6) Edges will be as shown and specified in the standard detail, SD 401.

6.16.7.10(7) Kickplates, where specified, will be of 1.6mm stainless steel and secured to equipment, easily removable.

6.16.7.11 Tops

6.16.7.11(1) Stainless steel tops as specified under "Worktables and Counters".

6.16.7.11(2) Wood tops as manufactured by Michigan Maple Ltd. style "G" - 48mm thick, cured and selected edge grain laminations c/w steel bolt reinforcements. Sand and finish both sides.

6.16.7.11(3) Polyethylene tops (high density types) as distributed by Johnson Plastics. Material is white (all surfaces polished with a hardness of 65 Ä 70 durometer), 19mm thick, no-toxic, with no odour or taste transfer and stain resistant. Top to be reversible and properly supported on stainless steel framework.

6.16.7.11(4) Marble tops will be continuous 25mm thick, white veined and fairly uniform in colour. Provide "A" type graded marble free of cracks and fractures. Support top on stainless steel framework with lateral cross members and a rubber cushioned underpad at the supports. Polish and seal to protect against acids and oils.

6.16.7.12 Backsplash

6.16.7.12(1) 2.0mm stainless steel fully welded.

6.16.7.12(2) Integral section of table or counter top turned up on a 19mm radius to the height specified, then boxed or splayed.

6.16.7.12(3) Enclose, fill and weld all exposed ends and back. Exposed backs at upturns and splashbacks will be faced with 1.2mm stainless steel back panel to bottom of splashback. Such panels will be removable as required for access to mechanical and electrical parts. Seal backs to wall with clear silicone.

6.16.7.13 Legs and Bracing

6.16.7.13(1) 1.6mm stainless steel wall, 41mm O.D. tubular.

6.16.7.13(2) Provide framework for table tops to maintain a height of 900mm above finished floor.

6.16.7.13(3) Leg spacing maximum 1600mm apart, 760mm front to back.

6.16.7.13(4) Bullet feet, Component Hardware Model A10-0851. When table has service connections, dowel and secure to floor using Component Hardware Model A10-0854. Secure to one set of feet only when bridging a structural expansion joint.

6.16.7.13(5) Braces will be continuously welded to legs, polished with minimum reduction in volume.

6.16.7.13(6) Cross brace legs in pairs and longitudinal brace at front, centre or back to suit requirements. All set at 250mm above floor.

6.16.7.13(7) Legs will be continuously welded to s.s. saddles of inverted U shape 100mm wide x 20mm deep x 2.75mm. Flanges angled back or rounded at each end.

6.16.7.14 Over cupboards

6.16.7.14(1) 1.2mm stainless steel all welded

6.16.7.14(2) Top sloped at 30 deg., end gables boxed and bottom shelf fixed.

6.16.7.14(3) Intermediate and adjustable shelves as specified under "Shelving".

6.16.7.14(4) Doors as specified under "Doors" section.

6.16.7.14(5) Secure units to wall with stainless steel fastenings.

6.16.7.15 Shelving

6.16.7.15(1) 1.6mm stainless steel all welded construction.

6.16.7.15(2) Boxed edges on all four (4) sides. Notch corners to fit contour of legs as required for work tables.

6.16.7.15(3) Shelves with sides or backs will be turned up 50mm and set to backs or folded if away from walls.

6.16.7.15(4) Shelves will be easily removable and in sections capable of being pulled out through a single door opening.

6.16.7.15(5) Overshelves to be boxed with backs set to walls and secured with stainless steel tubular brackets.

6.16.7.15(6) Wire shelves to be 5mm O.D. on 25mm centres, set in a 10mm O.D. perimeter frame either stainless steel or heavy duty chrome plated finish as specified.

6.16.7.15(7) Provide a removable bottom shelf in any counter or table set on an enclosed base with mechanical and electrical services.

6.16.7.15(8) Removable bottom shelf in counters or tables with sink for access to clean-out valve on trap.

6.16.7.16 Angle Slides

6.16.7.16(1) 1.6mm stainless steel construction

6.16.7.16(2) Slides will be of 50mm x 50mm section, length to suit. Leading corners rounded, fully welded to supports on vertical edge (for fabrication) or secured by no less than four (4) s.s. screws (for Millwork)

6.16.7.16(3) Round exposed corners and provide back stops. Mount units in key hole slots to ease cleaning and removal.

6.16.7.16(4) Back stops to be provided to limit travel.

6.16.7.16(5) Verify tray, pan or basket size to ensure accurate fit.

6.16.7.17 Drawers

6.16.7.17(1) Front will be double pan construction with insulation equal to cabinet body. Where drawer fronts are shown to have a plastic laminate finish, the double pan construction will be reversed so that the plastic laminate is contained by the outer edges of the back pan.

6.16.7.17(2) Frames will be 1.6mm. stainless steel channel, welded to drawer front.

6.16.7.17(3) Pulls will be formed of stainless steel and welded onto the top edge of drawers; profile shape and size as indicated on the Drawings. Where such formed pulls are not indicated, recessed pulls will be used, Component Hardware P63-1012 or approved equal.

6.16.7.17(4) Slides for refrigerated cabinets will be Component Hardware S52 series; for other drawers Component Hardware S26 series as specified under "Hardware".

6.16.7.17(5) All slides to be installed so that drawers are self closing.

6.16.7.17(6) Housing of 1.0mm stainless steel fully enclosed for drawers under worktables and open cabinets.

6.16.7.17(7) Drawers will accommodate one plastic pan Component Hardware S80 series or one stainless steel pan Component Hardware S81 series for 510 x 510 x 125mm insert.

6.16.7.17(8) Provide rubber buttons at end of frames to cushion drawer.

6.16.7.17(9) Locks as specified under "Hardware".

6.16.7.17(10) Bread drawers will have 510 x 510 x 250mm deep stainless steel removable pan.

6.16.7.18 Sink Bowl

6.16.7.18(1) All of 2.0mm stainless steel integrally welded into table or counter top.

6.16.7.18(2) Interior corners radiused 19mm both vertically and horizontally, all welded and polished. Slope bottom to drain fitting.

6.16.7.18(3) Undercoat with sound deadening compound when sinks are not exposed.

6.16.7.18(4) Multiple sinks to have 18 ga. stainless steel apron to conceal gap between bowls.

6.16.7.18(5) Faucets and drains as specified under "Hardware".

6.16.7.19 Hinged and Sliding Doors

6.16.7.19(1) Front and back of 1.6mm stainless steel.

6.16.7.19(2) All welded, double pan type 19mm thick sound deadened with fibreglass insulation board.

6.16.7.19(3) Hinges for cabinet doors will be concealed, continuous stainless steel piano type secured to body with stainless steel screws.

6.16.7.19(4) Sliding doors will be top hung with a stainless steel track mounted above to allow self closing. Provide nylon rollers with ball bearing centre except for heated cabinets where stainless steel rollers will be used. Doors must be removable without tools.

6.16.7.19(5) Provide rubber buttons to cushion doors.

6.16.7.20 Unheated Cabinets

6.16.7.20(1) Stainless steel tops and backsplash. Top edges boxed, backs up and splayed unless otherwise noted.

6.16.7.20(2) 1.2 mm stainless steel body.

6.16.7.20(3) Door to be hinged or sliding as required.

6.16.7.20(4) Stainless steel pilasters for adjustable shelves c/w clips.

6.16.7.20(5) 1.6 mm stainless steel fixed bottom shelf and removable intermediate shelf.

6.16.7.20(6) Legs as specified under "Legs and Bracing"

6.16.7.21 Heated Cabinets

6.16.7.21(1) Stainless steel tops and backsplash as for unheated cabinet.

6.16.7.21(2) 1.2 mm stainless steel body fully insulated with 13 mm thick fibreglass and stainless steel 2B interior finish.

6.16.7.21(3) Doors to be hinged or sliding and insulated as specified under the "Door" section.

6.16.7.21(4) Stainless pilasters and clips.

6.16.7.21(5) Removable and perforated intermediate shelf.

6.16.7.21(6) Fixed bottom shelf.

6.16.7.21(7) Legs as specified under "Legs and Bracing".

6.16.7.21(8) Maintain a minimum temperature of 160 deg. F (71 deg. C) within the cabinet.

6.16.7.21(9) Heater strip will be chromolox type c/w thermostatic control and pilot light mounted in a recessed panel.

6.16.7.22 Steam Tables and Bain Maries

6.16.7.22(1) Stainless steel top and backsplash

6.16.7.22(2) Construction as per "Heated Cabinet" unless specified otherwise.

6.16.7.22(3) Heating tank will be an integral, all welded unit with the top. Cove all corners and slope bottom to drain equipped with overflow assembly.

6.16.7.22(4) Perforated false bottoms will be stepped in varying heights and easily removable in sections c/w finger holes.

6.16.7.22(5) Insulate heating tank with 25 mm rigid fibreglass.

6.16.7.22(6) Provide chromolox type immersion heater c/w a low water cut off and a minimum heating capacity of 3.0 Kw per sq. m. of bain marie surface or 1.3 Kw per standard full size pan section of steam table.

6.16.7.22(7) Recess thermostatic controls and pilot lights into front of cabinet.

6.16.7.22(8) Manifold all multiple drain outlets to a common and larger diameter header. Trap the header as required by local codes.

6.16.7.22(9) Steam heated units will have 19 mm diameter copper coil assembly to maintain a 95 deg. C water temperature within the tank.

6.16.7.22(10) Provide recessed steam control valves and insulate all exposed steam piping within the cabinet.

6.16.7.23 Prefabricated, Insulated Walk -In Type Refrigerated and Frozen Room Assemblies

6.16.7.23(1) Materials

6.16.7.23(1)(a) Stainless steel sheet metal (min. 24 ga): to CSA G1110.6 1968 type 304 with No. 4 finish.

6.16.7.23(1)(b) Galvanized steel sheet metal: commercial grade to ASTM A526-M81 with galvanized zinc coating to ASTM A525-M80, designation Z275.

6.16.7.23(1)(c) Mild steel: cold rolled sheet to SAE 1010 to 1020 suitably prepared for the specified finish.

6.16.7.23(1)(d) Aluminum sheet metal: Utility sheet with "stucco" pattern finish unless otherwise indicated.

6.16.7.23(1)(e) Sealant: silicone sealing compound, e.g. Dow Corning Silastic 732 RTV silicone adhesive/sealant.

6.16.7.23(1)(f) Asphaltic paint: to CGSB 1-GP-108c, type 1.

6.16.7.23(1)(g) Insulation will be foamed-in-place polyurethane injected into the panels to form a rigid wall without the use of wood or metal structural members. Insulation will have a "K" thermal conductivity factor of not more than 0.86 watts per square metre per degree Kelvin for a temperature difference of 38°C (100°F) and will be rated as self extinguishing, fire retardant type. Overall wall thickness will be a minimum of 76mm (3"), having a density of 40 kg per cubic metre.

6.16.7.23(1)(h) Factory fabricate the exterior and interior walls, ceilings and floor panels using steel pressure dies and maintain uniformity.

6.16.7.23(2) Construction

6.16.7.23(2)(a) All pre-fabricated insulated wall and ceiling panels will bear a stamp indicating ULC approval.

6.16.7.23(2)(b) Panel sections will consist of exterior and interior metal pans with die formed flanged edges. Section edges will have a matching tongue and groove profile to ensure self-alignment and to provide a continuous foam-to-foam airtight contact, when panels are locked into place.

Flexible vinyl gaskets may be used in addition to the continuous foam-to-foam airtight contact.

6.16.7.23(2)(c) Silicone between all panel joints to provide a clean finished appearance and to form air-tight vapour-proof joints. No wood framing to be used in wall or ceiling panels.

6.16.7.23(2)(d) Panel sections will be of modular design, assembled with eccentric locking devices, or approved equal, actuated from the interior of any of the rooms and enabling sections to be erected within 38mm of any building room, column and ceiling.

6.16.7.23(2)(e) Steel for all panels to be painted will be satincoat or approved alternative, 0.595mm thick minimum. Paint will be baked white enamel in two coats. All exterior panels not exposed to normal view to be 0.792mm core galvanized steel.

6.16.7.23(2)(f) Door panels will be insulated and finished as per exterior and interior panels with a minimum 865 x 1980mm clear door opening. Ensure that doors will close and seal opening.

6.16.7.23(2)(g) Infitting flush hinged type doors (swing as indicated in item description) to fit door openings, insulated and finished same as panels, complete with 1015 high x 1.6mm thick stainless steel kick plates on both exterior and interior, as well as soft thermoplastic gaskets with magnetic steel core at top and both sides and adjustable rubber wiper gasket at bottom. Gaskets to be oil, fat, water and ultra violet resistant and to be replaceable.

6.16.7.23(2)(h) Door hinges will be self-closing type, with stainless steel pin and nylon cam-type bearing, of satin finished aluminum.

6.16.7.23(2)(i) Latches to match hinges, for opening door by breaking force of trigger-action door closer and magnetic gasket. Latch to be capable of being locked with padlock and to have safety release handle. Adjustable sliding gasket on the bottom of each door. The magnetic force of the gasket must be sufficient to keep the door closed and airtight.

6.16.7.23(2)(j) Foot treadles to match hinges and latches, for opening door without use of hands.

6.16.7.23(2)(k) One trigger-action positive door closer, located on exterior, to assist in positive closing of door.

6.16.7.23(2)(l) Anti-condensation heater cables will be supplied and installed on all walk-in doors at gasket contact area, in snap-on channel, providing sufficient heat to prevent condensation and frost formation. Heaters across sill will be protected with removable 1.60 stainless steel cover plates or angles. Heaters will be inter-wired at factory, terminating in a junction box located on top of prefabricated insulated refrigerated and frozen room assemblies, ready for connection by electrical trades.

6.16.7.23(2)(m) Provide appropriate number of LED fixtures to ensure a 70 foot/candle (light intensity) at working level.

6.16.7.23(2)(n) Where LED fixtures are specified for walk-in type refrigerated and frozen room assemblies provide CBM AW248 CWHO vapor proof type fixtures with LED vapour proof fixtures and standard 120 volt switches. LED fixtures to operate on 120/60/1. Terminate wiring for lights in junction boxes located on top of the prefabricated insulated refrigerated and frozen walk - in type room assemblies, ready for final connection by electrical trades. Use three-way switches if more than one door is specified.

6.16.7.23(2)(o) Provide and mount additional light fixtures for rooms with a floor area greater than 80 sq. ft. (7.43 metres square).

6.16.7.23(2)(p) Each door panel section will have on the latch side, approximately 1676 mm above the finished floor, an operating toggle switch and pilot light, inter-wired within the panel to an interior LED vapour proof light fixture complete with light tubes and suspended from ceiling panels.

6.16.7.23(2)(q) Wiring will terminate in a junction box on top of the prefabricated walk-in room, ready for connection by electrical trades. Use three-way switches if more than one (1) door is specified.

6.16.7.23(2)(r) Provide LED readout thermometers to provide temperature readings from -40 C to +15 C and mount on latch side of door panel approximately 1525mm from floor. Cover sensing bulb with protective metal cover, same finish as walk-in.

6.16.7.23(2)(s) Two-way pressure relief port will be installed in freezer door panel and refrigerator door panels in rooms operating at +2 C or less. Anti-sweat heater cables in frame of port to prevent intake and exhaust ports from freezing. Vent port to be pre-wired within panel.

6.16.7.23(2)(t) Where walk-in rooms are floor less, wall panels are to be fastened to screeds in lieu of floors; 76mm high screeds are to be of similar construction material and insulation to wall and ceiling panels. Screeds are to be installed plumb and level and secured to finished building floor.

6.16.7.23(2)(u) Supply and installation of an alarm system for each prefabricated walk-in refrigerated and frozen storage room. Install the removable alarm system control box on the outside of each room. Supply and install inter-wiring from alarm system to junction box installed on top of each room. Alarm system will be equipped with one contact for auxiliary remote alarm. Equip with temperature sensor, mounted inside prefabricated rooms and connect to the alarm system control box. Immerse capillary tube sensor in glycol bath. Run all wiring between the alarm system and junction box on top of prefabricated room through conduit and down inside of prefabricated wall panels to alarm system. Exposed wire is not acceptable and will be rejected.

6.16.7.23(2)(v) Removable closure panels will be installed from lower edge of erected ceiling panels to finished building ceiling and cover strips or angles to extend from building floor to ceiling closure panels between exposed ends of walk-in boxes and building wall. Closure panels, cover strips or angles to match finish of exposed exterior wall panels. Provide removable ventilation panels in front of each condensing unit.

6.16.7.23(2)(w) Supply and installation of bumpers on all exposed exterior walls. Bumpers constructed of a solid hardwood base, 50mm X 200mm, clad with 1.6mm stainless steel. Fasten to pre-fabricated walk-in refrigerators and freezers with matching brackets mounted 300 mm from centre to finished building floor. Tops and vertical ends, where bumper makes contact with wall panels, are to be sealed.

6.16.7.23(2)(x) Supply and installation of a 1.6 mm stainless steel protective plate 300mm high at 100mm above the finished floor, no. 4 finish all around the interior of each prefabricated refrigerated or frozen storage room.

Factory mount a 1.3mm galvanized steel reinforcement in the interior of the prefabricated walls.

6.16.7.23(2)(y) Supply and installation of 2.8mm stainless steel corner guards 150mm x 150mm x 1830mm H on all exposed exterior and interior corners.

6.16.7.23(2)(z) Openings through walls or ceilings for electrical, plumbing or refrigeration lines must be sleeved, fit with grommets and sealed with an approved sealant.

6.16.7.23(2)(aa) Prefabricated walk-in refrigerated, and frozen storage rooms covered under this section of the specification will be fabricated to comply with Canadian Standards Association. The CSA label will be affixed to the interior door jamb.

6.16.7.23(2)(bb) Prefabricated insulated wall and ceiling panels specified for refrigeration systems for the Facility or Food Services must meet the requirements of the BC Building Code.

6.16.7.23(3) Mechanical Refrigeration System

6.16.7.23(3)(a) Supply and installation of all mechanical refrigeration equipment and controls for refrigerators and freezers to form a complete and functional system.

6.16.7.23(3)(b) A rack design (similar to Hussmann Protocol or Hill Phoenix) is not required but will be considered if deemed more economical.

6.16.7.23(3)(c) Each individual system will be sized by the foodservice equipment subcontractor to suit the internal space, ambient temperatures and humidity levels of surrounding areas, product type and load, heat infiltration and temperature of incoming product in order to maintain the specified holding temperatures. The equipment supplier (refrigeration subcontractor) must verify all of this information with the Authority during the bidding period. Equipment sizes specified are to be used as a guideline only. Should an adjustment in the size of any refrigeration equipment be required, advise the Authority during the bidding period so that an addendum may be issued.

6.16.7.23(3)(d) Design compressor and coil capacity on a 16 to 18 hour day compressor operation in 32.8 C ambient temperature maximum.

6.16.7.23(3)(e) Design refrigeration equipment for use with Freon R290 for reach-in and undercounter refrigerators and freezers (high, medium, and low temperature applications).

6.16.7.23(3)(f) All condensing units 3/4 H.P. or greater if specified will be Scroll type complete with motor, water cooled condenser (connected to building chilled loop), receiver, compressor, suction and discharge valves, oil separator, high/low pressure controls and all other necessary components mounted in a flexible manner on a common base with all service valves and controls readily accessible and easily Serviceable. Air cooled condensing units will not be accepted.

6.16.7.23(3)(g) Evaporator (coil) to be forced convection unit cooler type, made to be suspended from ceiling panels. Forced air discharge to be parallel to ceiling. Air circulation motor, multi-fin with tube type coil and grill to be assembled within protective housing. Expansion valve, with strainer, heat exchanger inlet and outlet service valve connections also to be contained within housing.

6.16.7.23(3)(h) Construct evaporator entirely of non-corrosive materials. Air circulation motors to be life-time sealed and entire unit-cooler assembly readily accessible for cleaning.

6.16.7.23(3)(i) Evaporator (coil) will be equipped with mounting brackets, stainless steel drip pan, drain connection and required controls for a safe and satisfactory operation.

6.16.7.23(3)(j) Mechanical refrigeration systems used for freezer applications will have an automatic electric system for defrosting including heaters and time control. Defrost to be time initiated and temperature terminated with built-in fail-safe control and fan delay switch.

6.16.7.23(3)(k) Thermostatic type expansion valves, all metal, moisture proof with gas charged bulb clamped to suction end of evaporator (coil). Freezers with 10 P.S.I. expansion valves.

6.16.7.23(3)(l) Equip each prefabricated walk-in refrigerated or frozen storage room and refrigerated preparation/assembly rooms with a room thermostat to control solenoid valve. Mount solenoid valves on liquid lines, close to the cooling unit to control flow of refrigerant.

6.16.7.23(3)(m) Condensate drain lines from evaporators (coils) to ensure a fall of 25mm in 610mm.

6.16.7.23(3)(n) Install a PVC sleeve in the walk-in refrigerator wall where any pipe passes through. The sleeve will be larger than the penetrating pipe to allow for a "permagum" packing and vapour seal.

6.16.7.23(3)(o) All refrigeration piping will be type "L" copper tubing hard drawn with "silfos" brazed joints, verified free of leaks. Completely dehydrate piping before charging with refrigerant.

6.16.7.23(3)(p) Joints at equipment on lines 16mm O.D. and smaller will be made with flareless compression fittings, Swagelock or Imperial "Hy-Seal". Joints on lines larger than 16mm O.D. will be wrought copper solder joint fitting, with adaptor fittings where screwed connections are necessary.

6.16.7.23(3)(q) Installation of piping will conform to applicable requirements of ANSI code for Pressure Piping, Section on "Refrigeration Piping" and CSA standard for "Mechanical Refrigeration Code". Refrigerant piping to obtain a pressure drop of less than 23 kPa per 50 metres in suction lines and 47 Kpa per 50 metres in liquid lines. To increase the velocity and assure proper oil return, install smaller diameter vertical risers on suction lines.

6.16.7.23(3)(r) All new refrigerant piping is to be pressure tested with dry nitrogen and properly evacuated before recharging with refrigerant.

6.16.7.23(3)(s) All refrigerant piping will be properly identified as to service and direction of flow.

6.16.7.23(3)(t) Use ‘home-run” refrigerant piping design.

6.16.7.23(3)(u) Insulate suction lines with 16mm thick Armaflex, 19mm thick on freezer system; or approved equivalent fire-retardant pipe covering, installed in strict accordance with the manufacturer's recommendations. Tape liquid and suction lines together.

6.16.7.23(3)(v) Testing and evacuation procedure will conform to ANSI B31.5 and test pressure will be in accordance with CSA Code.

6.16.7.23(3)(w) Evacuation will be accomplished by use of a vacuum pump to ensure removal of all moisture and non-condensable gases.

6.16.7.23(3)(x) Provide all refrigerant required for charging and placing the system in proper operation. Charging will be done through a new filter dryer and completed by a licensed refrigeration contractor holding a valid ODP.

6.16.7.23(3)(y) If specified, equip all water-cooled condensing units on a re-circulating building-chilled glycol water system with a three-way flow control valve. Balance control valve on the water line entrance and discharge valve filter before water flow valve, thermometer on water entrance and discharge. Supply and install three (3) gauges to measure the pressure in the water circuit: one (1) before the filter; one (1) after the filter; one (1) at discharge end of condenser. Operating conductors will be closed loop cooling, 8.9 C supply water, 15.5 C return water.

6.16.7.24 Exhaust ventilators and hoods

6.16.7.24(1) The basic requirements of the design, installation and use of exhaust systems components including ventilator(s) (hoods with or without dampers) exhaust ducts, air moving devices, fire suppression systems, and auxiliary equipment will be supply and installed in accordance to the current edition of the NFPA-96 and NFPA-17a, and ULC standard ULC-S646-98.

6.16.7.24(2) Fabricate hoods of 1.25 mm stainless steel type 304, No. 4 finish with joints and seams fully welded and liquid tight.

6.16.7.24(3) Provide self-closing dampers if so listed by U.L.C. and approved by AHJ.

6.16.7.24(4) Duct collars will be 1.6 mm stainless steel all welded c/w 25 mm flanged perimeter connection.

6.16.7.24(5) Drains from multiple hood sections will be manifolded to one common connection.

6.16.7.24(6) Lights will be LED recessed vapour type fixtures c/w bulbs. Standard hoods will have Klein # 2310 incandescent vapour proof fixtures c/w bulbs.

6.16.7.24(7) Stainless steel removable enclosure panels will be provided from top of ventilators to underside of finished ceilings.

6.16.7.24(8) Provide a 1.25 mm stainless steel service chase approximately 300 X 200 mm to enclose services from top of service wall to underside of ventilators or hoods.

6.16.7.24(9) Provide the required and engineered number of U.L.C. grease extractors for filter type exhaust hoods. Extractors constructed of stainless steel frame with stainless steel interior air baffles and strategic weep holes to allow drainage into grease trough.

6.16.7.24(10) Grease trough will be one piece, at back of hood and below extractors c/w a removable 150 x 150 x 100 mm grease container drawer.

6.16.7.24(11) Support and hang ventilators and hoods by means of mild steel threaded rod, secured to structural ceiling member. Utilize turn-buckles to ensure a plumb and level installation.

6.16.7.25 Condensate Hoods

6.16.7.25(1) Fabricate hoods of 1.25 mm stainless steel type 304, No. 4 finish with joints and seams fully welded and liquid tight.

6.16.7.25(2) Provide removable s.s. condensate baffles.

6.16.7.25(3) Duct collars will be 1.6 mm stainless steel all welded c/w 25 mm flanged perimeter connection.

6.16.7.25(4) Provide 22mm s.s. condensate drain coupling and condensate trough.

6.16.7.25(5) Stainless steel removable enclosure panels will be provided from top of condensate hoods to underside of finished ceilings.

6.16.7.25(6) Support and hang condensate hoods by means of mild steel threaded rod, secured to structural ceiling member. Utilize turn-buckles to ensure a plumb and level installation, ready for duct connection.

6.16.7.26 Fire Suppression System

6.16.7.26(1) The basic requirements for the design, installation and use of a pre-engineered fire suppression system will be governed by the current edition of the NFPA-17a, NFPA-96, ULC listed, and acceptable to the local authorities having jurisdiction.

6.16.7.26(2) The hood manufacturer will supply a wet chemical fire suppression.

6.16.7.26(3) The hood manufacturer will provide a pre-piped fire suppression system with coverage to suit the equipment under the hood, plenum and duct collar. Each fire suppression drop will extend from the roof of the hood and will be chrome plated or stainless steel pipe or sleeve.

6.16.7.26(4) The hood manufacturer will provide detector(s) factory installed in each hood and wired to a common junction box on top of each hood. The quantity and location of the detectors will be in accordance with the ULC listing and the authority having jurisdiction.

6.16.7.26(5) A fire condition will cause the system to automatically discharge above the hazard areas and extinguish the fire.

6.16.7.26(6) On discharge of the system, all fuel and power to cooking equipment will be shut off automatically by means of a mechanical or electrical (if so specified) gas valve for gas equipment and/or under voltage shunt trip for electrical equipment

6.16.7.26(7) Provide mechanical or electrical, if so specified, remote fire pull stations at the kitchen exit(s).

6.16.7.26(8) System discharge nozzles will have grease caps.

6.16.7.26(9) The hood manufacturer will supply and install all field and factory piping in accordance with the ULC listing of the fire suppression system. Conceal all piping above the roof of the hood whenever possible. All exposed piping to be stainless steel or chrome plated and/or sleeved.

6.16.7.26(10) The system will be installed to the manufacturer's specifications, by qualified representatives and in strict accordance to all applicable codes.

6.16.7.26(11) Supply and installation of the field piping from the hoods to the fire suppression system will be by the hood manufacturer in accordance with the ULC listing. The hood manufacturer to supply all detection devices, release mechanisms and other accessories and components to form a complete operational and approved system.

6.16.7.26(12) The hood manufacturer to supply and set-in-place manual remote pull station for the fire suppression system(s) as required by the local authorities having jurisdiction.

## 6.17 Walk-In Cooler

6.17.1 Provide a secure laboratory/medical grade cold room to serve as F2.2 Walk-In Cooler with odor handling systems as required in Appendix 3A [Clinical Specifications and Functional Space Requirements].

6.17.1.1(1) Walk-In Cooler will have an operating temperature at 2 deg C.

6.17.1.1(2) The unexposed exterior top of ceiling will be 0.6mm steel unfinished. The exposed interior and exterior wall and ceiling panels will be stainless steel finish. Stainless steel sheet will be to ASTM A167, type 302/304 with No. 4 finish.

6.17.1.1(3) Refer to Cold Room and Freezer section for additional information and requirements.

6.17.1.1(4) Provide sufficient maneuvering space for decedent lift.

6.17.1.1(5) Provide wall bumpers, corner guards and door protection.

6.17.2 Provide decedent storage racks with the following requirements:

6.17.2.1 Capacity for 32 regular and 5 bariatric decedents. Stacking and layout will be in consultation with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.17.2.2 Rack construction will be:

6.17.2.2(1) Vertical supports: heavy gauge, 38mm square tubing, type 304 polished stainless steel;

6.17.2.2(2) Horizontal supports: 14-gauge type 304 stainless steel;

6.17.2.2(3) Roller Frames: formed from 14-gauge type 304 stainless steel, #4 finish; zinc plated steel roller bearings; full length anti-tilt guides, and type 304 stainless steel tray latch/stop;

6.17.2.2(4) Formed stainless steel with rubber bumper rear stop; and

6.17.2.2(5) Type 304 stainless steel, adjustable flanged feet.

6.17.2.3 Body trays will be as follows:

6.17.2.3(1) Constructed from one-piece welded construction 16 gauge stainless steel, type 304 with #4 finish. Complete with 25mm rolled edge construction with two hand slots on each end of the tray. Approximate weight capacity will be 175 kg (regular) and 340kg (bariatric);

6.17.2.3(2) Provide drain hole with plug for washing;

6.17.2.3(3) Dimensions:

6.17.2.3(3)(a) Regular: 584 x 1956 x 70mm; and

6.17.2.3(3)(b) Bariatric: 900 x 1956 x 70mm.

6.17.2.4 Acceptable manufacturer will be Mopec JC023 and JC027 or approved alternative by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

6.17.3 Provide 2 mobile decedent lifts with the following requirements:

6.17.3.1 Key switch to prevent unauthorized operation and serves as an emergency off switch;

6.17.3.2 Lift design will be conveyor style, end access and with sufficient functional capacity for bariatric loads. Includes control valve for even lowering at various loads and dual conveyor rollers with a stainless steel frame for decedent loading/unloading. Provide tray lock/release assembly made from type 304 stainless steel with manual pivots;

6.17.3.3 Integral 12V hydraulic lifting unit for vertical adjustment including positioning lock providing a minimum lifting capacity of 500 kg;

6.17.3.4 Lift will have four heavy duty, lockable, swivel style casters directional control;

6.17.3.5 Powder coated finish on rugged metal scissor lift frame structure;

6.17.3.6 Vertical adjustment will be via corded control box with up/down buttons;

6.17.3.7 Built-in integrated scale for weighing the decedent;

6.17.3.8 Removable handle to allow access to three sides of the lift;

6.17.3.9 Front mounted roller bumper;

6.17.3.10 Battery operated with on-board rapid battery charger;

6.17.3.11 Lifting height will be from 360 to 1900mm above floor;

6.17.3.12 Warranty will be for a period of two years, parts and labor inclusive; and

6.17.3.13 Acceptable manufacturer will be Mopec JD950 or approved alternative by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

## PART 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Mechanical Systems Design Principles

7.1.1 This section is accompanied and will be read in conjunction with Appendices 3A through Appendix 3T.

7.1.2 The HVAC, plumbing, fire protection, speciality systems and medical gas systems will be designed to provide a healing, comfortable and productive environment for the Facility Users and provide the environmental and infrastructure needs of all equipment.

7.1.3 The mechanical, plumbing, fire protection, speciality systems and medical gas systems will be designed to minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems. The systems will be designed to have no adverse effects on the existing BH facilities.

7.1.4 The mechanical, plumbing, fire protection, speciality systems, and medical gas systems will be designed and located to be hidden or blend into the overall Facility. The design and location of equipment will mitigate noise transmission as specified with Appendix 3C [Acoustic and Noise Control Measures] to areas of respite for Patients, Staff and visitors, and the residential properties adjacent to the Site.

7.1.5 It is essential that all mechanical systems, equipment, material and installation conform to the latest version of all the applicable codes, standards, regulations and guidelines.

7.1.6 For Class I areas, Clinical Spaces and Patient rooms as defined by CSA and the Appendix 3B [Minimum Room Requirements], mechanical and plumbing equipment will be configured and located in such a way that maintenance and repair can be performed without entering these areas. VAV boxes serving individual Patient rooms located on the Patient care floors may be located in the ceiling of the Patient room served.

7.1.7 The mechanical, plumbing, fire protection, speciality systems and medical gas systems component selection, system design, and installation will incorporate the flexibility and adaptability for future repurposing without major disruption or alteration to the Facility's infrastructure. Where possible, locate risers close to columns, exterior walls or other permanent features to accommodate future modification to floor plate.

7.1.8 Mechanical, plumbing, fire protection, specialty systems and medical gas systems will be planned for future repurposing. Expansion space will be shown on the developed drawings for the boiler room and the chiller room for future installation of hot water boilers, chillers and associated pumps and equipment for Phase 2, refer to Sections 7.5.3 and 7.5.9 for details. Valved connection points will be provided to connect future equipment to the associated systems. Adequate space will be provided and shown on drawings to install future cooling towers adjacent to the other cooling towers inside the screened area. Chilled water, heating water and condenser water primary loop systems in the mechanical room will be sized for 15% spare capacity above that required at date of occupancy for Phase 1 and anticipated Phase 2 for future capacity. Valved connections will be provided sized for connection of future capacity noted above. Easy access will be provided and shown on

drawings for moving the new equipment in and out of the mechanical rooms without disruption and major rework.

7.1.9 The mechanical (HVAC), plumbing, fire protection, speciality systems and medical gas systems will be developed to provide reliability of uninterrupted continual operation. Redundancy will be included in Building Systems design to ensure uninterrupted service and maintain all spaces in accordance with CSA Z317.2 Table 1 parameters and other applicable codes and standards in the case of a source equipment or component failure while under normal operating conditions. Provide 100% redundancy for Type 1 areas and 50% redundancy for Type 2 and 3 areas. Redundancy and spare capacity will be demonstrated in real time to the Authority after the Facility is commissioned and balanced. Drawings submitted for review in accordance with Part 2.4 Submittal Documents will include spare capacity and redundancy values for equipment as well as pipe and duct mains.

7.1.10 Provide water, sanitary, and storm services as required and sized to suit the consumption and discharge needs of the Facility requirements on opening day plus an additional 15% spare capacity to allow for future flexibility. Provide a new gas service sized for the anticipated load of the Phase 1, Phase 2 heating, plus 15% spare capacity for future flexibility. The existing water main currently located where the Facility will be built will be relocated by Project Co and reconnected to the existing systems. Water service disruption will be coordinated with the Authority and not last longer than 4 hours. Phase work so that the Phase 1A water entry is in place and active prior to relocating existing main, if this is not achieved the Project Co will provide and deliver to areas affected by shutdowns, bottled drinking water and water for flushing toilets and washing hands.

7.1.11 All mechanical piping systems, i.e. heating, cooling, domestic water, medical gas, natural gas, propane, etc. will have 15% additional capacity above Facility requirements on date of occupancy built into all main piping distribution sizing.

7.1.12 Mechanical services in electrical, communication, and Telecommunications Rooms will maintain a clear height of 2200 mm above finished floor. Generator room will maintain a clear height of 3050 mm above finished floor. With the exception of piping connecting the generator to the remote radiator if applicable hydronic, steam, sanitary, storm, fuel, natural gas or propane, medical gases, and domestic water piping will not be routed through these room types.

7.1.13 Water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, buildup of deposits, disease, bacteria and will prolong the equipment life. DuBois Chemicals will be used to ensure complete compatibility with existing systems.

7.1.14 All mechanical, HVAC, plumbing, fire protection, speciality systems, and medical gas systems will be vibration isolated to minimize noise and vibration in accordance with criteria noted in Appendix 3C [Acoustic’s and Noise Control Measures] and City of Burnaby Bylaw 7332 through the structure or other components of the Facility.

7.1.15 All mechanical, HVAC, plumbing, fire protection, speciality systems and medical gas systems will comply with standard acoustic requirements as per CSA or current ASHRAE application handbooks, whichever is more stringent. All pipes, ducts and fittings will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns. All Facility services and ductwork will be run inside the building envelope.

7.1.16 Speciality systems may include acid waste and vent, radioactive waste and vent, reverse osmosis water, laboratory air, laboratory vacuum, oncology pharmaceutical preparations, natural gas, laser cooling water and dialysate solutions as required by the Facility's clinical functions and equipment. Refer to Appendix 3B [Minimum Room Requirements] and Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

7.1.17 It is essential that the links to the existing BH from Phase 1A and Phase 1B will be pressurized by this Facility upon a fire alarm from BH and integration to the BH smoke venting control systems operation will be implemented. If the fire is located in the link, the link containing the fire will be exhausted and surrounding areas pressurized to prevent smoke from entering the buildings. This design requirement will be provided to Project Co's code consultant and will not be overridden by the code consultant.

7.1.18 Public and Staff entrances, including those from parking structure, will be protected by vestibules and air curtain heaters. Air curtains will contain heating and cooling elements to maintain the vestibule temperature set point and will be designed with sufficient capacity to ensure the interior spaces protected by the vestibules are not impacted by outdoor conditions or temperatures. Cooling elements may be substituted by cooling to maintain set point provided from the central ventilation system. Service entrances will be protected by air curtains equipped with heating elements.

7.1.19 No "drop in anchors" will be used to support, hang, or brace piping, ductwork, or other equipment.

7.1.20 Design will ensure all equipment, valves, cleanouts, and other mechanical and plumbing items are Serviceable. Roof top items will be serviceable and located a minimum of 2 meters away from an unprotected building edge, so they can be accessed without requiring fall protection equipment. Clear access will be provided for all equipment, valves, cleanouts, and other items requiring maintenance, so Staff can perform work without removing other services or building finishes other than ceiling tiles. Equipment located above the floor in Mechanical rooms or on roofs will be provided with permanent platforms and access. Where insulation needs to be regularly removed to perform maintenance the insulation will be removable blanket type insulation.

7.1.21 Except where specifically noted, any existing piping which becomes redundant will be removed back to the closest main and provided with a valve and cap for future. Any equipment made redundant will be removed. All hangers, supports, and housekeeping pads which served redundant equipment will be removed and the surfaces made good.

7.1.22 The following listed manufacturers are the acceptable manufacturers for equipment items noted. Requests to add an alternate manufacturer may be submitted and will be reviewed

by the Compliance Team. Acceptance will be by Addendum only. It remains the responsibility of the Project Co to ensure the products supplied meet the performance specifications in this Agreement

| | |
|---|---|
| • Access Doors | Maxam, Acudor, Milcor, Can.Aqua, Mifab |
| • Air Flow Measuring Air Monitor, Air Stations | Cambridge, Sentinel, Ebtron |
| • Air Handling Units | Haakon, Scott Springfield, E.H. Price |
| • Air Separators, Relief Valves | Armstrong, Bell & Gossett, Taco |
| • Air Terminals - Grilles Registers, Diffusers | E.H. Price, Titus, Halton |
| • Air Valves - Mixing, Constant Volume and VAV | E.H. Price, Titus, Trane, Phoenix Valves |
| • Air Vents | Hoffman, Maid-O-Mist, Taco |
| • Backdraft Dampers | Airolite, Vent-Aire, Penn, T.A. Morrison |
| • Backflow Preventers | Febco, Watts, Hersey, Singer, Ames |
| • Balance and Flow Control Valves | Tour & Anderson, Griswold, Armstrong, Bell & Gossett |
| • Balancing Dampers | Maxam, Ruskin, E.H. Price |
| • Boilers - Condensing | Viessmann, Cleaver Brooks, Buderus |
| • Bypass Filter (HW) | Sumco, GESL, Pace Chemicals, DuBois Chemicals |
| • Chillers - Centrifugal | McQuay, Multistack, Trane, York, Daikin, Carrier |
| • Chimney and Breeching | Metalbestos P/S, Van Packer P/S, Metal Fab PIL, Security Chimney |
| • CO and Combustible Gas Detector | MSA, ACME, Armstrong, Critical Environment Technology, Draeger |
| • Coils - Heating and Cooling | Trane, Aerofin, Colmac |
| • Condensing Units and Fan Coil Units | Trane, Dunham Bush, York |
| • Condensors - Air Cooled Refrigerant | Trane, Carrier, Engineered Air, Keeprite |
| • Controls Suppliers | Andover Continum or EcoStruxure by Scheider Electric |
| • Convectors - HW | Engineered Air, Trane, Rosemex, McQuay, Dunham Bush, Reznor, Modine |
| • Cooling Tower Water Filter | Baltimore Air Coil, PEP |
| • Cooling Towers - Blow Through and Fluid Coolers | Baltimore Air Coil, Evapco, Marley/ Recold |
| • Cooling Towers - Induced Draft | Baltimore Air Coil, Marley, Evapco |
| • Dampers - Control, Backdraft | Ruskin, Tamco, E.H. Price |
| • Dampers - Smoke-Fire Combination | Ruskin, Controlled Air, Prefco |
| • Domestic Water Heaters - Gas | PVI |
| • Domestic Water Heaters - Steam | PVI, Aerco, Spirax Sarco |
| • Drains - Floor, Roof, Cleanouts, Water Hammer Arrestors | Zurn, Ancon, PPP, J.R. Smith, Watts, Wade |
| • Expansion Compensators | Flexonics, Tube Turn, Hyspan, Hydroflex, Metraflex, United Flexible, Mason, Victaulic |

| | |
|---|---|
| • Expansion Joints | Flexonics, Hyspan, Hydroflex, Metraflex, United Flexible, Mason, Victaulic |
| • Eye Wash Fountains | Western, Haws, Guardian, Bradley, Acorn |
| • Fan Coil Units | Trane, Engineered Air, Williams, Daikin, York/JCI |
| • Fans - Axial | Northern, Chicago, Woods, Joy, CB&F, Greenheck, Loren Cook |
| • Fans - Centrifugal | Buffalo, Twin City, Trane, Chicago, Barry Blower, Northern, Greenheck, Loren Cook |
| • Fans - Roof and Wall Mounted | Greenheck, Ammerman, Powerline, ACME, Loren Cook, Penn, Jenn Fan, ILG, Carnes, Twin City |
| • Filters (Air) | Cambridge, AAF, Pacific, FARR, Filterco |
| • Filtration and polishing (Fuel oil) | Algea-X, DieselPure |
| • Filters (Water) | JUDO, Amiad, Culligan, PenteK, Aqua FI |
| • Fire Dampers | Controlled Air, Ruskin, Canadian Advanced Air, Maxam, Nailor |
| • Flexible Connectors - Ducting | Thermaflex, G.I. Industries Type IHP |
| • Flexible Connectors - Piping | Flexonics, Tube Turn, Atlantic, Hyspan, Hydroflex, Metraflex, United Flexible, Mason, Victaulic |
| • Flexible Duct | Thermaflex, Wiremold, GI Industries Type H.P. |
| • Fuel Inventory and Management Systems | Franklin Fueling Systems, Veeder-Root, Incon |
| • Gauges - Air | Dwyer, Magnehelic, Weiss |
| • Gauges - OWG Pressure | Trerice, Marsh, Ashcroft, Weiss |
| • Heat Exchangers - Plate | Alpha Laval, Tranter, Armstrong, APV, Bell&Gossett |
| • Heat Exchangers - Shell and Tube | Armstrong, Taco, Leitch, Bell & Gossett, Patterson Kelley |
| • Humidifiers - Steam | Armstrong, Sarco, Dri-Steam |
| • HVAC and Plumbing Isolation Valves | Toyo, Kitz, Niboc, Victaulic |
| • Immersion Heaters | Armstrong, Taco, B&G |
| • Insulation - Piping and Duct | Fibreglass Canada, Manson, Knauf Fibreglass, Plasti-Fab, Manville |
| • Louvres | Airolite, E.H. Price, Ruskin |
| • Piping Hangers and Saddles | Grinnell, Myatt, Anvil |
| • Plumbing Brass | American Standard, Cambridge Brass, Waltec, Kohler, Symmons, Toyo Chicago Faucets, Sloan, Delta, Moen |
| • Plumbing Fixtures | American Standard, Kohler, Toyo, Sloan, Franke, Kindred, Toto, Whitehall, Willoughby, Zurn, Stern Williams |
| • Pressure Reducing Valves | Watts, Singer, Bermad/Victaulic |
| • Pump - Condensate Packages | Paco, Leitch |
| • Pumps - Deaerators and Boiler Feed | York Shipley, Cleaver Brooks, Duro, DuBois Chemicals |
| • Pumps - Fire Booster | Aurora, Peerless, Leitch, Armstrong |
| • Pumps - In-Line Circulators | Armstrong, B & G, Taco, Grundfos |
| • Pumps - Manual | Crane |

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| • Pumps - Positive Displacement | Viking, Fairbanks, Morse, Ebara, Albany |
| • Pumps - Submersible Bilge or Sewage | Monarch, Barnes, Hydromatic or Sewage, Myers, Zoeller, Liberty |
| • Pumps - Sump | Monarch, Barnes, Hydromatic, Myers, Zoeller, Liberty |
| • Pumps - Turbine | Aurora |
| • Pumps - Vertical In-Line and Base Mounted | Armstrong, B & G, Taco, Leitch, Grundfos |
| • Radiant Ceiling Panels | Airtex, Frenger, TWA, Sigma. Fraccaro |
| • Radiation - Wall Fin | Engineered Air, Trane, Slant/Fin, Rosemex, Dunham Bush |
| • Roll Groove Couplings and Fittings | Victaulic |
| • Silencers - Fan and Duct | Vibro Acoustics, Vibron, Korfund, I.A.C, Koopers |
| • Sinks - Stainless Steel | KIL, American Standard, Elkay, Franesse |
| • Steam Traps | Spirax/Sarco, Armstrong, Erwal, Colton |
| • Tank - Diaphragm Type Expansion | Amtrol, Hamlet and Garneau Inc. |
| • Tanks - Boiler Feed and Blowdown | York Shipley, Cleaver Brooks, Shipco, Industrial steam, Penn |
| • Tanks - Domestic Hot Water Storage | PVI |
| • Tanks - Expansion | Bell & Gossett, AS Leitch, Sanford, Westeel-Rosco Steelweld, Clemmer, Wheatley |
| • Tanks - Fibreglass Fuel Oil Storage | CAE, ZCL Manufacturing, Owens, Corning |
| • Tanks - Steel Fuel Oil Storage | Clemmer, Westeel-Rosco, Tidy, Regal |
| • Unit Heaters - HW | Engineered Air, Trane, Rosemex, McQuay, Dunham Bush, Reznor |
| • Variable Frequency Drives | ABB, Danfos, Eaton |
| • Vibration Isolation | Mason, Vibro Acoustic, VibraSonic Control, Kinetics Noise Control |

## 7.2 Post-Disaster Design

7.2.1 Essential services including the HVAC, steam, domestic water, fuel supply, sanitary drainage, storm systems, and medical gases serving Phase 1A and Phase 1B are designed and constructed to post-disaster standards as defined in the BC Building Code. Locate these services in Utilities enclosures that meet post-disaster standards as defined in the BC Building Code. In addition, provide connections exterior to the Facility to allow delivery of potable water, oxygen, fuel oil for generators and boiler fuel (propane) by tanker truck. These locations will allow the potable water, oxygen, and one type of fuel delivery connections to be accessed at the same time without impeding emergency vehicles access to site. Provide drawings showing access routes, connection points, and turning radiuses of vehicles anticipated with each submission for review.

## 7.3 Fire Suppression (Division 21)

### 7.3.1 Fire Protection

#### 7.3.1.1 Basic Requirements

7.3.1.1(1) Provide all required fire protection for the Facility.

7.3.1.1(2) The sprinkler system and equipment will be designed to the occupancy classification that it protects. Provide additional capacity of 15% above Facility requirements within each system including main and branch line sizing.

7.3.1.1(3) Provide on the sprinkler system take-off from water supply an approved detector type double check valve assembly with approved listed OS&Y gate valves on both sides complete with tamper switches.

7.3.1.1(4) The fire pump will be on vital emergency power supply and will have a transfer switch which is part of the fire pump controller; package mounted in separate mechanically attached enclosure to form one assembly, specifically approved for the purpose as a complete unit. Carry full load of fire pump in the generator calculation with no diversity.

7.3.1.1(5) Sprinklers subject to freezing temperatures such as the parking structure and exterior overhangs will be supplied by a dry system. A system design utilizing the heat tracing of branch lines is not permitted.

7.3.1.1(6) Pendant concealed quick response sprinklers will be provided in all areas with dropped ceilings with temperature ratings to suit the specific hazard area. Refer to Appendix 3B [Minimum Room Requirements] for risk rating. Example of acceptable product: TYCO Series “Royal Flush II” Concealed Pendant Sprinklers.

7.3.1.1(7) Provide quick response concealed type institutional Tamper Resistant, and ligature restraint sprinkler heads in Mental Health secure areas. Refer to Appendix 3B [Minimum Room Requirements] for risk rating. Example of acceptable product: TYCO Raven Institutional Pendant Sprinkler.

7.3.1.1(8) Provide a double interlocked, cross zoned pre-action supplied sprinkler system(s) to the following rooms: Generator room, Transfer switch room, rooms with switch gear rated for 575 volt or higher, MCC/BCC, all TRs, and entry rooms for telecommunications and main power. Provide dedicated rooms with water proof floors and floor drains.

7.3.1.1(9) Each fire extinguisher will be located per relevant codes and to the satisfaction of the Government Authority and approved for the hazard and classification of the space it serves.

7.3.1.1(10) All fire extinguishers in finished spaces will be fully recessed. Mental Health floors to have lockable cabinets without glass, locks will be keyed to match the building master key system.

7.3.1.1(11) There will be no wet sprinkler system in main Electrical Room (as per B.C. Building Code). Provide either a double interlocked, cross zoned pre-action supplied sprinkler for the main Electrical Room or provide 3-hour rating around main Electrical Room and do not install sprinklers in the room.

7.3.1.1(12) Siamese connections to be located on Kincaid Street, coordinate location with Burnaby Fire Department, Siamese connections for the Support Facilities Building and Nursing Tower buildings are currently located in the footprint of Phase 1A, Relocate the Siamese connections to Kincaid Street, provide temporary connections and piping as required to accommodate Project phasing and include Burnaby Fire department in the development and implementation of the phasing plan.

7.3.1.2 Performance Criteria

7.3.1.2(1) All fire protection systems will be hydraulically sized to NFPA standards.

7.3.1.2(2) All equipment and installation will be in accordance with manufacturers' requirements.

7.3.1.2(3) All equipment will be ULC approved.

7.3.1.2(4) Qualified contractor licensed and regularly engaged in such installations will install all fire protection systems and equipment.

7.3.1.2(5) Provide backflow protection on all fire protection systems in accordance with CSA requirements.

7.3.1.2(6) Locate zone shut-off valves so they are visible and accessible from the floor without the use of a ladder. Do not conceal from view: do not locate in Housekeeping rooms, storage rooms, or stairwells. All valves controlling water flow will be monitored. On Mental Health floors provide lockable heavy gauge cabinets with full metal door, heavy duty security hinges, and mechanical deadbolt, deadbolt locks will be keyed to match the building master key system.

7.3.1.2(7) Fire department connection(s) will be installed at a location approved by the relevant Governmental Authority.

7.3.1.2(8) Install fire extinguishers in a semi (unfinished areas) or fully recessed (finished areas) cabinet to the satisfaction of the relevant Governmental Authority.

7.3.1.2(9) Coordinate with City of Burnaby fire department for new location of re-located annunciator panel. Update Fire Safety Plan indicating new location for annunciator panel.

## 7.4 Plumbing (Division 22)

### 7.4.1 Connection to Site Services

7.4.1.1 Provide individual water, fire protection, natural gas, sanitary, medical gas, and storm services as required and sized to suit the usage needs of the Facility and provide an additional future capacity of 15% above Facility requirements on day of occupancy based on Schedule 3 [Design and Construction Specifications], Appendix 3B [Minimum Room Requirements], and Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment]. Sewer, storm and water service penetrations will be designed for flexibility and movement. No service is permitted to be buried in concrete.

7.4.1.2 Provide two domestic water service connections, one for Phase 1A and one relocated service for Phase 1B. Phase 1A service will be sized for Phase 1A loads plus the existing Support Facilities Building and Nursing Tower loads and will be a minimum of 200mm diameter. The Phase 1A service will interconnect with the existing service in the Level 0 tunnel under Support Facilities Building. Phase 1B service will reconnect the existing 150mm service located in the Level 0 tunnel below Support Facilities Building and be sized for Phase 1B load and existing Support Facilities Building loads. Each supply into the Site will have N+1 redundant reduced pressure backflow preventer, spool sections for future N+1 PRV complete with valves before and after spools, and 25 micron filtration. Each supply will have independent shut-off valves and wye strainer before the backflow prevention located in a dedicated Water Entry room. Submit the projected domestic water supply load and spare capacity values in each design submission. Each connection point will be from Kincaid St, separated by 50m (side by side) and with gate valve on the main between the two connections. Minimum trench separation for each connection must also be 50 m. If the BH Energy Centre is designed as a stand alone building it will be provided with a dedicated domestic water service and water entry room.

7.4.1.3 Provide domestic water filters at 25 microns on the incoming services into the Facility. Design will provide a level of redundancy which will allow for filter maintenance or replacement to occur without affecting water flow or quality to the Facility and will be provided with an emergency floor drain sized for full anticipated load from a filter housing failure. Floor will slope to drain.

### 7.4.2 Sub Surface Drainage

7.4.2.1 Provide drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs. Perimeter drainage and weeping tile will be

provided with cleanouts every 26 meters and for every cumulative change of direction greater than 45 degrees. Piping will be graded at a minimum 1" in 40'.

7.4.2.2 If pile foundations are used to support the structure, all underslab piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and be installed at intervals to carry the pipe and load and maintain the required slope. Hangers and rods will be corrosion proof stainless steel. Install light-weight fill above all piping that is supported (hung) from the concrete slab above. Support system will be demonstrated to work and demonstration witnessed by the Authority and Compliance Team.

7.4.2.3 Connect all sanitary and storm drainage utilizing gravity drainage whenever possible.

7.4.2.4 Pumping systems for subsurface, storm, or sanitary drainage will include two redundant units for each active unit and related equipment will be supplied with delay vital power. The storm / subsurface sump will have twin compartments for settling and pumping and will be sized to prevent short cycling of the pump. Provide local alarm and outputs to the BMS for high water levels, status, and pump failure.

7.4.3 Plumbing System Distribution Systems

7.4.3.1 Domestic water systems will meet the requirements outlined in American Water Works Association (AWWA) standards. Provide water treatment, as required to meet CSA/AWWA standards, LMFM flushing and Sanitation of Potable Water Systems Technical Bulletin 2017-02, or the Canadian Drinking Water standard. Provide an exterior domestic water connection to enable domestic water connection to an exterior source if water main service is not available from the City main. Provide Legionella testing and certification prior to Facility occupancy. All products including pipe, valves, fittings, accessories, factory supplied as well as fabricated assemblies and spools that will come into contact with domestic potable water shall be tested and certified to NSF/ANSI/CAN 61 and 372 for commercial hot and cold water ratings as applicable. Project Co shall provide documentation of agency certification before commencing work on site. Any products found to be non-compliant will be replaced at Project Co's expense.

7.4.3.2 Refer to Section 5.2 regarding post disaster requirements for water services.

7.4.3.3 Provide reverse osmosis system to serve the MDRD fixtures as noted in Appendix 3B [Minimum Room Requirements] and the sterilizing and washing equipment noted in Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

7.4.3.4 Provide Utilities-grade meters for domestic water, propane, and natural gas. The meters will be used to accurately measure water flow and natural gas consumption in all flow conditions. Refer to Section 7.5.10 Metering Requirements for Energy Measurement and Verification.

7.4.3.5 Provide the plumbing, fire protection, reverse osmosis, and medical gas systems in such a manner as to avoid disruption to the operation of the Facility during maintenance or repairs. Design the systems so that, as much as possible, Clinical Spaces do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be Serviceable from an 8' ladder. Locate valves so ladders do not obstruct doorways while accessing valves.

7.4.3.6 Distribute domestic water with a minimum of two risers to each Phase 1A and Phase 1B floor plate. Each riser will be sized to provide full fixture load of floor. Floor distribution will utilise a completely looped system connected to all risers serving the floor. Divide the total floor area into six equal zones and provide valves to allow any one zone or riser to be shut off for service while maintaining service to the other five zones. Provide electronic isolation valves on each domestic cold water connection to the riser at every floor level. Valves will be controlled from the Nursing Station on the floor and the BMS via the graphics.

7.4.3.7 Provide dedicated electronic shut off valves on the water piping serving each set of inpatient, Patient washrooms and washroom/showers and secure room fixtures in Mental Health Areas. The valves will be controlled remotely via the BMS. Staff for the Mental Health Areas will be able to open and close the valves for inpatient rooms, Patient washrooms and washroom/showers from the Central Care Team Station and control valves for the secure room fixtures from the associated anteroom and Central Care Team Station.

7.4.3.8 Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Pipe labels will be installed every 8 meters, each side of every wall penetration, and beside service valves. Pipe and equipment labels will match existing site Pipe Identification standard.

7.4.3.9 Provide Avery dots to identify access points for valves, dampers, control devices, and cleanouts. Provide Avery dot color matrix to the Authority for review before installing. Avery dots will be provided on ceiling grids and access panels.

7.4.3.10 Provide brass valve identification tags on all valves. Schedule valve numbers using sequential numbering system. Provide valve tag list indicating valve number, system, location, normal operating position, and area served. Confirm starting number and existing site tagging convention with the Authority.

7.4.3.11 Provide and install all fixtures and equipment in accordance with manufacturer's specifications, standards, and installation instructions.

7.4.3.12 Provide the water systems to ensure that water is supplied at the required pressures for optimal fixture operation to all water outlets. Minimum water pressure will be maintained at 45 psi to all fixtures, to be demonstrated to Compliance Team after Commissioning.

7.4.3.13 Provide water inlet connections exterior to the Phase 1A for supply water through tanker truck connections. Design to include the ability to maintain the minimum pressure required by code in the building with building operational while drawing water from the tanker truck by using a booster pump provided in the building. The system may use the domestic pumps utilized in daily operations to achieve the required pressure, pumping system will be on delayed vital power. Provide express pipe to steam water make up system and valving so FMO can prioritize supply to steam plant and Phase 1A while on back up water. The system will be designed in such a way that it may be used as a backup should the municipal services fail during a disaster such as an earthquake and will tie in downstream of the building back flow protection. The operation of this system will be demonstrated to the Authority in real time with a tanker truck prior to building occupancy.

7.4.3.14 Provide durable materials to allow for 24 hour a day operation with minimal downtime. Domestic and non-potable water piping in the Facility will be Type K copper, ductile iron, or stainless steel. Ductile iron to be limited to Water Entry room piping. Piping for domestic hot water recirculation will be stainless steel, or Type K copper for piping 12mm to 40mm in diameter and stainless steel for piping over 40mm in diameter for domestic water sizing use a maximum velocity of 8’ per second for cold water, domestic hot water 5’ per second, and domestic hot water recirculation 3’ per second. Pex piping is only permitted for use in trap primer lines run in the slab. Sanitary and storm piping above ground in the Facility will be cast iron or copper.

7.4.3.15 Domestic and non-potable water piping will be connected by soldering, brazing, threading, flange or roll grooved systems. Connections utilizing compression will not be used except for connection of trap primer lines run in the slab. If roll grooved systems are used, then components in domestic and non-domestic grooved piping applications will be by Victaulic, unless a required product is not manufactured as part of their offering, including but not limited to grooved couplings, fittings, balancing, isolation, pressure reducing valves, check valves, strainers, anchors and expansion compensators. Victaulic shall provide a Contractor Certification and will provide inspection services. The inspection services will be provided for 100% of installed mechanical couplings and will be inspected by the grooved piping system manufacturer’s inspection services representative. The trained representative will report any deficiency to the installing contractor, the Authority and Project Co. All identified deficiencies will be resolved by the installing contractor and re-inspected by Victaulic. Tamper proof inspection stickers will be affixed to each of the inspected joints to confirm the assembly has passed the inspection. Upon completion of the piping system, and following pressure testing, Victaulic confirmation and inspection reports and data are to be submitted to Project Co for inclusion in close out documents provided to the Authority indicating that 100% of couplings have been inspected and approved. The warranty on Victaulic products will be provided in accordance with the Warranty Period as defined in Schedule 1 [Definitions and Interpretation].

7.4.3.16 Provide services for easy access and serviceability while avoiding interference with other services during operation and maintenance activities. All equipment, valves, and cleanouts will be Serviceable and removable, if required, without adapting wall/ceiling finishes or structure. No plumbing piping (sanitary, storm, or domestic water) will pass through electrical, server, communication, generator, or UPS rooms.

7.4.3.17 Provide floor drains in all mechanical rooms, rooms noted in Appendix 3B [Minimum Room Requirements], and for all devices and equipment requiring these drains including emergency showers, reverse osmosis systems, pre action sprinkler systems, and backflow prevention devices. Ensure all equipment drain piping is terminated at floor drains and floors slope to the drains. Drains serving back flow prevention devices will be sized to accommodate the full flow of the back flow prevention device as calculated by the device manufacture.

7.4.3.18 Connect the sanitary systems from the Workroom-Frozen Section Lab/Specimen Collect and specimen collect rooms by means of a single point connection per system to the main sanitary building drain. Provide space and venting allowances for future solids interceptors at this connection.

7.4.3.19 Provide, as required by code and City bylaws, interceptors to intercept oil, grease, dirt, solids, and bio-waste from the Facility. Interceptors will be located in such a manner that they can be emptied without running hoses through the building. Provide central grease interceptor to serve all fixtures which may receive grease.

7.4.3.20 Interceptors will be provided and installed in accordance with manufacturer's specifications and applicable codes. Interceptors will be located so they can be serviced without pulling hoses through the Facility or releasing contaminates into the surrounding air.

7.4.3.21 Provide the domestic water booster pumping system per the requirements of CSA Z317.1-09 to serve Phase 1A, Phase 1B, Support Facilities Building, and Nursing Tower. The number, electrical service, control, and arrangement of pumps will be such that peak demand can be met in the event of failure, during maintenance on, or replacement of one pump. Provide a connection to delayed vital power if required to provide minimum pressure requirements on the top floor and include in the emergency generator calculations. The system will provide uninterrupted water service and constant pressure under all conditions. Domestic water pumping system will work in conjunction with equipment and piping provided for Section 5.2 Requirements for Post-disaster Conditions.

7.4.3.22 Provide all systems to meet the infection control requirements of this Schedule and CSA Z317.13.

7.4.3.23 All piping will be accessible. No in-slab or concrete encased piping is allowed except piping serving the trap primers and drainage piping serving elevator pit drains.

7.4.3.24 The Morgue and all Secure Rooms will be equipped with flushing rim style floor drains. Flushing device will be concealed push button type, location of flush valve button to be confirmed with user groups. Backflow prevention on supply piping to floor drains will be located in Housekeeping and/or Mechanical Rooms.

7.4.3.25 Provide floor drains beside all solid waste disposal units in case of overflow, where solid waste disposal units are provided in ensuite washrooms the shower drain may be used for this purpose providing it complies with the requirements of this clause. This floor drain will not connect to the same horizontal branch piping as the solid waste disposal unit drain. The length of the horizontal branch or fixture arm from a solid waste disposal unit to its connection to a vertical stack will not exceed 1525mm (5'0"). Horizontal branch pipe will be minimum 75mm in diameter.

7.4.3.26 Coordinate final location of all drains through the User Consultation Groups process with the Authority through the Review Procedure.

7.4.3.27 All vents will terminate outdoors; the use of air admittance valves is not permitted.

7.4.3.28 Performance Criteria

7.4.3.28(1) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout per BCICA quality standards. Where piping and/or piping components are subject to freezing, provide insulation and heat tracing. Provide vinyl service jacket on all exposed insulation inside, provide aluminum jacketing outside and on exposed piping in parking structure. Ensure Life Safety Systems are not installed in locations subject to freezing.

7.4.3.28(2) All plumbing drainage for acidic fluids will be of ‘acid’ resistant material up to the connection with a neutralizer to reduce the acidity of the discharge to a neutral pH.

7.4.3.28(3) Provide flushing and disinfection of domestic water systems to AWWA and CSA infection control standards. Provide independent testing of piping systems once flushing and cleaning has been completed and provide documentation of testing to the Authority for review.

7.4.3.28(4) Provide BMS controlled trap primers in drains that are subject to losing the trap seal due to infrequent use, negative pressure, or overly hot conditions. This includes floor drains in Mechanical, Housekeeping or Soiled Utility rooms, floor drains for emergency showers, or floor drains without a dedicated load for equipment or fixtures.

7.4.3.28(5) Provide BMS controlled trap primers with automatic solenoid valves to maintain the prime of p–traps for showers, lavatories, and hand hygiene sinks in negatively pressurized Airborne Isolation Rooms Patient and AIR Anterooms.

7.4.3.28(6) Conceal all sanitary, waste, and water piping in walls. Only trap arms and water supply piping will be exposed, water supplies will be wall type only. Fixture outlet piping for adjustable height fixtures will be installed so that no water can collect in the drain piping at any fixture height. Provide solid supply tubing to sinks and lavatories for ease of cleaning, no braided flex in Clinical Spaces. Trap arms will connect to drain piping with a slip joint connection at the wall, MJ clamp not acceptable. Provide chrome escutcheons for water and drain wall penetrations.

7.4.3.28(7) If domestic water system pressure exceeds the acceptable delivery pressure noted in BC Plumbing Code of 80 psi, then provide pressure reducing valves with 100% redundancy. Place the valves in accessible locations in Mechanical Rooms or accessible chases with valving to permit the servicing or replacement of each valve without impacting water supply to areas served. Pressure reducing valves dedicated to equipment with specific pressure requirements may be mounted beside equipment served and do not require redundancy.

7.4.3.28(8) Locate sanitary cleanouts between 1.2 metres and 1.5 metres from finished floor. Cleanouts will be Serviceable and oriented so that a drain auger can be easily inserted. Locate cleanouts for lavatories behind the mirror located above the fixture, Fixtures without mirrors will be provided with key lockable stainless-steel access doors. In Mental Health areas the water closet flush valve access panel may be utilized to access the cleanout. Keys will be complying with the master key system.

7.4.3.28(9) Where water filters are required at point of service for equipment, they will be Serviceable, provided with adequate space below for housing removal to change filters, be equipped with isolation valves and unions, and be located in a space with a floor drain.

7.4.3.28(10) Where back flow prevention devices are required they will be installed in Mechanical or Services rooms in a Serviceable location.

7.4.3.29 Shop Compressed Air system will have a N+1 compressor system serving a single storage tank. Shop air will be generated and filtered to meet ISO 8573-1 Class 3 parameters. Shop air will be distributed in copper or black steel piping to all compressed air outlet locations noted in Appendix 3B. Piping will not contaminate compressed air.

7.4.3.30 Workroom-Plumbing will be provided with a piped Nitrogen outlet served from a single bottle manifold. Nitrogen outlet pressure and flow to be user adjustable. Nitrogen piping shall be purged brazed medical grade copper and all components to be oil free and will not contaminate the gas. Locate the Nitrogen outlet with the movable hood noted in Appendix 3B for brazing.

7.4.3.31 To permit removal of existing acid neutralizer sump Project Co will replace the existing glass p-trap serving the fume hood located in the Level 1 Lab Room 136 with a point of use acid neutralization system. Standard of Acceptance is the Zurn Z9A-PHIX complete with Z9-PHIX-Media and Z9-PHIX Filter. Replacement will be completed prior to starting excavation.

7.4.4 Plumbing Fixtures

7.4.4.1 Basic Requirements

7.4.4.1(1) All plumbing fixtures will be suitable for a hospital facility. Fixtures selected will have proven acceptable hospital performance from previous installations. All wall hung fixtures will be supported by floor mounted carriers and be equipped with shrouds to cover traps and water shut offs. Shrouds will be completely sealed to prevent access by Patients or public for tampering or hiding of contraband. Provide ¼ turn fixture stops.

7.4.4.1(2) Consult with the Authority through the Review Procedure on the selection of fixtures and give particular attention to performance relative to infection prevention and control. The dimensions will at a minimum meet CSA standards for all hand hygiene sinks. Small ‘bar’ type sinks (inside dimensions less than 530 mm long by 400 mm wide) are not acceptable. Public lavatories provided for handicap accessibility and lavatories in Patient washrooms will meet CSA 561 accessible guidelines. A minimum of 800mm clear space on either side of Patient toilets is to be provided for Staff to assist.

7.4.4.1(3) Provide security and ligature restraint fixtures where noted and as identified by Facility Users. Refer to Appendix 3B [Minimum Room Requirements] for locations requiring Ligature Resistant fixtures.

7.4.4.1(4) Toilets in bariatric washrooms will be floor mounted toilets as per Section 7.4.4.1(9) which will accommodate mobile commodes. Provide mock-up to confirm compatibility with the Authority supplied equipment, i.e., commodes. Compatibility to be demonstrated and accepted by the Authority through mock-up process as per Schedule 3 [Design and Construction Specifications], Part 2.5 Mock-up Rooms and Prototypes.

7.4.4.1(5) Provide anti-splash, anti-aerosolizing, faucet fittings (i.e. laminar flow) that do not retain air. Unless otherwise specified, provide gooseneck faucet fittings. Avoid low profile gooseneck faucet fittings. Faucet discharge will not discharge directly in drain grid.

7.4.4.1(6) With the exception of the Mental Health Areas, fixtures will not have an overflow. Fixtures without overflow will be provided with strainer assemblies without overflow holes. Coordinate locations of fixtures requiring overflow with Mental Health Facility Users during design.

7.4.4.1(7) Public toilets will be floor mounted, elongated bowls with an open front seat and concealed hardwired electronic flush valves. Toilets will be a minimum height of 425 mm from floor to rim. Minimum MaP score of 1000.

7.4.4.1(8) Staff toilets will consist of floor mounted elongated bowls with an open front seat and exposed hardwired electronic flush valves equipped with exposed wheel handle stop. All toilets will be a minimum height of 425 mm from floor to rim. Minimum MaP score of 1000.

7.4.4.1(9) Patient toilets, with the exception of the Mental Health Areas, will consist of floor mounted rear outlet elongated bowls, an open front seat, manual high/low dual flow flush valves, complete with exposed wheel handle stops and have a minimum clear space of 800 mm on either side to provide room for Staff to assist. All toilets will be a minimum height of 425 mm from floor to rim. Toilets will be of a type that can be used with portable bariatric commode chairs as required. Compatibility to be demonstrated to the Authority prior to approval. Minimum MaP score of 1000.

7.4.4.1(10) Patient and Public toilets for the Mental Health Areas and any area noted as ligature resistant, will consist of floor mount rear outlet stainless steel elongated bowls with stainless steel finish, an integral seat and manual concealed push button operated flush valves. Flush valves to be accessed through a key locked stainless steel access door. All toilets will be a minimum height of 425 mm from floor to rim. Toilets will be of a type that can be used with portable bariatric commode chairs as required. Compatibility to be demonstrated to the Authority prior to approval. Minimum MaP score of 800.

7.4.4.1(11) Patient water closets in Secure Rooms will be 12 gauge 304 stainless steel combination water closet and lavatory fixtures with stainless steel finish and integral recessed toilet paper holder. Toilet will be elongated bowl with integral contoured seat. Fixture will be able to withstand loadings of 5,000 pounds without damage. Secure Rooms will be equipped with flushing rim floor drains activated from the Anteroom. Anterooms will be equipped with hose bib in recessed box with lockable lid.

7.4.4.1(12) Clinical Floor Mounted Service Sink (Hopper) will be a floor mounted, flushing rim, vitreous china fixture with top spud, tight fitting cover, flush valve with exposed hand wheel stop, rim guards, and pedestal base.

7.4.4.1(13) Showers and bath tubs will be provided with pressure balanced and high temperature limit valves, metal shower heads will be utilized.

Shower valves will utilize single motion activation only to operate i.e. no pull out-turning motion.

7.4.4.1(14) Bath tubs in Patient Room-LDRP washrooms (Ensuite/Tub) will be accessed from 3 sides. Minimum internal tub dimensions will be 1320 mm long by 700 mm wide and 1016 mm deep. Tubs will be equipped with a step through door and a 3” drain for fast draining. Telephone shower from adjacent shower area will be used for washing tub occupant. Provide shower hose long enough to provide this function.

7.4.4.1(15) Bath tubs will be designed so the contents can be drained without reaching into the tub. This will be provided by mechanical or other means.

7.4.4.1(16) Patient showers, except for areas serving Mental Health Areas, will be telephone style including Ligature Resistant shower elbow with check valve and quick disconnect fitting. Telephone shower hoses will have smooth easy to clean surface. Shower hoses to be sized to ensure the shower head cannot be submerged in any adjacent plumbing fixture. Mental Health Area showers will be Ligature Resistant one-piece shower heads.

7.4.4.1(17) Slide bars provided for telephone showers will be significantly sturdy to act as CSA B651 rated grab bars.

7.4.4.1(18) Shower bases will ensure that the water is contained within the shower area and drain fully without puddling, these parameters to be demonstrated to the Authority in real time. Floor drainage will be demonstrated to the Authority prior to the install of final floor finish and remediated and retested should puddling be observed. Floor grade to drain to be minimum 1.5% with no lip. Shower bases will not be fibreglass or acrylic and will be integral to the floor system. Built up shower will have two mechanically secured membranes to protect from water seepage through the slabs. Membranes will extend to 150mm above flood level rim on all adjacent walls.

7.4.4.1(19) Showers for Staff use will not be less than 1200 mm x1200 mm.

7.4.4.1(20) Urinals will be wall-hung and low-consumption with hardwired electronic hands-free flush valve operation complete with exposed wheel handle stops.

7.4.4.1(21) Public and Patient washroom (outside of IPU’s) lavatory fixtures will be made of an impervious, durable material and will have hardwired electronic hands-free type faucets with single temperature supply that can be adjusted and set to the desired temperature. Lavatories will be wall hung and will be wheelchair accessible. Refer to Appendix 3L [Approved Sink and Faucet Combinations] for list of

products approved by the Authority, no substitutions will be permitted.

7.4.4.1(22) Inpatient room washroom lavatory fixtures, with the exception of the Inpatient Psychiatry Unit component, will be made of an impervious, durable material and will have manually operated faucets with blade handles. Provide thermostatic tempering valve to limit hot water discharge temperature to 43 degrees C. Lavatories will be wall hung with shroud to cover waste and supplies and will be wheel chair accessible. Refer to Appendix 3L [Approved Sink and Faucet Combinations] for list of products approved by the Authority, no substitutions will be permitted.

7.4.4.1(23) Inpatient room washroom lavatory fixtures for the Inpatient Psychiatry Unit component and any area noted as ligature resistant will be made of an impervious, durable solid surface material and will have electronically operated Ligature Resistant faucets. Provide thermostatic tempering valve to limit hot water discharge temperature to 43 degrees C. Lavatories will be wall hung with shroud to cover waste and supplies and will be wheel chair accessible. Refer to Appendix 3L [Approved Sink and Faucet Combinations] for list of products approved by the Authority, no substitutions will be permitted.

7.4.4.1(24) Inpatient room washroom lavatories for bariatric rooms will be made of an impervious, durable solid surface material and will have manually operated faucets with blade handles. Provide thermostatic tempering valve to limit hot water discharge temperature to 43 degrees C. Lavatories will be wall hung with shroud to cover waste and supplies and will be wheel chair accessible. Lavatory and carrier will be rated for 1,000-pound weight capacity. Refer to Appendix 3L [Approved Sink and Faucet Combinations] for list of products approved by the Authority, no substitutions will be permitted.

7.4.4.1(25) Utility sinks will be commercial grade stainless steel sinks, integral to the counter top where noted on Minimum Room Requirements. Faucets will be goose neck laminar flow with blade handle unless noted otherwise. Provide thermostatic mixing valve to limit hot water discharge temperature to 43 degrees Celsius. Provide utility sinks where noted in Appendix 3B [Minimum Room Requirements] and where ever glycol systems and other water treatment procedures will take place (generator room, chiller room, etc.).

7.4.4.1(26) Hand Hygiene sinks (Clinical hand wash) for Care Team Stations, Clinical Spaces, examination rooms, and other similar function rooms will be CSA Z8000 compliant, wall hung, and will be made of an impervious durable material (vitreous china, porcelain). Hand hygiene sinks in Soiled Utility, Housekeeping and other Back of

House areas may be made of stainless steel for impact resistance. The sinks will have hardwired electronic hands-free type faucets and single temperature supply that can be adjusted and set to the desired temperature and will have an integral temperature control which is user adjustable. Hand hygiene sink to be reviewed and approved by the Authority and Infection Control. Refer to Appendix 3L [Approved Sink and Faucet Combinations] for list of products approved by the Authority, no substitutions will be permitted.

7.4.4.1(27) Nourishment station sinks will be stainless steel or solid surface sinks integral to the countertop with a blade handle goose neck faucet. Provide water supply and drain connection for ice maker.

7.4.4.1(28) Operating room scrub sinks will be equipped with hardwired electronic hands-free type faucets. Faucets will have sufficient clearance and height to allow proper surgical scrubbing to occur. Faucet will have a single temperature supply with integral temperature control that can be user adjusted. Number of compartments per scrub sink will depend on location/distribution and will be confirmed with Facility Users during the User Consultation Group meetings with the Authority through the Review Procedure.

7.4.4.1(29) MDRD and scope cleaning faucets within the soiled decontamination side of the departments to be selected through the user consultation process with the Authority through the Review Procedure. There will be multiple faucets providing multiple water qualities (domestic, filtered, and RO) required at each workstation to allow proper filling of sinks and cleaning of instruments and equipment.

7.4.4.1(30) MDRD equipment cleaning sinks will be made of stainless steel integral to counters with blade handle faucets and gooseneck spouts. Sinks will be large and deep to accommodate proper washing of equipment and have demarcation line noting ½ full and full conditions.

7.4.4.1(31) Bottle fillers will be fully recessed, stainless steel, hardwired, with no touch sensor activation. Fixture will have a drain connection connected to sanitary. Fixtures will be CSA B651 compliant.

7.4.4.1(32) Hair wash sinks will be porcelain enamel wall hung with floor mounted concealed carriers, neck rest, vacuum breaker, faucet, spray attachment, and hair interceptor. Standard of Acceptance Belvedere Model 522 with 603 backflow preventer.

7.4.4.1(33) Foot wash sinks will be floor mounted sanitary grade reinforce acrylic with thermostatic mixing valve, manual level tap, and panel mounted soap dispenser. Standard of Acceptance Wudumate Classic.

7.4.4.1(34) Fixtures will meet CSA B561 accessibility requirements.

7.4.4.1(35) Provide BMS controlled trap primers with automatic solenoid valves to maintain the prime of p–traps for showers, lavatories, and hand hygiene sinks in negatively pressurized Airborne Isolation Rooms Patient and AIR Anterooms.

7.4.4.1(36) Provide suitable quantities of mop sinks, hose bibs, eye wash and emergency shower stations to provide sufficient service to the Facility. Locate as noted in Appendix 3B [Minimum Room Requirements] and as required by Facility Users.

7.4.4.1(37) Provide all appropriate services and connections to all equipment noted in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment], and as required for Patient care, laboratory and all other areas. Provide all accessories as needed.

7.4.4.1(38) Sinks will be stand-alone wall hung type with floor mounted concealed arm carriers or have bowls integrally formed into countertops. Drop-in or under-mount style countertop sinks will not be used.

7.4.4.1(39) Provide impact resistant floor mop sink with stainless steel rim in each housekeeping room of an adequate size, depth and access to support the floor burnishers and other required housekeeping equipment. Faucet will have blade handles, integral stops, vacuum breaker, and be equipped with a hose connection on the spout. Mop sinks will be stainless steel with integral lip on all sides in contact with the wall. Lip to extend behind wall protection to direct splashed water into the fixture and prevent water penetration into the wall assembly. Minimum sink dimensions will be 24”x24”x12” deep.

7.4.4.1(40) Provide a RPBD protected hose thread connection for all housekeeping detergent dispensing systems, minimum one per housekeeping room and as noted in Appendix 3B [Minimum Room Requirements].

7.4.4.1(41) Provide eye wash and emergency shower fixtures to comply with ANSI 2358.1- 2009 or latest standards, Authority Work Place Health and Safety Guidelines, WorkSafe BC OHS Guidelines, as Noted in Appendix 3B [Minimum Room Requirements], and in rooms containing batteries or chemical treatment procedures. Project Co, in consultation with the Authority, to determine emergency eye wash and shower requirements to suit the identified level of risk. Provide floor drain for each emergency shower location, centred directly below the shower head with floor sloped to drain for 1200mm around drain.

7.4.4.1(42) Concealed frost free key operated hose bibs will be provided around the Phase 1A, Phase 1B, and BH Energy Centre buildings on each ground level exterior wall, on every exterior deck or enclosed exterior area for Patient or Staff use, and every accessible roof. Provide 2 hose bibs for each level of parking at opposite ends. Hose bib systems will be isolated from the building by a reduced pressure backflow device. The parking system design will incorporate the ability to drain down the parking system during the winter so piping does not require heat tracing.

7.4.4.2 Performance Criteria

7.4.4.2(1) Provide isolation valves for all plumbing services and clearly identify the location of all valves.

7.4.4.2(2) Provide accessible clean-outs for all sinks and lavatories above the flood-level rim of the sink. Locate clean outs behind removable mirrors where mirrors are provided, other locations provide stainless steel key locking access doors with keys on the master key system. Also include provisions for clean outs on rough-ins for future sinks and lavatories. Accessibility of clean outs will be demonstrated to the Authority in real time prior to handover.

7.4.4.2(3) With the exception of the Mental Health Area Patient water closets, provide low/high flush toilets for inpatient rooms to reduce water consumption.

7.4.4.2(4) Fixtures requiring backflow preventers will have backflow preventers installed in a Serviceable location in a back of house nonclinical area or located in Mechanical Room or Housekeeping Room.

7.4.4.2(5) Select toilets that will reduce the spread of infection. Size flush valves for the water consumption of the bowl. Toilet bowls will not splash or spray water onto the toilet rim or anywhere outside of the toilet bowl and will be designed to minimize the aerosolization of the toilet contents.

7.4.4.2(6) All electronic sensor-activated fixtures will be hardwired and on delayed vital emergency power.

7.4.5 Domestic Hot Water Systems

7.4.5.1 Basic Requirements

7.4.5.1(1) Provide a domestic hot water system with sufficient capacity and recovery rate for the hot water requirements of Phase 1A, Phase 1B, renovated and existing Support Facilities Building loads, and existing Nursing Tower loads. Allow for 15% expansion capacity within the system for future flexibility. Calculate domestic hot water demand in

accordance with ASPE Plumbing Engineering Design Handbook. Connect new domestic hot water supply and recirculation piping to existing domestic hot water mains and recirculation piping serving Support Facilities Building and Nursing Tower in Level 0 tunnels. Provide dedicated main and recirculation system for Phase 1A and meter system flow and BTUs for the energy Target.

7.4.5.1(2) Domestic hot water supply will be of adequate temperature to serve the needs of the Facility and stored and circulated at temperatures noted in CSA Z317.1 Table 1. Provide central mixing valve to reduce from stored tank temperature to distribution temperature. Provide thermostatic mixing valves where temperatures are required to be less than 60ºCelsius at point of use as required by CSA standards. Provide fail safe bypass for over temperature water after central mixing valve. Provide alarm to BMS for over temperature conditions. To permit uninterrupted service provide normally closed bypass around the mixing and diverting valves complete with lockable valve. Bypass will connect to piping before over temperature monitoring sensor to permit continuous monitoring of domestic hot water temperature.

7.4.5.1(3) Ensure timely delivery of hot water to all fixtures (0-10 seconds acceptable). Domestic hot water will be recirculated, use of heat maintenance cable is not permitted. Hot water recirculation velocity limited to a maximum of 0.9 meters per second. Provide automatic flow limiting valves at each fixture served to balance system; manually adjusted balancing valves not permitted.

7.4.5.1(4) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the piping, fixtures, or any other component. Design methods will include eliminating dead-leg piping and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures. Hand hygiene sinks will have the circulation connection within 50mm of the hot water supply to the fixture.

7.4.5.1(5) Provide dedicated domestic hot water generation and recirculation for Phase 1A. Provide normally closed valves so system could be served from the campus domestic hot water system in the case of failure. Provide metering of energy input for the Phase 1A system for energy target verification and monitoring.

7.4.5.1(6) If the BH Energy Centre is designed and built as a dedicated stand alone building the domestic hot water required for the eyewash and utility sink may be provided by a stand alone electrically generated system.

7.4.5.2 Performance Criteria

7.4.5.2(1) Provide multiple hot water generating units for flexibility and maximum efficiency at all flow rates. Include the fuel requirements for domestic hot water generation in the 80-hour fuel allowance. If separate system is provided for dedicated systems, this system will also be included in the fuel storage capacity. Domestic water will be pre heated by the heat recovery system, if the pre-heating process utilizes a tank, the tank will be able to achieve 80ºCelsius.

7.4.5.2(2) Generate domestic hot water at 70 ºCelsius to minimize conditions for Legionella bacteria.

7.4.5.2(3) Recirculate domestic hot water from the distribution system(s) back to the generating equipment. Provide N+1 redundancy and pump capacity.

7.4.5.2(4) Monitor hot water supply temperatures via the BMS with dedicated sensors and provide alarm outputs when the temperature exceeds or is lower than the design set point.

7.4.5.2(5) The domestic hot water generating equipment will meet the energy efficiency requirements of ASHRAE 90.1.

7.4.5.2(6) Tanks used to generate or store domestic hot water will have internal active heating elements (gas, steam or hot water) capable of attaining a water temperature in the tank of 80 degrees Celsius for the purpose of sanitizing. All domestic hot water system components will be on delayed vital emergency power. Provide 25-year warranty on domestic hot water tanks.

7.4.5.2(7) The Support Facilities Building and Nursing Tower domestic hot water system are to be transferred over to the new domestic hot water system once it is commissioned and operational. Project Co will maintain service to the existing West wing from the existing hot water systems until the West wing is fully decanted, at this time Project Co will decommission the existing system and remove all redundant equipment and piping. Refer to sections 4.1.5 and 4.2 for more information.

## 7.4.6 Medical Gas Systems

### 7.4.6.1 Basic Requirements

7.4.6.1(1) Project Co will provide oxygen and nitrous oxide to the Facility by connecting to the oxygen distribution piping at the bulk oxygen tank farm and the nitrous oxide manifold. Project Co will be responsible to run all piping to the tank farm from the Facility through the existing BH Campus at Level 0 and will coordinate the connection point, routing, and tie in with the Authority and their supplier. Provide flexible connection between Facility and existing BH Campus piping.

7.4.6.1(2) Project Co will:

7.4.6.1(2)(a) Provide new central medical air and medical vacuum systems to provide required system capacity and redundancy so that if 2 of the compressors or pumps in either system were to fail or be shut down, there will be no degradation of the system's ability to meet the capacity requirements of the BH Campus. The medical air and medical vacuum source equipment will be sized to meet the Phase 1A, Phase 1B, existing and renovated Support Facilities Building, and existing Nursing Tower requirements plus 15%. Locate the new source equipment in the Phase 1A or post disaster Phase 1B mechanical room and connect the new equipment to the existing piping serving Support Facilities Building and Nursing Tower in the Level 0 tunnels. Existing medical air and vacuum systems will remain in service till the new systems are operational and commissioned. Once the systems have been transferred to the new medical air and medical vacuum system the existing equipment will be decommissioned and removed. Redundant piping will be removed to the closed main and provide with a valve and cap for future connection.;

7.4.6.1(2)(b) Provide Lab Air with receiver served by compressors and dyers with N+1 redundancy for other non-medical compressed air consuming equipment including boom brakes and MDRD outlets. Lab Air will meet the CSA Z7396.1 quality parameters of Table 4D for Medical Air USP Formulary and will be oil free. Lab Air piping will comply will all CSA Z7936.1 requirements for Pipeline distribution systems and as noted in Section 7.4.6 Medical Gas Systems of this Schedule. Alarms to be monitored on BMS, alarm requirements for Lab Air to align with CSA Z7396.1 Table 4 for oil less Instrument Air systems. Connect to delayed vital emergency power. Outlet pressure will be user adjustable;

7.4.6.1(2)(c) The medical air and Lab air intake piping will be equipped with a take off and valve to permit the connection of the intake to an outdoor air intake duct for connection in future.

7.4.6.1(2)(d) Provide active anesthetic gas scavenging system with redundancy so that with 2 vacuum producers out of service the system can meet design loads. System will have sufficient spare capacity to permit extension of system to existing OR's in future plus an additional 10%

spare capacity. System will operate at 50kPa to -65 kPa (-15” Hg to -19” Hg). Provide valve and capped connections to permit connection of anesthetic gas reclamation system in future. Locate system in Phase 1A or post disaster Phase 1B roof top Mechanical room.

7.4.6.1(2)(e) Provide high-pressure cylinder supply systems for Carbon Dioxide and Nitrogen in a Phase 1A or post disaster Phase 1B mechanical room and connect new manifolds to the existing and new piping systems. Systems will be provided with duplex manifolds with each bank sized for one month’s consumption. Provide alarm to BMS when the manifold switches from bank in use to reserve bank. Provide rack space in the same room for spare cylinders for both gas systems, rack space to be sized to meet one month’s consumption for each system. Remove all redundant piping and equipment once the new systems have been commissioned and placed in service.

7.4.6.1(2)(f) Provide new high-pressure cylinder medical air reserve manifold in a Phase 1A or post disaster Phase 1B mechanical room and connect new manifold to the existing and new piping system. System will be provided with duplex manifold with each bank sized for eight hours of peak consumption. Provide alarm to BMS when the manifold switches from bank in use to reserve bank. Remove all redundant piping and equipment once the new system has been commissioned and placed in service.

7.4.6.1(3) With the exception of outlets such as those located in booms and single outlets, locate medical gas outlets in either a built-up head wall or prefabricated head wall system that incorporates medical gases, electrical and data outlets as per Appendix 3B [Minimum Room Requirements] and Appendix 3P [Multimedia Room Matrix].

7.4.6.1(4) All pipe and pipe fittings will be in accordance to ASTM 88, de-greased copper Type ‘L’.

7.4.6.1(5) Service Outlets

7.4.6.1(5)(a) Provide recessed service outlet boxes designed for concealed piping and fabricated for straight insertion of secondary equipment.

7.4.6.1(5)(b) Each recessed wall outlet will have a permanently marked, colour-coded non-interchangeable index system to prevent connection to the wrong gases. Provide a

secondary check valve to maintain the line pressure if the primary valve is removed for maintenance.

7.4.6.1(5)(c) Provide 2-part DISS type outlet connections for each medical gas. Refer to Appendix 3B [Minimum Room Requirements] for locations and quantities.

7.4.6.1(6) Ball type shut off valves will be U.L. labelled showing the appropriate gas service & pressure rating. Valves will swing out during installation and have a quarter turn from full open to close. All valves to be dual port. In the case of valves over 2" for vacuum system butterfly valves may be used instead of ball valves provided purge points are provided in piping immediately before and after valve and the valves are stainless.

7.4.6.1(7) Area zone shut off valves will be housed in a single box comprised of multiple shut off valves with tube extensions, polycarbonate sheet door with hinges and pull out opening ring. Provide pressure / vacuum gauges for each service. Provide label stating rooms served by valves.

7.4.6.2 Performance Criteria

7.4.6.2(1) Provide the medical gas system so that there is a minimum of one zone shut off valve per program area and a local alarm panel for each zone. Monitor all local alarms on BMS system.

7.4.6.2(2) Provide valve and capped medical gas piping connection stubbed into the ceiling of the Mental Health floor for medical air, vacuum, and oxygen for future flexibility. Piping to be same size as provided to Med/Surgical floor.

7.4.6.2(3) All medical gas piping in normally inaccessible areas (e.g. behind walls and boarded ceilings) will be clearly identified.

7.4.6.2(4) Provide the medical gas system such that each program area will have its own valve box and alarm panels. Alarm panels will be connected to delayed vital emergency power.

7.4.6.2(5) Provide an alarm interface signal to the BMS for critical alarms such as low or high pressure from each local alarm station.

7.4.6.2(6) All piping, valves and filters will be factory cleaned and capped or sealed to prevent contamination.

7.4.6.2(7) All departments will be provided with local valve boxes and alarm panels.

7.4.6.2(8) Provide a new master medical gas alarm panel to monitor all medical gas functions. Master alarm panel will be located in location with 24-

hour continuous responsible surveillance. The Authority has selected the Emergency Care Station G.1.3.6 as a suitable location for these alarm panels. Project Co will relocate the existing medical gas master alarm points from the Existing Hospital and provide a new master alarm panel for these existing alarms in the Emergency Care Station or other suitable room agreed upon with the Authority during the design process. Remote alarm annunciation will be provided at a location with 24-hour continuous monitoring by FM provider/personnel and not be located in Clinical Spaces. Provide an inter-connected status and alarm point and signal to the BMS.

7.4.6.2(9) Individually connect all alarms from master alarm panels to the BMS.

7.4.6.2(10) All medical gas systems will be certified in accordance with CSA standards by an independent and qualified testing agency who will be employed by the Authority.

7.4.6.2(11) All systems components requiring electrical power will be on delayed vital emergency power.

7.4.6.2(12) The medical gas supply system will be for Patient consumption only. If equipment and/or procedure(s) require medical grade gas supply, then provide separate dedicated source equipment, piping, valving and monitoring to accommodate that application.

7.4.6.2(13) Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Pipe labels will be installed every 8 meters, each side of every wall penetration, and beside service valves. Pipe and equipment labels will match existing site Pipe Identification standard.

7.4.6.2(14) Provide Avery dots to identify access points for service valves. Provide Avery dot color matrix to the Authority for review before installing. Avery dots will be provided on ceiling grids and access panels.

## 7.5 Heating, Ventilating and Air Conditioning (Division 23)

### 7.5.1 General

7.5.1.1(1) Provide the HVAC systems to avoid disruption to the operation of the Facility during maintenance or repairs. Design the systems so that the Clinical Spaces do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be accessible from an 8’ ladder. Service location will not block doorways.

7.5.1.1(2) Equipment, filters, and piping will be Serviceable and installed with adequate service space, access panels and the ability to remove filters or equipment for servicing or replacement without adapting wall/ceiling finishes or structure. Access routes from exterior into Mechanical rooms will be designed to accommodate moving the largest piece of equipment without damaging or adapting walls, ceilings, or doorways. Roof top mechanical rooms that rely on craned in equipment will allocate roof top space for this function and include the structural and roof design to accommodate the load. As the mechanical systems will be adding chillers and boilers in a future phase, installing this equipment will be incorporated into the design.

7.5.1.1(3) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.5.1.1(4) Balancing valves, flow-measuring devices, temperature and pressure sensors will be provided throughout the system to facilitate system balancing.

7.5.1.1(5) Design pumps to operate at the system fluid temperature without vapour binding and cavitation. Pumps will be non-overloading with motor sized for end of curve operation in parallel or individual operation and will operate within 25% of the midpoint of published maximum efficiency curve with a minimum margin of NPSH of 1 meter at rated flow. Variable frequency drives will be provided for all pumps with motor horsepower of 5 or greater or where more than 40% variation of flow is anticipated. Provide grounding rings on all motors equipped with VFD’s.

7.5.1.1(6) Pump construction and installation will permit complete pump servicing without disrupting piping or motor connections, no close coupled pumps. Pump connections will be flanged.

7.5.1.1(7) 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.

7.5.1.1(8) Design seismic mitigation and building separation devices for all piping that crosses buildings and/or Utility corridors.

7.5.1.1(9) Equipment will be CSA approved, and will meet all applicable standards, including applicable sections of the ASME Code.

7.5.1.1(10) Welding materials, fabrication standards, and labour qualifications will comply with all applicable standards, including applicable ANSI and ASTM codes.

7.5.1.1(11) Provide equipment and piping with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement without affecting Facility operations.

7.5.1.1(12) Vent all flammable storage cabinets to outdoors utilizing schedule 40 steel piping. At a minimum pipe diameter will align with the size of tapping of cabinet and be size in accordance with good engineering practice to ensure cabinet does not over pressurize.

7.5.2 Heating

7.5.2.1(1) Project Co will provide a central hydronic heating plant sized for the opening day loads of the Phase 1A, Phase 1B, renovated Support Facilities Building areas, and connected Support Facilities Building ventilation load with 15% spare capacity. This system will be expandable to supply the future Phase 2 building, the renovated Nursing Tower, and the full Support Facilities Building loads as the remaining areas are to be renovated in Phase 2.

7.5.2.1(1)(a) To accomplish this, Project Co will provide a primary heating loop in the Phase 1A mechanical room sized for the total of all the anticipated loads noted in clause 7.5.2.1(1) plus 15% spare capacity with fully redundant circulation pumps. This primary loop will receive boiler input from the secondary pumped boiler loops and receive heat from the heat recovery chiller loop. In this Project, Project Co will provide all boilers and dedicated pumps required to meet the Phase 1 Project load with redundancy to CSA Z317.2.

7.5.2.1(1)(b) Project Co will provide the physical space to add the remaining boilers required to serve the full Phase 2 load including Phase 2 building, Nursing Tower renovations, and remaining Support Facilities Building renovations with redundancy to CSA as well as valved pipe connections, combustion air allowance, breeching penetrations, and all other allowances required to increase the boiler plant output without shutdowns or rework.

7.5.2.1(1)(c) Project Co will serve the Phase 1A, Phase 1B, renovated Support facilities Building, and Support Facilities Building ventilation loads through a tertiary system with redundant dedicated circulation pumps for each building. Provide flow and BTU meters on each tertiary system so each building can be broken out for energy target compliance. Piping serving the heating coils, reheat coils and radiant panels in the Support Facilities Building ` will be routed to connection points on each renovated floor plate a

minimum of 1-meter inside of the existing Support Facilities Building perimeter and provided with isolation valves and caps.

7.5.2.1(1)(d) Project Co will provide valved connection points and physical space to accommodate the future tertiary pumped loops for Phase 2 building, Nursing Tower, and remaining Support Facilities Building systems without shut downs or rework.

7.5.2.1(1)(e) Project Co to provide supply and return piping, sized for Phase 2 and Nursing Tower future renovations, from the heating plant to the Level 0 tunnels ending at the demising point between Support Facilities Building and the future Phase 2 and demising point between the Support Facilities Building and the Nursing Tower. Piping will be tested, insulated, and labelled. Drawings will note locations of pumps and mechanical room piping for future install. Project Co to ensure the routing shown is not impeded by Phase 1 construction.

7.5.2.1(1)(f) Project Co to provide supply and return piping to connect the Support Facilities Building and Nursing Tower steam to hydronic heat exchanger system noted in clause 7.5.4.5 to the existing supply and return piping in Level 0 tunnels to serve the existing hydronic heating loads in Support Facilities Building and Nursing Tower. Provide expansion tank, water make up, chemical treatment pot feeder, and all other components required for a complete and working system.

7.5.2.1(1)(g) Project Co will relocate the existing North, South, East, and West exterior hydronic heating zones from the existing West Block Mechancial room to the Level 0 tunnel and will provide new pumps and control valves and will reconnect the supply and return piping to the existing zone piping in Level 0 and Make Good insulation.

7.5.2.1(2) Central hydronic heating plant will include multiple low temperature condensing hot water heating boilers with a supply temperature designed to maximise the contribution from the heat recovery chillers.

7.5.2.1(3) The boilers will provide heat for the entire Facility to meet their full functional requirements for a period of at least 80 hours following any disruption of the supply of natural gas Utility service.

7.5.2.1(4) Project Co will not use the existing campus plant to provide back-up heating or humidification for the Facility.

7.5.2.1(5) The heating plant will consist of multiple individual boilers. The heating plant will be sized so that with the largest boiler out of service the plant can provide 100% of the design load under normal operating conditions as defined by CSA Z317.2. Heating plant will be capable of meeting the full heating load under catastrophic 100% outdoor air conditions with plant fully operational.

7.5.2.1(6) Boilers will be capable of operating at a minimum AFUE efficiency of 93% at all firing rates. Steam boilers will operate at a minimum efficiency of 80% and achieve a 10:1 turndown with 3% excess air across the entire firing range.

7.5.2.1(7) Boilers will operate on natural gas as the primary fuel and propane blended to match the calorific value of natural gas as the secondary fuel. Adequate storage of secondary fuel will be provided on-site to operate the boilers (hydronic and steam) for a minimum of 80 hours, under maximum demand conditions. Complete boiler plant will be designed such that low load and shoulder season loads can be achieved at high efficiency.

7.5.2.1(8) Sources and related accessories of heating systems that serve the Facility will be connected to the delayed vital power supply or vital power if required to balance loads

7.5.3 Heating Hot Water system

7.5.3.1(1) It is essential that perimeter heating with radiant ceiling panels be utilized for Phase 1A, Phase 1B, and renovated Support Facilities Building, excluding Secure Rooms, mechanical, electrical and Communication Rooms. Radiant panels will also be provided around all sides of light wells and skylights. If the LDR ensuite washroom is located with an exterior wall, provide separate control zone for the radiant panel to permit temperature control of the washroom. In Inpatient Mental Health Secure Rooms, in-floor radiant heat will be provided. Monitor slab temperature with in slab temperature sensor. Locate in-floor manifold so it is accessed from the anteroom through a locked access panel.

7.5.3.1(2) Provide adequate expansion compensation for heating piping. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices will be based on a thorough review of piping layout, and piping stress analysis. Anchor systems to be pour-in-place type (inbed or pre-set).

7.5.3.1(3) All high points in piping will be equipped with automatic air removal devices including air collection chambers and air vents. Relief will be

piped to nearest drain, glycol systems pipe to receiver or back to feed tank. Discharge termination will be visible.

7.5.3.1(4) Insulate all heating water piping, equipment and accessories in accordance with the most stringent of all applicable standards, including applicable BCICA and ASHRAE standards. Provide PVC service jacket on all exposed piping inside, exterior piping will have aluminum jacketing. Piping 3 meters above finished floor in Mechanical rooms does not require service jacketing.

7.5.3.1(5) Utilize screw fittings for steel piping welded fittings, or roll grooved mechanical couplings for steel piping. Type K copper piping for run outs, coil connections, and radiant panel circuiting will be soldered with lead free or 95/5 solder. If roll grooved systems are used then all components in grooved piping applications will be by Victaulic, unless a required product is not manufactured as part of their offering, including but not limited to grooved couplings, fittings, balancing, isolation, pressure reducing valves, check valves, strainers, engineered vibration isolation pump drops, anchors and expansion compensators. Victaulic shall provide a Contractor Certification and will provide inspection services. The inspection services will be provided for 100% of installed mechanical couplings and will be inspected by the grooved piping system manufacturer's inspection services representative. The trained representative will report any deficiency to the installing contractor, the Authority and Project Co. All identified deficiencies will be resolved by the installing contractor and reinspected by Victaulic. Tamper proof inspection stickers will be affixed to each of the inspected joints to confirm the assembly has passed the inspection. Upon completion of the piping system, and following pressure testing, Victaulic confirmation and inspection reports and data are to be submitted to Project Co for inclusion into close out documentation for the Authority indicating that 100% of couplings have been inspected and approved. The warranty on Victaulic products will be provided in accordance with the Warranty Period as defined in Schedule 1 [Definitions and Interpretation].

7.5.3.1(6) Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Pipe labels will be installed every 8 meters, each side of every wall penetration, and beside service valves. Pipe and equipment labels will match existing site Pipe Identification standard.

7.5.3.1(7) Provide Avery dots to identify access points for valves, control devices, and low point drains. Provide Avery dot color matrix to the

Authority for review before installing. Avery dots will be provided on ceiling grids and access panels.

7.5.3.1(8) All piping installed in Phase 1 including pipe to future connection points will be chemically cleaned, flushed, and filled with treated water as part of the Project scope. Project Co is required to provide all temporary interconnections to achieve these requirements.

7.5.4 Steam System

7.5.4.1 Provide a new steam plant in Phase 1A mechanical room to create clean steam for MDRD equipment, humidification, kitchen equipment, and existing Nursing Tower and Support Facilities Building steam loads not transferred onto the new hydronic heating plant including AHU steam coils, humidification, and steam to hydronic heat exchangers. Steam will be generated by a gas boiler plant with N+1 redundancy. Steam quality to meet sterilizer equipment supplier's purity and moisture criteria. Clean steam for humidification will not contain chemicals or contaminates harmful to health or which slow the healing process.

7.5.4.2 Piping used for clean steam serving the MDRD will not contaminate the steam it carries.

7.5.4.3 Humidification systems will maintain the Facility Type I and Type II spaces at a relative humidity range between 40% to 60%, Type 3 spaces may have an extended humidity range between 30% and 60%.

7.5.4.4 Steam plant to include all specialties require to efficiently produce clean steam not limited to low water fuel cut off devices, deaerator, condensate transfer tank, flash tanks, chemical injection etc.

7.5.4.5 Provide new steam and condensate piping. Connect the existing Nursing Tower and Support Facilities Building loads to the new steam plant. Connect the new piping to the existing Nursing Tower and Support Facilities Building piping in the Level 0 tunnels to serve the AHU coils and humidification loads. Provide a new steam to hydronic heat exchanger and hydronic pumps with N+1 redundancy in Phase 1 A mechanical room to replace the existing heat exchanger MO.WS-125-2 system in the existing West Wing Level 1 Mechanical room to serve the existing Support Facilities Building and Nursing Tower hydronic heating loads. Once the new steam plant is operational and commissioned the existing campus loads may be shifted to the new steam plant. The timing of the transition from West Wing Steam Plant to new steam plant may be scheduled to coincide with the decommissioning of the West Wing Steam Plant if the load transfer will adversely affect the ability of the West Wing Steam Plant to operate effectively. The transition period will include a calibration period between the transition of the existing loads to the new steam plant and the decommissioning of the West Wing Steam Plant to ensure a back up is available should there be any problems during the transition process. The duration of the calibration period will be determined in consultation with the Authority during schedule planning. Following the calibration

period the West Wing Steam Plant and all accessories will be removed as part of the CM Scope.

7.5.4.6 Meter steam and condensate serving the existing Support Facilities Building, Support Facilities Building Food service, Nursing Tower, and Phase 1A humidification loads, so these loads can be separated from the MDRD loads and tracked separately on the BMS. Steam and condensate piping provided for Food Services in the Support Facilities Building renovation CM scope will be piped to the floor plate serve and routed a minimum of 1 meter into the Support Facilities Building, provided with valves and capped. Piping will be tested, cleaned, and flushed ready for connection in the CM phase.

7.5.4.7 Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Pipe labels will be installed every 8 meters, each side of every wall penetration, and beside service valves. Pipe and equipment labels will match existing site Pipe Identification standard.

7.5.4.8 Provide Avery dots to identify access points for valves, control devices, and steam traps. Provide Avery dot color matrix to Authority for review before installing. Avery dots will be provided on ceiling grids and access panels.

7.5.5 Fuel systems-Boilers and Domestic Hot Water Generation

7.5.5.1(1) Provide a new gas service to supply the boilers, humidifiers, domestic hot water generation equipment, and Food Service equipment in Support Facilities Building renovation CM scope.

7.5.5.1(2) Provide new propane system to supply back up fuel to the gas fired boilers and domestic hot water generation.

7.5.5.1(3) Provide new liquid propane tanks (minimum two), vaporizer and air mixer to calorifically convert the propane to match natural gas BTU per cubic foot values, sized for the gas consumption of the heating, steam, and domestic hot water systems for 80 hours at peak loads. Run the new supply piping from the propane tank location and connect to the gas line serving Phase 1 after the gas meter. Provide 3-way isolation valve on the propane/natural gas connection.

7.5.5.1(4) Propane vaporizer and air mixer/calorific convertor will be connected to delayed vital or vital power. This system to be monitored for status and alarms by the BMS.

7.5.5.1(5) Project Co will provide a meter and propane interconnection with minimal visual impact by recessing or fully screening new assembly.

7.5.5.1(6) Provide gas piping for Food Services (see Schedule 3 [Design and Construction Specifications] Section 6.16 for more information) in

Support Facilities Building renovation CM scope to the floor served and extend piping a minimum of 1 meter into the Support Facilities Building, terminate with valve and cap for connection in next phase.

7.5.6 Fuel Systems-Generators

7.5.6.1 Provide a complete and fully operational fuel oil system to serve the new emergency power generation systems. Provide a total of 80 hours of fuel storage in an underground and day tank system. Fuel storage to be calculated using fully load capacity of generators using #1 diesel fuel. Project Co to maintain fuel supply infrastructure serving the existing generators until new generators are tested, commissioned, operational, connected to the existing power distribution, and accepted by the Authority.

7.5.6.2 Underground storage tanks will be double wall fibreglass tanks complete with mechanical anti-overfill device, inventory floats for fuel and water levels, interstitial and turbine leak detection, personnel-access with H20 loading for tank maintenance and spill containment on fill connection from tanker truck. Tanks will have 30-year warranty. Tanks will be installed at a 2% slope with the fuel polishing system pulling from the low end to capture water and the fuel intake pulling from the high end of the tank. The site has high ground water levels, provide adequate deadman and cable systems to address possible tank flotation issues.

7.5.6.3 Day tanks will be double wall tanks with minimum capacity for 4 hours of generator run time at full load. Tanks will be complete with mechanical anti-siphon device, inventory floats for fuel and water levels, backup 50% float on BMS, and interstitial leak detection, Piping and conduit to and from the tank inside the BH Energy Centre will be routed either at 3050mm off finished floor or in recessed concrete trenches covered with checker plate.

7.5.6.4 Underground double wall piping system will include leak detection monitored transition sumps. Piping will rise above grade before entering the Facility. Provide shut off valves in tamper proof location before and after the piping enters the Facility above grade. Provide signage marking location of exterior valves for First Responders.

7.5.6.5 Provide an fuel inventory and management system to provide fuel levels to transfer pumps, monitor inventory and water levels in all tanks, and all interstitial / turbine / and transition sump leak detectors. Fuel inventory and management system will communicate with BMS to provide alarms / status, tank inventory levels and graphics.

7.5.6.6 Provide duplex transfer pumps to serve each day tank with control panel, relief valves, strainers, check valves, gauges, flow switches and hand priming ability for remotely located suction pumps. Control panel will communicate and receive signals from BMS and fuel inventory and management system and accommodate manual operation of the pumps. Each pump will be sized to provide 1.5 times the

load placed on the day tank. Transfer pumps will shut down on low level alarm from underground storage tank.

7.5.6.7 Provide fuel filtering and polishing to maintain stored fuel at the recommended generator supplier fuel quality parameters and remove water and fuel contaminants. Fuel polishing system to pull from low end of the underground tanks and return to the high end. Fuel polishing intake elevation to be minimum of 25mm lower than day tank fuel intake elevation. Fuel filtering process will not impede the systems ability to provide fuel to the day tanks during a power outage. Provide redundancy and bypasses required to allow filter maintenance without interrupting fuel flow to generators. Fuel polishing system will be sized to treat one underground tank in a 60-hour time period.

7.5.6.8 Provide cathodic corrosion protection on any direct buried steel pipe associated with oil distribution and storage system to provide 20 years of protection.

7.5.6.9 Remove all redundant equipment, piping, controls, belly tanks, etc. from the existing emergency power generation systems after existing system is decommissioned. Existing above ground fuel storage tanks to remain in service until the steam plant is decommissioned and then the tanks will also be decommissioned and removed. Remove all underground fuel piping and make good.

7.5.6.10 Provide all fuel required for testing, commissioning, and demonstrations of the generator system including all functions noted in Commissioning and HVAC sections. Project Co will only use #1 Diesel fuel without Bio-diesel, Commissioning agent to confirm fuel type used in tests. Project Co will provide full underground and day tanks at time of turn over using #1 Diesel with no Bio-diesel content. Once existing generators and boilers are decommissioned Project Co to remove the existing fuel, polish it, and transfer the fuel into the new underground tank.

7.5.7 Cooling

7.5.7.1 Basic Requirements

7.5.7.1(1) Project Co will provide a central chilled water plant sized for the opening day loads of the Phase 1A, Phase 1B, renovated Support Facilities Building, and remaining Support Facilities Building Level 4 ventilation load plus 15%. This system will be expandable to supply the future Phase 2 building, the renovated Nursing Tower, and the full Support Facilities Building loads as the remaining areas are renovated in Phase 2. Chilled water plant will be capable of meeting the full cooling load demand under catastrophic 100% outdoor air conditions with plant fully operational.

7.5.7.1(1)(a) To accomplish this, Project Co will provide a primary chilled water loop in the Phase 1A Level 0 chiller room sized for the total of the anticipated loads noted in clause 7.5.6.1(1) plus 15% spare capacity with fully redundant

circulation pumps. This primary loop will receive chilled water from the secondary pumped chiller loops. In this Project, Project Co will provide all chillers and dedicated pumps required to meet the Project load.

7.5.7.1(1)(b) The existing chiller plant may be retained to provide 520 tons of capacity until Phase 2 is complete, provide interconnection to existing system through the Level 0 tunnels in Support Facilities Building and Nursing Tower

7.5.7.1(1)(c) Project Co will provide the physical space to add the remaining chillers required to serve the full Phase 2 load including Phase 2 building, Nursing Tower renovations, and remaining Support Facilities Building renovations with redundancy to CSA as well as valved pipe connections, and all other allowances required to increase the chiller plant output without shutdowns or rework.

7.5.7.1(1)(d) Project Co will serve the Phase 1A, Phase 1B, and Support Facilities Building through a tertiary system with redundant dedicated circulation pumps for each building. Project Co will provide valved connection points and physical space to accommodate the future tertiary pumped loops for Phase 2 building, and Nursing Tower, and remaining Support Facilities Building systems without shut downs or rework. Provide flow and BTU meters on each tertiary system so each building can be broken out for energy target compliance.

7.5.7.1(1)(e) Project Co to provide supply and return piping sized for Phase 2 and Nursing Tower future renovations from the chiller plant to the Level 0 tunnels ending at the demising point between Support Facilities Building and the future Phase 2 and demising point between the Support Facilities Building and the Nursing Tower. Piping will be tested, and insulated, and labeled.

7.5.7.1(1)(f) Project Co will show the pipe routing for the future tertiary piping including pump locations and will ensure these locations and routes are not impeded by Phase 1 construction. Tertiary piping routed through finished areas of Phase 1 will be installed under the Phase 1 contract.

7.5.7.1(1)(g) If the BH Energy Centre is designed and constructed as a stand alone building a dedicated cooling system with 100% redundancy in equipment will be provided to serve the BH Energy Centre.

7.5.7.1(2) The chiller plant will consist of standard chillers with associated cooling towers and heat recovery chillers sized to serve the 24/7 loads of specialized medical equipment, walk in coolers and freezers for Food Services and Morgue, elevator rooms, server rooms, communication and IM/IT rooms, and electrical rooms with an additional 15% spare capacity. Heat recovery chillers will input heat to the hydronic heating system and domestic water pre-heating, heat that can not be utilized must be dispersed through cooling towers or heat rejection coils in the exhaust streams. Phase 1 will provide N+1 redundancy in heat recovery chillers for all loads associated with Phase 1 scope. Provide space to add additional heat recovery chiller in Phase 2 for the Phase 2 loads.

7.5.7.1(3) To accommodate the phasing inherent in the Phase 1 Project, provide a buffer tank in the chiller room to provide additional heat recovery system fluid capacity to assist the heat recovery chillers in handling the partial loads at the start of the Project.

7.5.7.1(4) Provide flow and BTU metering for Phase 1A building loads so these loads can be tracked for the Phase 1A energy targets.

7.5.7.1(5) Provide all necessary space, ventilation and process cooling for the Facility including an additional 15% allowance for future above Facility requirement. Design will accommodate the removal of heat generated by equipment; refer to equipment list for list of equipment. Emergency generators will be equipped with remote or inline radiators for engine cooling, provide space cooling to maintain the generator room temperature within the manufacturers specified optimal range. Connect all cooling systems to delayed vital.

7.5.7.1(6) The design and installation will comply with all applicable standards, including CSA B52, Mechanical Refrigeration Code.

7.5.7.1(7) Equipment will be CSA approved, and will meet all applicable standards, including applicable sections of the ASME Code.

7.5.7.1(8) Welding materials, fabrication standards, and labour qualifications will comply with all applicable standards, including applicable ANSI and ASTM codes.

7.5.7.1(9) Chillers will have multiple individual refrigerant circuits for redundancy. Alternately multiple chillers will one refrigerant circuit, complete with dedicated power supply and disconnect, will be provided with chiller size and quantity designed to meet Schedule 3 clause 7.5.7.1(14).

7.5.7.1(10) Cooling towers performance will be certified in accordance with CTI (Cooling Tower Institute) Standard STD-201. No open type cooling towers are allowed; condensing water from the chillers will be in a

closed loop. Evaporative cooling of the chilled water closed loop bundle is acceptable. Cooling towers will be visibly screened for full height of equipment sympathetic to architectural design.

7.5.7.1(11) Chillers and cooling towers will be designed and located so as not to have an adverse effect on the BH Campus mechanical systems. Installation will be fully screened and acoustically treated to comply with the City of Burnaby's Bylaw 7332 maximum 45 dBa limit at the property line.

7.5.7.1(12) Provide chillers and cooling towers in a location that provide full Serviceability, permits ease of operation, accessibility for maintenance, safety, addresses acoustics limits, and in shrouded for appearance. Cooling towers will be equipped with platforms for access.

7.5.7.1(13) Installation will comply with ASHRAE Guideline 12-2000 for Minimizing the Risk of Legionellosis Associated with building water systems and will include sampling ports for legionella testing.

7.5.7.1(14) Redundancy will be as per CSA standards. Cooling distribution systems will be designed such that non-critical loads can be isolated, and cooling directed toward critical areas if the system capacity is limited due to equipment failure. All cooling systems will be on delayed vital.

7.5.7.2 Performance Criteria

7.5.7.2(1) Provide water cooled refrigeration systems where required for the medical needs connected to the dedicated condensing water system. Refer to Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

7.5.7.2(2) Provide sufficient space cooling capacity to meet the required indoor design temperatures outlined in applicable CSA standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code and a July 1% design temperature of 26.6. ºCelsius dry bulb and 17.6 ºCelsius wet bulb for Type 1 areas.

7.5.7.2(3) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dew point temperature.

7.5.7.2(4) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.

7.5.7.2(5) Design piping to be installed in an orderly manner (aligned with structural elements and at right angles). Slope piping to permit complete drainage of the system.

7.5.7.2(6) All high points in the closed loop piping will be equipped with automatic air removal devices, such as air collection chambers and air vents. Relief valves will be piped to drain. Glycol systems will be piped back to make up tank.

7.5.7.2(7) Provide equipment and piping with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement without affecting Facility operations. Provide chilled water risers and piping with 15% spare capacity to accommodate future flexibility.

7.5.7.2(8) Provide isolation valves, unions and bypass piping to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.5.7.2(9) Select pumps that operate without vapour binding or cavitation, be non-overloading in parallel or individual operation, and operate within 25% of the mid-point of published maximum efficiency curve.

7.5.7.2(10) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.

7.5.7.2(11) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal to no disruption to the delivery of health care services.

7.5.7.2(12) Insulate all chilled water piping, equipment and accessories in accordance with the most stringent of applicable standards, including BCICA and ASHRAE standards. Provide a continuous approved vapor barrier, including through fire rated walls and floors, on all chilled and cold piping to provide a completely sealed system. Fittings, couplings, and flanges will be provided with the same thickness and density of insulation as the piping, duct wrap style products may not be used. Valve stem extensions will be provided. Provide PVC service jacket on all exposed piping inside, exterior piping will have aluminum jacketing. Piping above 3 metres off finished floor in Mechanical rooms does not require service jacketing.

7.5.7.2(13) Provide 100% redundancy for fan coil units serving electrical and Communication Rooms to ensure continuous cooling in the case of a unit failure or required maintenance shut down.

7.5.7.2(14) Utilize screw fittings, welded fittings or roll grooved mechanical couplings for all piping. If roll grooved systems are used then all

components in grooved piping applications will be by Victaulic, unless a required product is not manufactured as part of their offering, including but not limited to grooved couplings, fittings, balancing, isolation, pressure reducing valves, check valves, strainers, engineered vibration isolation pump drops, anchors and expansion compensators. Victaulic shall provide a Contractor Certification and will provide inspection services. The inspection services will be provided for 100% of installed mechanical couplings and will be inspected by the grooved piping system manufacturer's inspection services representative. The trained representative will report any deficiency to the installing contractor, the Authority and Project Co. All identified deficiencies will be resolved by the installing contractor and re- inspected by Victaulic. Tamper proof inspection stickers will be affixed to each of the inspected joints to confirm the assembly has passed the inspection. Upon completion of the piping system, and following pressure testing, Victaulic confirmation and inspection reports and data are to be submitted to Project Co for inclusion in close out documents for the Authority indicating that 100% of couplings have been inspected and approved. The warranty on Victaulic products will be provided in accordance with the Warranty Period as defined in Schedule 1 [Definitions and Interpretation].

7.5.7.2(15) Provide seismic mitigation and building separation devices for all piping that cross buildings and/or Utility corridors.

7.5.7.2(16) Incorporate flexibility in the system designs to accommodate future alterations. Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. Pipe labels will be installed every 8 meters, each side of every wall penetration, and beside service valves. Pipe and equipment labels will match existing site Pipe Identification standard.

7.5.7.2(17) Provide Avery dots to identify access points for valves, control devices drains. Provide Avery dot color matrix to the Authority for review before installing. Avery dots will be provided on ceiling grids and access panels.

7.5.7.2(18) All piping installed in Phase 1 including pipe to future connection points will be chemically cleaned, flushed, and filled with treated water as part of the Project scope. Project Co is required to provide all temporary interconnections to achieve these requirements.

## 7.5.8 Space Heating and Cooling

### 7.5.8.1 Ventilation

7.5.8.1(1) Basic Requirements

7.5.8.1(1)(a) This Project will provide ventilation systems (supply, return, and exhaust) to Phase 1A, Phase 1B, BH Energy Centre, the Support Facilities Building Levels 1 through 3 in their entirety, and the renovated areas of Level 4. System design will include 15% spare capacity above capacity required on day of occupancy in source equipment and mains. The ventilation system serving the Support Facilities Building Levels 1 through 3 will be located in the new Phase 1A or Phase 1B mechanical rooms and redundancy will be provided by the Phase 1A or Phase 1B ventilation system. The Level 4 renovated areas in the Support Facilities Building must be served from Phase 1A or 1B mechanical rooms with 100% redundancy or by a new dedicated 100% redundant air handling system located on the Support Facilities Building roof level. Head end ventilation equipment will be installed, tested, and commissioned as part of the Project.

7.5.8.1(1)(b) This Project will provide all required ductwork to a connection point at least 1 metre past the perimeter of the Support Facilities Building complete with air tight dampers to serve the new duct shafts down through the Support Facilities Building provided in the Support Facilities Building renovation CM scope to connect the floor level distribution to the new air handling systems. In renovated areas Project Co will provide all new ventilation systems with all parameters complying with CSA Z317.2 to the spaces served. In areas not being renovated Project Co will connect to the existing floor distribution system. Non-renovated areas on Levels 1 and 3 and anywhere the Phase 1A building connects to the existing will have an air survey completed prior to the source system transfer and be rebalanced after the system transfer using the survey volumes as a minimum base line. Balancing contractor will ensure correct relative pressures are maintained.

7.5.8.1(1)(c) The connection of the Support Facilities Building ventilation system to the new air handling system will be phased. Project Co is responsible for all work required to keep the Support Facilities Building in service at all times through the Project duration including temporary ducting and piping, temporary control equipment and programing, rebalancing of existing and new systems, and revision of existing systems required to route and access the new systems.

7.5.8.1(1)(d) Project Co will remove all redundant ductwork, piping, controls, and supports, in the Support Facilities Building. The existing roof top mechanical rooms equipment may remain in place with all services capped, coils drained, and all systems safe.

7.5.8.1(1)(e) Provide all necessary ventilation for the Facility as per applicable CSA standards with 100% uninterrupted service redundancy for Type 1 spaces and 50% redundancy for Type 2 and 3 spaces. System design will provide separate metering of Phase 1A, Phase 1B, BH Energy Centre, and Support Facilities Building renovation energy usage and energy recovery.

7.5.8.1(1)(f) Ductwork velocity not to exceed 1500 feet per minute when designed. For future flexibility allowance will be made up to 1800 fpm to accommodate future air handling growth. Air handling units will also have static requirements built in to accommodate increase. balancing contractor to confirm this requirement has been met in the final report.

7.5.8.1(1)(g) The ventilation system for the Facility will be able to provide 100% outdoor air or 100% recirculated air to respond to catastrophic conditions inside or outside of the Facility to all areas served. Provide high efficiency heat wheels (80% minimum efficiency) or equivalent heat recovery system to reclaim heat from building exhaust streams.

7.5.8.1(1)(h) Design the ventilation systems to mitigate the spread of infections during an outbreak by creating negative pressure Outbreak Control Zones on the Medical Inpatient Unit floor and Emergency Department as follows:

7.5.8.1.1.(h).1 Configure the ventilation systems serving control zones to allow the building operator to easily move each zone into a negative pressure condition with respect to adjacent floor areas by proportionately changing the supply and return air ratio for all rooms within the zone;

7.5.8.1.1.(h).2 Program the settings required into the BMS system so that the Outbreak Control Zone settings for each zone

can be initiated or returned to normal operation with a single command; and

7.5.8.1.1.(h).3 Configure the ventilation systems to exhaust all air for the Outbreak Control Zones to ensure that no airborne infection can be re-circulated into any ventilation system from the Outbreak Control Zones. The 24 bed unit will be able to be separated into two 12 bed units with one or both operating as an Outbreak Control Zone. The Emergency Department will be provided with 3 Outbreak Control zones.

7.5.8.1(1)(i) The Outbreak Control Zones will be commissioned, balanced, and demonstrated to the Authority as part of the verification process.

7.5.8.1(1)(j) Provide an HVAC system that maintains appropriate pressure relationships between various areas of the Facility and provides 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- (Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities) for the relative pressurization and other minimum indoor air quality requirements for the Facility. Where relative pressurization is required (either negative or positive), the minimum pressure differential will be 2.5 Pa.

7.5.8.1(1)(k) Provide an HVAC system to maintain the Decontamination Area (E.1) of MDRD negative to all surrounding areas, the Clean Assembly and Sterilization Areas (E.2 and E.3) positive to the Decontamination Area by 7.5 Pa but negative to the Sterile Supply Storage, and Sterile Supply Storage and Case Assembly Area (E.4) positive to all surrounding spaces.

7.5.8.1(1)(l) Provide an HVAC system to maintain the Scope Decontamination Room negative by 7.5 Pa to the Scope High Level Disinfection Room.

7.5.8.1(1)(m) Provide HVAC systems with equipment and system redundancy to ensure continuous Facility operations at all times. Design will accommodate maintenance and repair

functions on source equipment without impacting the system's ability to provide the required air flows. All HVAC systems serving the Facility will be on delayed vital emergency power.

7.5.8.1(1)(n) Provide air handling units with sectional heating and cooling coils and manual isolation valves that will enable isolation removal, or repairs to the damaged sections of coils without stoppage of the system. Provide space for coil removal and replacement without removing piping or accessories serving other equipment.

7.5.8.1(1)(o) All air handling units (supply, return, heat recovery, and exhaust) will provide redundant capacity so that, in the event of a failure or scheduled shutdown of one unit for servicing, the remaining units will continue to run and provide capacity noted in Section 7.5.8.1(1)(a) to the affected area.

7.5.8.1(1)(p) Provide air filtration in accordance with all applicable standards, including CSA Z317.2. Operating Rooms and Pharmacy Compounding rooms will be supplied with HEPA filtered air. Supply air handling units will be able to accommodate carbon filters should they be required in future to remove smoke from forest fires or fumes from equipment. Air handling units will be provided with the racks and motor allowance for this additional static pressure requirement.

7.5.8.1(1)(q) Provide dedicated supply air with HEPA filters for spaces as required by applicable CSA standards.

7.5.8.1(1)(r) Provide the ventilation system and all components in accordance with all applicable standards, including ASHRAE and CSA standards.

7.5.8.1(1)(s) Provide fans with variable frequency drives (VFDs) for energy savings under part-load conditions. Motor loads of 100 hp. or greater will be provided with reduced voltage motor starter acceptable to BC Hydro. Provide grounding rings on all motors with VFD's.

7.5.8.1(1)(t) Provide an indirect and/or direct heat recovery system on all non-contaminated exhaust air systems.

7.5.8.1(1)(u) Provide dedicated exhaust air systems suitable for the laboratory requirements and any other special venting requirements as per CSA standards. These systems will be interlocked with the supply air systems.

7.5.8.1(1)(v) Provide supply and return air to the retail area spaces. Spaces will be completed under a tenant improvement. Base building design will provide the ventilation requirements for the spaces including the VAV and reheat coils, final diffuser/grille locations to be done by tenant. Refer to OPR's and SoA for more information on room function and anticipated equipment.

7.5.8.1(2) Performance Criteria

7.5.8.1(2)(a) Incorporate a strategy to allow the installation and removal of major building equipment such as fans or boilers without disrupting Hospital operations. Show access routes on submittal drawings as per Section 2.4.2 including verification of door openings. Locate fans, common filters (e.g. HEPA), and other equipment in the central mechanical rooms. Manufactures recommended clearances will be provided and all equipment will be Serviceable.

7.5.8.1(2)(b) Airborne Isolation Rooms and their associated anterooms will be served by dedicated exhaust VAV boxes controlled by the pressure monitors maintaining the pressure relationships noted in CSA Z317.2 Figure 1 (1 VAV box for Anteroom, 1 VAV box for Airborne Isolation Room). One supply VAV can serve both rooms. System will be able to self-compensate for small changes in room seal without alarming or requiring rebalancing.

7.5.8.1(2)(c) Exhaust grilles in Negative pressure Airborne Isolation Rooms will be located close to the Patient's head and located so the grille will not be blocked when the head of the bed is elevated. Noise criteria for these grilles will not exceed NC20.

7.5.8.1(2)(d) Provide exhaust systems with high velocity vertical exhaust discharge terminating a minimum of 3 meters above roof. Provide 100% redundancy in equipment (fans, filters) for isolation room exhaust systems. Label exhaust discharge points so workers can easily identify.

7.5.8.1(2)(e) All equipment for supply air, return air and general exhaust systems will be located inside the building envelope in a mechanical penthouse. All ductwork except for final exhaust terminations will be run inside the building envelope. Project Co may use the existing redundant Support Facilities Building mechanical rooms to route ductwork.

7.5.8.1(2)(f) Provide fresh air intakes, cooling coil drain pans, air handling units, duct mounted humidifiers, 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.

7.5.8.1(2)(g) Fresh air intakes will be located to not entrain contaminants from outdoor sources including Existing Hospital exhaust points. All intakes will be located in areas that are not accessible by the public and will not be located near exhaust air outlets. Take into account the location of the emergency generator exhaust and ensure that fumes from the generator exhaust are not introduced into the Facility or adjacent buildings' fresh air intakes. Perform computer air dispersion modelling to support the placement of all intakes. Computer modeling will take into account existing BH Campus exhaust locations, local wind conditions, cooling towers, and Facility exhausts. Report will be provided in the 30% design submission.

7.5.8.1(2)(h) All supply, return, transfer, and exhaust air will be fully ducted to the space being served. Ceiling area will not be used as return air plenums. Door grilles are only permitted for non-medical storage and service rooms with exhaust flows less than 48 L/s. Door undercuts are not permitted.

7.5.8.1(2)(i) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal disruption to the delivery of health care services.

7.5.8.1(2)(j) Insulate all ductwork in accordance with the most stringent of applicable standards, including BCICA, ASHRAE and CSA standards. Provide canvass service jacket on all exposed insulation inside and up to 3 meters above finished floor in Mechanical rooms.

7.5.8.1(2)(k) Provide seismic mitigation and building separation devices for all ductwork including that which cross between buildings and/or Utility corridors.

7.5.8.1(2)(l) Grilles and diffusers in Inpatient Psychiatry Unit inpatient rooms, Treatment Bays and Secure Rooms will be ligature-resistant, ceiling mounted, and located away from the Patient bed to avoid Patient discomfort from diffuser down draft.

7.5.8.1(2)(m) Duct work will be metal, non-metallic and non-metallic flexible duct work may not be used. Flexible duct work will be limited to a maximum length of 1 meter and only used to connect diffusers in T-bar ceilings.

7.5.8.1(2)(n) Provide combustion air for emergency generators and sufficient air change rates to maintain the emergency generator room within the manufactures specified optimal temperature range. Incoming air will be treated by MERV 8 filters. Provide air tempering in required to ensure the generator room stay above 5 ºCelsius while generators are operating. Equipment for emergency generator room temperature control will be 100% redundant.

7.5.8.1(2)(o) Ventilation system air intake and exhaust locations will be designed and constructed to comply with the City of Burnaby's Bylaw Number 7332 maximum 45 dBa limit at the property line.

## 7.5.9 Exhaust Systems

### 7.5.9.1 Design Principles

7.5.9.1(1) All exhausted air will be discharged to ensure that there is no cross contamination with outdoor air intakes for the Facility and for the existing BH buildings.

7.5.9.1(2) Provide exhaust fans and locate them as close as possible to 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. Provide welded pressure ductwork after isolation and other contaminated exhaust fans to the Facility exterior. Exhaust systems, fans, and terminations will be clearly labeled.

7.5.9.1(3) Provide exhaust systems for enclosed parking areas controlled by $CO_2$-monitors, system alarms and fans status will be monitored by BMS.

7.5.9.1(4) All exhaust systems will be served by delayed vital or vital power systems.

7.5.9.1(5) Provide exhaust above all floor model printers, MFPs, or multipurpose business machines to remove fumes.

7.5.9.1(6) Provide counter top-level exhaust in Surgical Services Frozen Section Laboratory and MDRD decontamination at work stations with sufficient velocity to remove odors and volatile chemicals. Coordinate location with Facility Users.

7.5.9.1(7) Provide dedicated exhaust systems to serve Elevator Machine rooms, Paint Shop, Welding Shop, Key Cutting Shop, Plumbing Shop, Rapid Response Room, and Wood Shop glue booth. Provide a Wood Shop dust collection system.

7.5.9.1(8) Provide NFPA 96 ductwork and exhaust fans for kitchen hoods as identified in Appendix 2L [Food Services Equipment] and included in Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items].

7.5.9.1(9) Provide connections for Construction Air Handling Units (CAHU's) on each floor at each duct shaft for Phase 1A and Phase 1B buildings. Connections will be sized to handle 2000 cfm and will consist of a 12" round connection with gasketed removable cap and a BMS activated control damper and flow grid. Connections will be Serviceable and activated through the BMS.

7.5.9.2 Performance Criteria

7.5.9.2(1) Negative pressure or Airborne Isolation Rooms and their associated washrooms will be provided with dedicated exhaust systems with 100% redundancy in equipment.

7.5.9.2(2) Biosafety cabinets, fume hoods, and/or grossing tables/specimen mounting tables will be provided with dedicated exhaust systems that are appropriate for their class and type. Where multiple cabinets are tied into a common system, a 100% redundant central exhaust system will be provided. Specimen mounting tables, grossing tables, and MDRD decontamination stations will be equipped with counter top-level exhaust.

7.5.9.2(3) Fume hoods and other smoke/fume generating process booths/space will be provided with dedicated exhaust systems that are corrosion/ chemical resistant to the exhaust media.

7.5.9.2(4) Dedicated exhaust systems will be provided as required for the medical equipment.

7.5.9.2(5) Emergency generator exhaust will exit above the Facility roof. Exhaust termination will be located to meet the clearances noted in CSA Z317.2 Table 2 to all existing and new campus air intakes. The emergency generators and exhaust system will be designed to meet the minimum 35 meters per second discharge exit velocity noted in CSA Z317.2. Generator exhaust silencer to be designed to meet the City of Burnaby's Bylaw Number 7332 maximum 45 dBa limit at the property line. Generator exhaust system will be designed so the total back pressure does not exceed 80% of the generator manufactures maximum allowable backpressure. Provide Schedule 40 piping to

drain condensate from exhaust. Provide isolation valve and terminate above funnel floor drain.

7.5.10 Metering Requirements for Energy Measurement and Verification

7.5.10.1 Provide all required system meters, trend logging equipment sensors, and data storage to comply with and fulfill the energy measurement and verification requirements to valid energy model targets and meet selected LEED points. Phase 1A will meet Energy and Carbon Target (per Appendix 2D) and LEED Gold, provide metering to permit the separation and trending of Phase 1A energy consumption from the energy consumed by the Phase 1B and Support Facilities Building. Phase 1B will meet the M&V requirements noted in Section 5.4. Refer to Appendix 2D [Energy and Carbon Targets] for more details.

7.5.10.2 Metering intervals will be 5 minutes or less with all points trended and data logged for a minimum of 24 months to accommodate Energy Target for all points associated with LEED or energy model verification. System will be capable of storing all data logged for 5 years.

7.5.10.3 Metering will separately trend process and non-process loads. Dietary and MDRD system loads will be separately metered along with AGSS, medical air, and medical vacuum loads. Metering points to include heat recovered by the heat recovery chiller system and utilized by the Building Systems hydronic or domestic water systems as well as heat recovered by heat wheels or heat recovery coils.

7.5.11 Sound Attenuation and Vibration Isolation

7.5.11.1 Provide provisions and mitigation on all mechanical systems to prevent sound and vibration transmission between spaces, and transmission to all hospital spaces. Provide sound attenuation to limit sound levels in accordance with Appendix 3C [Acoustic and Noise Control Measures] and CSA Z317.2. Design and install mechanical systems located at or near any exterior wall to minimize sound transmission to the neighbouring residential community.

7.5.11.2 Provide vibration isolation devices on all equipment with rotating components.

7.5.11.3 All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.

7.5.11.4 Provide flexible connections where needed to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

7.5.11.5 Performance Criteria

7.5.11.5(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

7.5.11.5(2) Utilize fibre free internal insulation with stainless steel perforated liner.

7.5.12 Test, Adjusting, Balancing (TAB) and Commissioning (Cx)

7.5.12.1 Without limiting Project Co's Commissioning obligations under Section 5 subsections 5.5 Commissioning and 5.6 Commissioning Plan (LEED+Z8001 Framework) and Appendix 3H [Commissioning], demonstrate to the Authority that the mechanical and electrical systems are substantially operational and integrated by testing, adjusting and balancing the systems in accordance with Good Industry Practice. Demonstration to the Authority will include redundancy in the case of equipment failure, recovery from loss of primary energy source, and spare capacity in real time. Provide documentation verifying the spare capacity and redundancy allowances confirmed in the Commissioning process to the Authority.

7.5.12.2 Provide fully integrated demonstrations for loss of primary power, response to fire alarm, or other integrated system.

7.6 Major Equipment Performance Specification

7.6.1 Custom Air Handling Units.

7.6.1.1 The systems and units noted on the following performance specifications are, in the Authority's opinion, capable of meeting the general design intent, quality and performance characteristics specified. It remains the responsibility of Project Co to ensure the products supplied (whether from the specifications below or others) meet the performance specifications in this Schedule.

7.6.1.2 Air handling units will be designed and manufactured to the specific requirements of this Project. This specification applies to the custom air handling units for supply, return, and heat recovery systems.

7.6.1.3 Units will be produced by a recognized manufacturer who maintains a local service agency and parts stock. Manufacturer to provide a 10 year full parts warranty which includes paint, casing, fans, dampers, and bearings.

7.6.1.4 Air handling units and major components will be products of manufacturing firms regularly engaged in production of such equipment whose products have been in satisfactory use in similar service for not less than 10 years.

7.6.1.5 Units with factory wiring will be factory approved and labelled.

7.6.1.6 Environmental Requirements

7.6.1.6(1) Units will not be operated for any purpose, temporary or permanent, until ductwork is clean, and space served is clean, filters are in place, bearings lubricated, isolators adjusted, belt tension checked, sheaves aligned, and the fan has been test-run under observation.

7.6.1.6(2) The manufacturer will provide the factory assembled air handling unit. The unit will include all specified components installed at the factory. Field fabrication of units and their components will not be accepted. Air handling units will sit directly on housekeeping pads; all vibration isolation will be internal to the air handling unit.

7.6.1.6(3) The internal liner will be 304 stainless steel and will be suitable for washing with a pressure washer or steam cleaner without risk of wetting the insulation. The liner will be installed over top of the panel flanges and each liner seam will be sealed with a lap joint. The wall liner will be installed over top of the base water dam such that any water run-off from the liner will drip into the water tight base rather than into the wall panel. The roof liner will be installed over top of the roof support so that water cannot enter the roof insulation. All exposed wall material inside the unit will be stainless steel.

7.6.1.7 Acoustical Performance

7.6.1.7(1) The housing will have been tested for acoustical performance by an accredited independent laboratory.

7.6.1.7(2) Test methods and facilities used to establish sound transmission loss values will conform explicitly with the ASTM designation E90-85 and E413-73.

7.6.1.7(3) The manufacturer will submit the lab report for approval as part of Shop Drawing submission.

7.6.1.7(4) Sound transmission loss: The following octave band data will be met or exceeded. Sound data will be submitted as part of the submittal process to confirm these numbers will be met.

| Sound Transmission Loss | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Band | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2” Walls STC =37 | 18 | 19 | 27 | 33 | 43 | 52 | 52 | 52 |
| 4” Walls STC=40 | 20 | 20 | 28 | 41 | 51 | 56 | 55 | 57 |

7.6.1.7(5) Test methods and facilities used to establish sound absorption values will conform explicitly with the requirements of the ASTM Standard Test Method for Sound Absorption Coefficients by the Reverberation Method: ASTM C423-84A and E795-83.

7.6.1.7(6) Sound absorption: The following octave band data will be met or exceeded. Sound data will be submitted as part of the submittal process to confirm these numbers will be met.

| Sound Absorption | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Band | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2” Walls STC =37 | .10 | .23 | .75 | 1.-08 | 1.05 | .99 | .97 | .95 |

7.6.1.8 Base Construction:

7.6.1.8(1) Units will be constructed from structural steel C-channel around the perimeter of the unit with intermediate channel and angle iron supports. Unit will have a minimum 6 in high channel.

7.6.1.8(2) A 12 gauge aluminum checker plate floor will be installed on the base. All seams on aluminum floor will be continuously welded. The floor will be flat, reinforced below with all seams continuously welded. Drive screw attachment and caulking are not acceptable. The base will be provided with lifting lugs, a minimum of four (4) per unit section. The base will be insulated with 50mm (2") rigid foam insulation and sheeted with a 22 gauge galvanized steel liner. Floors that "oil can" are not acceptable and will be site-remedied at this contractor's expense.

7.6.1.8(3) The manufacturer will provide a 40mm (1.5") perimeter collar around the entire unit and around each floor opening to ensure the unit is internally watertight. The entire base will act as an auxiliary drain pan and hold up to 40mm (1.5") of water.

7.6.1.8(4) The manufacturer will provide auxiliary drains in fan sections downstream of cooling coils and in mixing sections.

7.6.1.8(5) All drain connections on floor mounted air handling units will terminate at the side of the unit, will be piped to drain and provided with a p-trap sized to match the anticipated static pressure in section served. Drain piping to be route close to and alongside the AHU to ensure it is not a tripping hazard.

7.6.1.8(6) Maximum base deflection will be 6mm (0.25") on 600cm (240") in unsupported span.

7.6.1.9 Airflow Measuring Probes

7.6.1.9(1) Provide on each fan air flow measuring probes capable of continuously monitoring the air handling capacity of the respective fan.

7.6.1.9(2) Each airflow probe will contain multiple, averaged velocity pressure taps located symmetrically around the throat of the fan inlet and a single static pressure tap located on the fan housing. The entire airflow monitoring probe will be located outside the inlet throat as to not obstruct airflow.

7.6.1.9(3) The probes will be capable of producing steady, non-pulsating signal of the velocity pressure, independent of the upstream static pressure without adversely affecting the performance of the fan. The sensing probes will be accurate ±3% of actual fan airflow.

7.6.1.10 Airflow Display

7.6.1.10(1) Provide for each fan a method of displaying digitally, in real time, the fan's current air flow. Air flow to be displayed on AHU and BMS.

7.6.1.10(2) The display will be capable of showing the airflow of two (2) independent fans simultaneously.

7.6.1.10(3) For interaction with a controller, the display will output one (1) 0-10VDC signal for each fan being monitored.

7.6.1.10(4) The output signal will be accurate to ±0.5% of Natural Span, including non-linearity, hysteresis and non-repeatability.

7.6.1.11 Filters

7.6.1.11(1) Merv 8 pre-filters or approved alternate will be utilized in exhaust air streams for protection of heat extraction units. Dynamic 1" or approved alternate pre-filters will be used with sterile sweep UV lights in units with return air. Supply air handling units will be able to accommodate carbon filters should they be required in future to remove smoke from forest fires or fumes from equipment. Racks for these filters will be provided. Air handling units will be designed with this additional static pressure requirement.

7.6.1.11(2) Final filters will be dynamic air cleaner V8 with UV sterile sweep or approved alternate (sterile sweep is only required on units with mixing of return air with OA – not on 100% OA units). Units with sterile sweep will have a 1" dynamic pre-filter upstream of the V8 bank. Units that have 100% outside air do not require sterile sweep lights.

7.6.1.11(3) The air cleaner will have been tested and meet CSA Standard C22.2 No. 187-M19986 and UL Standard 867 for electrostatic air cleaners.

7.6.1.11(4) The air cleaner will remove 97% of contaminants at 0.3 microns and above in a re-circulating system. The pressure drop of the V8 air cleaner bank will not exceed 100 Pa (0.30" wpd) when the filter media is new. The pressure drop will not exceed 160 Pa (0.65") when panels are fully loaded. Filter media will be changed when the pressure drop reaches 0.65" wpd.

7.6.1.11(5) The air cleaner will have an active electrostatic field that polarizes a dielectric media. The unit will not ionize airborne particles and will not produce ozone. Units that utilize "ion cloud" ozone (carcinogen) producing technology will not be acceptable.

7.6.1.11(6) The high voltage powerheads will require 24 volts AC input. The powerheads will be fully potted and connected in parallel.

Powerheads will be factory wired and will include factory supplied and mounted transformer.

7.6.1.11(7) The 24VAC power supply will be a UL or CSA certified transformer, class “2” type, which will permit one side of the secondary output (24V) to be attached to electrical ground.

7.6.1.12 Filter Gauges

7.6.1.12(1) The manufacturer will provide magnehelic gauges or approved equivalent.

7.6.1.12(2) Magnehelic gauges will be accurate to +/- 2% of full range.

7.6.1.12(3) One gauge will be provided for each filter bank.

7.6.1.12(4) Gauges will be recessed into the exterior cabinet casing to provide a “flush” finish.

7.6.1.13 Lights

7.6.1.13(1) Provide 1219mm (48”) vapour proof LED lights in each section. Duplex receptacles will be installed in each fan section on the wall across from the access doors. A switch with an indicator light will be installed on the unit outer wall at each access door location. Electrical power will be 120V/1/60. All lights will be wired back to a single point on the unit for connection of power by Div 16. This circuit will also be factory wired to the electronic air cleaner system for single point 120 Volt power.

7.6.1.14 Finish

7.6.1.14(1) The unit will be finish painted with two components, etch bond primer and alkyd enamel. All metal surfaces will be pre-painted with vinyl wash primer to ensure paint bonds to metal. Unit colour will be standard grey or white.

7.6.1.15 Unit Mounted Silencers

7.6.1.15(1) Each silencer pod will consist of radiused noses and tails and perforated metal panels stiffened for flatness. Silencers will be rated in accordance with ASTM E477.

7.6.1.15(2) Acoustic media will be compressed and supported to minimize dusting and erosion. Mineral wool is not acceptable. Insulation will be encapsulated with tedlar.

7.6.1.15(3) Minimum 915 mm (36”) silencer with 50% free area will be provided for each of supply fan and return fan.

7.6.1.15(4) Silencer pods will be full height and full width of the plenum.

7.6.1.15(5) Stacked duct type silencers are not acceptable.

7.6.1.15(6) Sound power levels: The following octave band data will be met or exceeded. Sound data will be submitted as part of the submittal process to confirm these numbers will be met.

| Octave Band Sound Power Levels (dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Octave Band (Hz) | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| AHU typical SA discharge | 85 | 90 | 88 | 77 | 65 | 59 | 62 | 59 |
| AHU typical RA inlet | 84 | 87 | 77 | 62 | 56 | 55 | 55 | 55 |

7.7 Reserved for Future Expansion (Division 24)

7.8 Integrated Automation (Division 25)

7.8.1 Overview

7.8.1.1 Provide a Schneider ECOStruxure BMS (previously called Andover) for Phase 1A, Phase 1B, BH Energy Centre, Support Facilities Building renovated areas and areas and equipment in Support Facilities Building served from the Phase 1A/B buildings. This new installation will include full compatibility with the existing system ECOStruxure (Andover) on site. All existing legacy HVAC BMS controls at the Burnaby Hospital site will be able to be viewed and controlled from the ECOStruxure graphical user interface. The new ECOStruxure front end will be able to configure alarms and schedules, program, and reload the existing legacy field controllers. Information from the new ECOStruxure system will be passed to and received from the legacy controllers. The resulting BMS will operate as a seamless entity and command and control functions will be demonstrated to the Compliance Team prior to Substantial Completion.

7.8.1.2 Project Co will be responsible for the relocation of the BMS head end to the Phase 1A Mechanical room in the Engineers Control Room and provision on new work station and monitors. Project Co’s controls contractor will migrate the BMS to a dedicated FMO network from its current location on the Fraser Health IM/IT network prior to Substantial Completion. The controls contractor will be responsible for maintaining system operation during the head end and system transfer.

7.8.1.3 Renovated areas will be transition onto the new BMS backbone complete with DDC components. Areas being refurbished or remaining untouched will remain on their existing control medium of pneumatic or DDC devices. These areas will be connected to the new BMS but will not be upgraded in Phase 1.

7.8.1.4 The renovation boundaries will not match the control zones of the existing BMS. During the renovations the controls contractor will be responsible for locating and labeling all existing controls raceways’ conduit, wiring, and pneumatic tubing prior

to demolition of the areas. The controls contractor will migrate all devices remaining in the control zone to the new BMS.

7.8.2 Basic Requirements

7.8.2.1 Provide a stand-alone, web accessible BMS or Building Management System (also referred to as a BAS or Building Automation System) for the Facility that performs the following functions:

7.8.2.1(1) Automatically operates, monitors and manages the Facility's mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the delivery of clinical and Patient treatment services;

7.8.2.1(2) Interfaces with the building mechanical, electrical and communication systems and controls with full graphic interface for each system new and existing;

7.8.2.1(3) Meters, trends and archives all data related to the flow of services into and out of the Facility, including domestic water, natural gas, and electricity and takes into account seasonal variations in flow rate;

7.8.2.1(4) Data trending and storage includes BMS Data Storage Server (DSS) and reporting capability will be provided with the ability to store and query large volumes of data. This will include trends over long periods of time (minimum 5 years) to compare values such as indoor and outdoor environment conditions, equipment status and energy utilization;

7.8.2.1(5) It will be possible for the iBMS DSS to store large quantities of timed sequenced records limited only by the capacity of the storage media;

7.8.2.1(6) Data from the DSS will be available for copy within the building premises, corporate data storage or compatible cloud storage validated and approved for use by the iBMS system integrator;

7.8.2.1(7) The quantity of data points which can be stored on the DSS will only be equal to the number of objects that are defined on the BMS servers and 3rd party equipment as specified in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment];

7.8.2.1(8) The DSS will be capable of storing data from subsystems integrated to the iBMS;

7.8.2.1(9) It will be possible to capture any point data value at 5-minute intervals and store the data for a minimum of 5 years. Project Co will carry all costs associated with data storage required for Energy

Target verification in accordance with Appendix 2D for a minimum of 2 years, or until the Target is confirmed;

7.8.2.1(10) Postgres SQL compatible analytical and reporting tools including: Azure Analytics, “R”, Jaspersoft, Qlik and Tableau will be able to access and analyze data from the DSS;

7.8.2.1(11) Annunciates building and equipment alarms, freezer alarms, pharmacy fridges, morgue cooler, specimen fridge alarms, morgue walk in cooler, lab alarms, medical equipment alarms, lighting, UPS, Emergency Power Systems and switchgear alarms, and generates a monthly log of all alarms for review by the Authority;

7.8.2.1(12) Monitors the status, temperature, humidity and alarms for equipment identified in Appendix 2E Clinical Equipment and Furniture] Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment]and the Authority, including freezers, coolers, labs and medical equipment; and

7.8.2.1(13) Acquires and collates all data associated with energy measurement and verification as required in this Schedule and Appendix 2D [ Energy and Carbon Guarantees].

7.8.2.2 Design the controls systems to allow monitoring and operation of the Facility from a BMS location in the Facility. Display building related alarms at the systems monitoring space and on associated graphics.

7.8.2.3 The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.

7.8.2.4 The BMS will be non-proprietary and designed with open protocol.

7.8.2.5 The BMS will optimize the system performance under all operating conditions to minimize Facility energy usage.

7.8.2.6 The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion of the system for future renovations. System will have additional 15% spare capacity floor by floor for traffic increases and Future Expansion. If panels are not mounted on every floor provide spare conduits to floors served to accommodate the 15% additional capacity utilisation without coring.

7.8.2.7 The BMS will be an independent system separate from the fire alarm and other control systems. The BMS will be provided as a complete package from one manufacturer, not a composite system from several manufacturers.

7.8.2.8 Provide airflow sensors, pressure sensors, and infectious control isolation dampers in ductwork to ensure isolation can be achieved for each of the Outbreak Control Zones. Provide local audio and visual alarms at the associated care

stations in addition to the BMS alarms. Provide all programming required for implementation of Outbreak Control Zones with single command. Outbreak control to be activated by FMO via the BMS with local pressure readouts and audible and visual alarms provided at the Care stations of equipped floors.

7.8.2.9 BMS will provide programing to activate Catastrophic modes for 100% outdoor air or 100% recirculation for the Facility through a single command for each mode accessed through the graphics for each building.

7.8.2.10 Provide a minimum of 4 physical access points complete with monitors, keyboard etc. Main access in the Phase 1A penthouse mechanical room, secondary access from the Phase 1A chiller room, access from BH Energy Centre, and access from location identified by the Authority through the Review Procedure during User Consultation Groups.

7.8.2.11 Provide system complete with cyber security:

7.8.2.11(1) Intelligent Building Management System software cyber security requirements:

7.8.2.11(1)(a) The BMS will be developed using secure development life cycle best practices for software development;

7.8.2.11(1)(b) The BMS will be subjected to regular and verifiable best practice cyber security testing by the system supplier. Results of this testing will be made available upon request prior to deployment of the system;

7.8.2.11(1)(c) The BMS system supplier will provide cyber security service incident escalation through help desk on a 7/24/365 basis;

7.8.2.11(1)(d) All BMS server level devices will require access via HTTPS;

7.8.2.11(1)(e) All BMS AS will support SNMP V3 monitoring of network performance and stack statistics for the purpose of managing denial of service attacks;

7.8.2.11(1)(f) The BMS will support the feature to auto logoff any logon that has had no activity for a predefined period of time;

7.8.2.11(1)(g) The BMS will support the feature to alarm on a predetermined period of time until the default password for each device is changed from the default factory setting;

7.8.2.11(1)(h) The BMS will support encrypted password authentication for all web services whether serving or consuming;

7.8.2.11(1)(i) The BMS will support single sign on allowing user authentication information to be shared from one trusted system to another. All cyber security standards and practices will apply to secure the single sign on;

7.8.2.11(1)(j) The BMS will support Active Directory; and

7.8.2.11(1)(k) The BMS will support password rules required by good security practices to include: password complexity, password history, minimum password length, password age, forced password change, invalid login alert, auto lock out after three invalid attempts.

7.8.2.11(2) Secure network environment requirements:

7.8.2.11(2)(a) The BMS network level servers will support encryption standard throughout the network.

7.8.3 Performance Criteria

7.8.3.1 Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, room heating and cooling loads, and Appendix 3B [Minimum Room Requirements] temperature control requirements. Provide independent zone for each Patient care room. For non-Clinical Spaces, a maximum of 3 rooms or bays will be on one zone. Configure zoning to minimize reheat/recool.

7.8.3.2 Zone floor areas to provide control of smoke in a fire situation as required by B.C. Building Code. Zone floor areas to accommodate the Outbreak Control Zones and ensure zones served by VAV boxes do not cross zones.

7.8.3.3 Provide adjustable type thermostats with temperature read out in all private Patient rooms, operating rooms, lounges, sleep rooms, and as noted in Appendix 3B [Minimum Room Requirements]. The temperature range will be controlled by the BMS and will match CSA Z317.2 Table 1 range; User adjustable range of +/- 2 ºCelsius.

7.8.3.4 Operating room temperatures will be monitored in the space utilizing an adjustable thermostat and temperature sensors in the return air ducts from the room served. Secure Rooms will not have a temperature sensing device located on room wall but will monitor the return air temperature and slab temperature.

7.8.3.5 Provide local pressure controllers for each Airborne Isolation Room, AIR Anteroom, Trauma/Resuscitation Suite, and T/R Anteroom-AIR. Provide a local annunciator panel located in the corridor outside each of these rooms. Annunciator panel will be provided with local read out, visual alarm and audible alarm. The audible function will be able to be silenced while maintaining the visual alarm function. Standard of Acceptance: Phoenix or equivalent. Provide door sensors on doors between the Airborne Isolation Rooms, Trauma/Resuscitation Suite and the

corridor and alarm delay to permit doors to be opened for short time periods without triggering pressure alarms. Door contacts will also provide alarm if door left open for more than 5 minutes; duration to be editable by FMO. Provide a remote alarm at the associated care station. Provide additional control points as required to allow function of room to be in non-isolation mode/ non positive mode while still meeting the visual display needs as outlined in CSA.

7.8.3.6 Provide pressure monitors with BMS alarms and local readout for all pressure critical spaces including OR's, Sterile core, MDRD Sterile Storage, Resuscitation, Negative Pressure Airborne Isolation Rooms and their associated anterooms, Pharmacy Hazardous Compounding and associated anteroom, and as noted in Appendix 3B [Minimum Room Requirements], and as required by CSA Z317.2.

7.8.3.7 Monitor pass throughs in MDRD and Pharmacy. Provide local audible and visual alarm and alarm of BMS graphics.

7.8.3.8 Provide remote control of all Inpatient Mental Health Secure Room temperature from the associated Care Team Stations. Provide remote control of domestic water serving Mental Health inpatient rooms, SSAT Unit Patient washroom and washroom/shower and Secure Rooms as noted in Section 7.4.3.

7.8.3.9 Provide programing to monitor and activate CAHU connection points noted in clause 7.5.1(9). BMS will open control damper and increase the speed of the associated exhaust fan to accommodate the added 2000 cfm of flow from the CAHU. Program will provide an alarm if the damper is manually operated.

7.8.3.10 BMS will monitor the BH Energy Centre and provide status and alarms for the Fuel Inventory system, backup 50%-day tank alarm, Generators, Generator Control Panel general alarm plus 4 additional alarms to be confirmed with the Authority during design, remote radiator system status if applicable, alarms, and temperatures, remote radiator glycol make up alarm if applicable, and combustion air status and alarm. BMS will include a hardwired watchdog function to monitor the generator control panel to confirm controls functionality and provide alarm if system function is impaired.

7.8.3.11 Failsafe components will be hard-wired to provide reliable operation in all circumstances.

7.8.3.12 The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points. BMS will generate a monthly report for all alarms.

7.8.3.13 Refer to Schedule 3 [Design and Construction Specifications], Section 7.9 Electrical for systems and equipment to be monitored or controlled by the BMS including lighting control, transfer switch monitoring, transformer monitoring, emergency generator system monitoring, and UPS monitoring.

7.8.3.14 The BMS will be connected to vital power.

7.8.3.15 The BMS will monitor critical alarms for essential building and Life Safety Systems. Provide ability to direct alarms to an e-mail address and an alpha numeric pager. Critical alarms include:

7.8.3.15(1) Fire Alarm System for Initial Stage 1 alarm, Stage 2 Evacuation, and general trouble;

7.8.3.15(2) All temperature alarms resulting from set point deviations;

7.8.3.15(3) Failure of any major HVAC or plumbing equipment;

7.8.3.15(4) Medical gas system high and low pressure alarms;

7.8.3.15(5) All alarms relating to the fire protection system;

7.8.3.15(6) UPS, Emergency Power Systems; and

7.8.3.15(7) Alarm locally and monitor all medication, blood and bone fridges via the BMS.

7.8.3.15(8) Generator failure, loss of Utility power, transfer switch out of position.

7.8.3.16 The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

7.8.3.17 User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments. Generate a pop-up window on the browser display panel with audible alarm, informing operator that an alarm has been received.

7.8.3.18 BMS will provide sufficient level of monitoring for evaluation and observation on system performance for all systems noted. An Indicative points list for standard equipment has been provided in Appendix 3M [Indicative BMS Points List] to establish a minimum level of information for equipment and spaces.

7.8.4 Electrical Systems

7.8.4.1 All wiring and cable will be installed in accordance with requirements of Section 7.9

7.8.4.2 No wiring or cabling to be installed “free air”, all wiring and cabling will be in rigid conduit or in cable tray.

7.8.4.3 Flexible conduit may be used for the last 300mm before connection to equipment.

7.8.5 FMO Network and Infrastructure

7.8.5.1 Basic Requirements

7.8.5.1(1) System Overview

7.8.5.1(1)(a) The FMO Network is a dedicated IEEE 802.3 network whose purpose is to provide a single, converged and secure network for IP Building Systems separate from the Authority's IM/IT Data Network.

7.8.5.1(1)(b) Project Co will provide a standard ethernet network solution for the FMO network.

7.8.5.1(1)(c) The FMO Network does not include the following systems which will be provided separately by the Authority:

7.8.5.1.1.(c).1 IM/IT Data Network;

7.8.5.1.1.(c).2 IM/IT Wi-Fi Network;

7.8.5.1.1.(c).3 Routers; and

7.8.5.1.1.(c).4 Servers.

7.8.5.1(2) System Responsibilities

7.8.5.1(2)(a) Authority will:

7.8.5.1.2.(a).1 Provide design feedback to Project Co.

7.8.5.1(2)(b) Project Co will:

7.8.5.1.2.(b).1 Select the system as determined with the Authority through Review Procedure;

7.8.5.1.2.(b).2 Design, supply, install and commission all system infrastructure;

7.8.5.1.2.(b).3 Design, supply, install, configure, program and commission the FMO Network, including all required hardware interfaces;

7.8.5.1.2.(b).4 Design, supply and install all system software; and

7.8.5.1.2.(b).5 Commission all system infrastructure, hardware and software.

7.8.5.1(3) Performance Criteria

7.8.5.1(3)(a) General

7.8.5.1.3.(a).1 The FMO Network will be designed and implemented in a manner consistent and appropriate for the critical nature of 24/7 acute care Facility operations.

7.8.5.1.3.(a).2 Project Co will provide network management functionality for the FMO Network to actively monitor, report, troubleshoot and configure all network settings and devices. The software user interface will be designed for use by Facility managers in visual format without the need for Command Line Interface (CLI) programming.

(a).2.1 At minimum, the GUI will allow for a simple to use centralized management of the following:

(a).2.1.1 network hardware;
(a).2.1.2 VLAN assignments;
(a).2.1.3 operational status;
(a).2.1.4 power-over-ethernet settings;
(a).2.1.5 audit logs;
(a).2.1.6 user access control;
(a).2.1.7 BACNet/IP traffic; and
(a).2.1.8 network security.

7.8.5.1.3.(a).3 Project Co 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.

7.8.5.1.3.(a).4 The FMO Network is a critical component for the commissioning of electrical and mechanical IP Building Systems. Project Co will ensure the FMO Network is fast-tracked to support accelerated and optimized commissioning schedules of FMO Buildings Systems.

7.8.5.1.3.(a).5 Project Co will provide all software licensing associated with the FMO network for two (2) years.

7.8.5.1(3)(b) Network Architecture

7.8.5.1.3.(b).1 The FMO Network will be designed for redundancy of all core equipment and connections between core and edge switching.

7.8.5.1.3.(b).2 The FMO Network design will allow for concurrent upgrading of networking equipment and software to eliminate unplanned downtime.

7.8.5.1.3.(b).3 FMO Network hardware will be installed in parallel with IM/IT Data Network hardware in each Communication room in the Facility.

7.8.5.1.3.(b).4 FMO Network hardware will be installed on the same floor as the equipment and mechanical controllers that they are serving.

7.8.5.1.3.(b).5 FMO Network hardware will be installed within coordinated for installation in designated IM/IT racks.

7.8.5.1.3.(b).6 FMO Network hardware will be installed on the same floor as the equipment and mechanical controllers that they are serving.

7.8.5.1.3.(b).7 FMO Network hardware port counts will be sized for a minimum of 25 % spare.

7.8.5.1.3.(b).8 FMO Network will be supplied with all hardware connectors and SFPs to provide a fully functional network.

7.8.5.1(3)(c) FMO Network Structured Cabling

7.8.5.1.3.(c).1 Adhere to the 2020 PHSA Communications Infrastructure Standards and Specifications when designing, supplying, installing, and

commissioning structured for the FMO Network.

7.8.5.1.3.(c).2 All horizontal and structured cabling jacketing for the FMO network will be grey in colour.

7.8.5.1.3.(c).3 Provide all structured cabling, power peripherals and patching accessories required for a functional and secure end-to-end system.

7.8.5.1.3.(c).4 Intrabuilding backbone single-mode fibre backbone cabling will be provided as part of the IM/IT Structured Cabling System defined in Division 27. Dedicated fibre strands will be provided for FMO Network.

7.8.5.1.3.(c).5 Provide Category 6A horizontal cabling drops for each Building Systems device that requires ethernet/IP access.

(c).5.1 Provide rack mounted patch panels for FMO network equipment within each TR in compliance with PHSA IM/IT Infrastructure standards.

## 7.9 Electrical (Division 26)

### 7.9.1 Design Principles

7.9.1.1 This section is accompanied and will be read in conjunction with the Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items], Appendix 2L [Food Services Equipment] and Appendix 3B [Minimum Room Requirements]**.**

7.9.1.1(1) All electrical systems, materials and equipment will be new and of a type and quality intended for use in a health care facility.

7.9.1.1(2) All electrical systems to be functional and will implement the latest proven technologies in equipment and systems that are available at the time of installation;

7.9.1.1(2)(a) Efficient and Reliable;

7.9.1.1(2)(b) Adaptable and expandable for future needs;

7.9.1.1(2)(c) Configured with redundancy to allow flexible operation and concurrent maintenance; and

7.9.1.1(2)(d) Located to allow convenient equipment service.

7.9.1.1(3) Design the BH Energy Centre and electrical rooms to be readily accessible, secure, well ventilated and free of corrosive or explosive fumes, vapours, gases or any flammable material.

7.9.1.1(4) All electrical systems for the Inpatient Psychiatry Unit, Inpatient Unit and similar areas, as directed by the Authority will be tamper-proof, Tamper Resistant, Ligature Resistant and be of a type and quality intended for use in a mental health care facility.

7.9.1.1(5) All systems for the Inpatient Psychiatry Unit, Inpatient Unit and similar areas, as directed by the Authority will adhere to all relevant mental health standards including the CSA Psychological Health and Safety in the Workplace, and Design Guide for the Built Environment of Behavioral Health Facilities.

7.9.1.1(6) Configure electrical systems to meet requirements of the identified program and Patient care needs in an efficient manner with optimal utilization of space, Staff and equipment resources.

7.9.1.1(7) Provide electrical systems that provide redundancy, protection, continuity of service and a comfortable and safe working environment for Patients, visitors and Staff.

7.9.1.1(8) 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 or impact the operation of the Facility or the Existing Hospital.

7.9.1.1(9) 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 BH Campus level, zone boundaries to coincide with the outlines of the Facility and the Existing Hospital. Zone interior boundaries to coincide with floor levels and fire compartments.

7.9.1.1(10) Zoning of Life Safety Systems to be coordinated with mechanical systems to ensure consistent alert/alarm annunciation, notification, and response of ancillary systems.

7.9.1.1(11) Each floor area will be served from multiple electrical riser rooms. Each electrical riser room will serve a maximum of 2325 m2 (25000 ft2) of space, except for electrical riser rooms serving only parking and mechanical rooms which may serve a maximum of 4650 m2 (50000 $ft^2$) of space.

7.9.1.1(12) Integrate systems where integration provides efficiency, operational and cost advantage.

7.9.1.1(13) 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 building activities.

7.9.1.1(14) Include systems and equipment coordinated to provide synergy and reliable electrical performance for the various Facility functions.

7.9.1.1(15) Provide provisions to minimize the noise and vibrations of electrical equipment/components (transformers, luminaries, cables etc.) to below an acceptable level as required in a health care facility and as referenced within this document, relevant codes and standards.

7.9.1.1(16) Locate electrical rooms and power distribution equipment in order to minimize the distances for feeder runs and to provide easy access for the equipment to be moved in and out of the electrical rooms and/or be replaced with new distribution equipment. Locate power distribution equipment to avoid interference with other services and equipment.

7.9.1.1(17) Design and install the mechanical services, electrical and IM/IT systems and services to route above the t-bar or other ceiling systems in corridors and locate light fixtures, fire alarm, security cameras, nurse call, DAS and other systems so that they will not impede access to other devices, equipment, valves, junction boxes or any other element that a maintenance person may need to access, work on, adjust, remove, replace, maintain. Provide construction coordination between all divisions to ensure ceiling access to the installed systems are provided.

7.9.1.1(18) Provide clear aisle ways and routes to permit removal of major electrical equipment from the Facility as well as to bring in new equipment into the electrical rooms without impacting the Existing Hospital operations and site access. Indicate on the floor plans the removal aisle ways and routes for major electrical equipment such as diesel generators, transformers sized 225kVA and greater, ATS, UPS and all switchgear sections.

7.9.1.1(19) Install equipment, conduits, piping, ductwork etc. in electrical rooms, generator room, and UPS room such that a minimum clear height of 3050 mm (10’-0”) AFF is available.

7.9.1.1(20) Outlets for equipment must be coordinated with Schedule 3 [Design and Construction Specifications], Appendix 2E [Clinical Equipment and Furniture] Appendix 2J [Construction Items] and Appendix 2L

[Food Services Equipment]. Outlets, connections and data for equipment detailed in Schedule 3 [Design and Construction Specifications], Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment] have not been included in Appendix 3B [Minimum Room Requirements] and will be provided for. Project Co will coordinate with the Authority and provide as required.

7.9.1.1(21) Electrical rooms, BH Energy Centre, generator room, UPS rooms and Communication Rooms will not have drain pipes, plumbing pipes or water-cooled fan-coil units located in the room.

7.9.1.1(22) Incorporate energy management systems to minimize demand pressures on the Building Systems and minimize the anticipated increase to energy costs.

7.9.1.1(23) Project Co will obtain approval from the Authority through the Review Procedure for the proposed classification of all Patient care areas in the Facility as per CSA Z32-15. 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 Z32-15 and will be in accordance with section 7.9.4.3 Equipment Identification. Where this Schedule identifies requirements beyond CSA Z32-15, Project Co will comply with the requirements of this Schedule 3 [Design and Construction Specifications].

7.9.1.1(24) Refer to Appendix 2D [Energy and Carbon Guarantees] regarding energy incentive programs. Integrate any requirements of those programs into the electrical systems.

7.9.1.1(25) Provide testing, Commissioning and Authority training for all systems in accordance with all relevant sections codes, standards, Appendixes and all other reference documents.

7.9.1.1(26) Project Co to provide a minimum of one month notice for all FMO required Facility training sessions. Due to staff vacations and limited FHA staff more that 4 weeks notice may be required to ensure that the appropriate staff are available for system training. Coordinate all staff training schedules in conjunction with the Authority.

7.9.1.1(27) Project Co to provide a scheduled shut-down program that identifies the timing, phasing and coordination of all work required for the installation of new distribution and circuits in existing distribution. Project Co will work with the Authority representative and will provide all required power work-arounds including temporary power sources for power, lighting, life safety and telecommunication systems. Provide schedule to the Authority representative for review and

approval through the Review Process two weeks prior to any work being completed.

7.9.1.1(28) Refer to independent testing agency requirements in Section 7.9.2 and Section 2.8 System Shutdown Interruptions for scheduled shut-down approval process timeline requirements.

7.9.1.1(29) Project Co (Division 26) will engage the services of a specialist Independent Testing Agency (ITA) to conduct the electrical testing of equipment which will include assisting Project Co to prepare Work Plans requiring outages and/or testing. The ITA will prepare a Test Plan and will summarize the inspections and tests to be monitored and the reports to be prepared. The Test Plan will be submitted to the Authority for review. For detail requirements refer to Section 7.9.2 Independent Testing Agency. The ITA services will provide testing and Commissioning services as set out herein.

7.9.1.1(30) The feeders fed from vital, delayed vital and conditional branches will be kept entirely independent of each other and will not occupy the same maintenance hole, pull pit, junction box, pull box, cable tray, fire rated shaft, enclosure, etc., except where mechanical protection is provided or where it is required to connect power sources at tie breakers and transfer switches.

7.9.1.1(31) All electrical equipment and or devices, junction boxes, and pull boxes will be oriented such that they are easily Serviceable with a minimum 1000mm horizontal clear (working space) such that a maintenance person can perform service work without reaching over, under or across any other piping, ducting, cable trays or conduits.

7.9.1.1(32) Electrical systems to be the most reliable/dependable, proven, and technologically-advanced at time of installation.

7.9.1.1(33) The high voltage electrical distribution equipment will be an outdoor BC Hydro approved unit substation. The high voltage distribution switchgear equipment will consist of stacked, high voltage, draw out breakers. Provide vacuum high voltage switch gear that protects operating and maintenance personnel from dangerous arching faults. Switchgear to be certified per IEEE C37.20.7 and compartmentalized design conforming to IEEE C37.20.2 and CSA C22.2 No 31-44 including motorized draw out breakers, mechanical kirk key interlocks and VT/CPT drawers. Draw out breakers will have Arc Flash Reduction Maintenance Switches (ARMS) and shall be remotely operated.

7.9.1.1(34) The low voltage 600V main electrical distribution switchboards will be of the ANSI Type 2B switchgear type with an arc flash quencher

and transfer system. The arc flash sentry system in conjunction with zone interlocking will be provided to initiate arc quenching and to contain the arc energy.

7.9.1.1(35) All 600V and 208V sub-electrical distribution panels will be standard equipment.

7.9.1.1(36) All MCCs will be of the high arc resistance mitigation type. The MCCs will lower the probability of the creation of a short circuit phase-to-phase or phase-to-ground fault, lowering the possibility of an arc flash event.

7.9.1.1(37) Size and configure equipment to permit routine testing and servicing of power generation and distribution equipment with minimal loss of service continuity.

7.9.1.1(38) Electromagnetic interference (EMI) to be considered in installation of electrical equipment within Phase 1A and Phase 1B. EMI reduction to be achieved by electromagnetic shielding for transformers and switchgear, use of ferrous raceways such as EMT as required by electrical code. Limits for residual magnetic fields shall comply with General Output Specifications Section 5.6 and IEEE 299 - Standard Method for Measuring.

7.9.1.1(39) EMI reduction to also be achieved by close spacing of conductors in feeders, running all the spaces of a feeder together to cancel net magnetic fields, locating all distribution transformers in electrical rooms and running feeders in service spaces and ceiling spaces away from occupied areas.

7.9.1.1(40) Bus duct is acceptable when used only in electrical rooms or in vertical risers from electrical room to electrical room and will be fully enclosed. Should there be an electromagnetic field that results in interference to equipment, Project Co will mitigate the electromagnetic field with appropriate techniques.

7.9.1.1(41) Reference and provide for all electrical requirements referenced in all clinical, non-clinical, and FM sections of the Project Agreement Output Specifications for requirements affecting Divisions 26, 27 and 28.

7.9.1.1(42) Install electrical systems and equipment in a fixed and permanent manner, seismically restrained to meet post-disaster building standards. Plan installation of equipment to allocate space for future additions and to facilitate easy access to other systems and equipment which may require inspection or maintenance.

7.9.1.1(43) Where electrical equipment is located below grade, provide protection against the risk of flooding. Protect electrical rooms from

flooding or ground water infiltration. To mitigate the risk, provide drainage and sump pumps, on Delayed-vital power:

7.9.1.1(43)(a) Within the electrical rooms and cable pull rooms where concrete encased duct banks interface with the building; and

7.9.1.1(43)(b) Other electrical service areas as required.

7.9.1.1(44) Provide fire stopping and smoke sealing in all the areas of work for all existing and new penetrations for feeders, cables, raceways, conduit and similar installations with an approved fire stopping method. All other penetrations to be sealed to suit surface.

7.9.1.1(45) Provide seismic isolation on all feeders, cabling, raceways and conduits that penetrates (is routes through) a structural seismic joint and any feeders, cabling, raceways or conduit that that is routed between any new or existing buildings. Provide fixed pull box or junction box on either side of the seismic joint and utilize flexible raceway or conduit between the fixed connections on either side of the seismic joint. Flexible connection will be installed to allow for 50mm of movement up and 50mm down to accommodate for seismic movement.

7.9.1.1(46) Incorporate redundancy into the electrical system design such that failure of any electrical equipment or feeder will not impair building operation or leave any area, room, floor plate or functional program or department of the building without at least one active light and one active receptacle unless stated otherwise.

7.9.1.1(47) Design and construct all systems with protection, grounding, isolation and control to address the functional requirements where they are located. Power throughout the Facility will comprise of a combination of 600V for mechanical loads and 120/208V for all power, lighting and equipment loads except where 277/480V is required for Authority’s equipment. Localized transformers will be allowed for Authority’s equipment with specialized power requirements as required.

7.9.1.1(48) In addition to allowing for known future requirements, operating factors, safety factors, and mechanical loads and requirements, design and construct the Facility electrical systems with a minimum 25% spare capacity, 25% physical space, and 1 spare breakers of each size installed or 10% spare breakers which ever is greater. This spare capacity is to be provided throughout the distribution network elements on secondary distribution and all major electrical equipment.

7.9.1.1(49) Design and construct the Facility to provide a minimum of 25% physical floor and wall space within all electrical rooms and service spaces for future electrical equipment.

7.9.1.1(50) All branch panelboards will be located in an electrical equipment rooms such that maintenance can be performed with the door open & code required access is provided. Access doors shall open fully 180 degrees and not block access to any other doors or openings. Provide sufficient floor space from the face of the panel to allow a 1500mm workspace plus a 1500mm walkway..

7.9.1.1(51) Redundancy will be incorporated into systems and equipment such that the failure of a single piece of major equipment or major conductor will not impair the operation of the Facility nor the clinical or administrative activities.

7.9.1.1(52) The installation will economically occupy available space, leaving space for future additions, and will be planned to facilitate easy access to other systems and equipment, including mechanical equipment, Building Systems access ways and architectural building components which may require periodic inspection or maintenance.

7.9.1.1(53) Provide a maintenance hole with a drained sump immediately before each duct bank enters (or exits) the Facilities. Slope all ducts towards maintenance holes and install T-drains at low points in ducts.

7.9.1.1(54) The essential electrical systems will supply loads designated by the health care facility administration as being deemed essential for the life, safety, and care of patients and the effective operation of the health care facility, and as defined in the CSA Z32-15 Electrical Safety and essential electrical systems in health care facilities.

7.9.2 Independent Testing Agency (ITA)

7.9.2.1 The purpose of this section is to specify Division 26 responsibilities in the Commissioning process. The systems to be commissioned are listed in herein

7.9.2.2 The systems to be commissioned are as specified herein.

7.9.2.3 Commissioning requires the participation of Division 26 to ensure that all systems are operating in a manner consistent with the contract documents. The general Commissioning requirements and coordination are detailed herein. Division 26 will execute all Commissioning responsibilities assigned to them in the contract documents.

7.9.2.4 The ITA will be responsible to review all testing and Commissioning documentation to ensure it complies with the contract requirements and together

with the Authority monitor the testing and commission process. All documentation regarding testing and Commissioning will be sent to the Authority.

7.9.2.5 Test and commission temporary and modified equipment as well as the new permanent equipment. Test all breakers and controls to ensure their correct settings and operation

7.9.2.6 Electrical Contractor will coordinate and pay for all tests specified herein including further tests as required by relevant Governmental Authorities.

7.9.2.7 All testing will be performed after each system installation has been completed and prior to the system being put into continuous operation unless otherwise noted. The testing and Commissioning will comply with CSA Z8001 Standard and will consist of a three-step process as outlined herein.

7.9.2.8 Perform the testing and Commissioning only when conditions are commensurate with actual operating conditions for the given system.

7.9.2.9 Advise the Authority 48 hours in advance of each test. Carry out tests in the presence of the Authority.

7.9.2.10 Submit detailed typewritten test reports in duplicate to the Authority within 7 days after the completion of each test. Include all test reports in the maintenance manuals. Each test will clearly indicate, in a line-by-line format, that the components (not as a group) have been tested, test results, and whether test results are within acceptable limits. Each test report will be accompanied by a front cover sheet briefly outlining what the test report is for and clearly summarizing all items that have failed the tests. The cover sheet will indicate names of individuals who conducted the tests and their signatures. The Commissioning tests will confirm that the systems as a whole i.e.; all components function correctly as required by these specifications

7.9.2.11 Provide the services on an Independent Testing Agency (ITA) to undertake the testing and Commissioning of the Project’s electrical equipment using trained and qualified personnel. The ITA will have on Staff a BC registered Professional Electrical Engineer to review all work and sign reports. All testing and Commissioning work will comply with CSA Z8001-13 and NETA test procedures and acceptance values. Utilize only calibrated test equipment to perform the work and provide test equipment calibration certificates prior to undertaking test work. The ITA will only use their own Staff, work will not be contracted out to 3rd parties. The ITA will be in good standing with the Authority. The serial numbers of the test equipment used will be recorded on all test reports.

7.9.2.12 The scope of work of covers testing and Commissioning of all Project electrical power distribution equipment including new, temporary and existing modified equipment. Provide a complete testing and Commissioning plan including schedule for the electrical work for the Project. Incorporate the testing and Commissioning work undertaken by equipment suppliers and manufacturers. Commissioning will comply with the requirements of each section of these

specifications and in accordance with Z8001-13 - Commissioning of Health Care Facilities. Work will include temporary, modified and new equipment and systems. Utilize the CSA Z8001/Z320Testing Check Sheets for the testing equipment. This work will include:

7.9.2.12(1) High voltage transformers;

7.9.2.12(2) Generators;

7.9.2.12(3) Automatic transfer switches;

7.9.2.12(4) 600 V switchgear;

7.9.2.12(5) Circuit breakers;

7.9.2.12(6) Disconnect switches;

7.9.2.12(7) 600 & 208 V cables;

7.9.2.12(8) 600 & 208 V distribution;

7.9.2.12(9) Transformers;

7.9.2.12(10) PT's;

7.9.2.12(11) CT's;

7.9.2.12(12) Protective relays;

7.9.2.12(13) Grounding systems;

7.9.2.12(14) Bus ducts; and

7.9.2.12(15) Thermographic (Infra-red) surveys.

7.9.2.13 Set, test and commission all circuit breakers according to the requirements of the manufacturer and incorporating the device setting provided by the Authority. Prepare Work Plans for all necessary testing and commission including work requiring outages where equipment testing is required. Work Plans to be in PDF format for review. Provide Work Plans planned outages and high-risk activities to be completed at site, including bypassing and installing all new switchgear. The Project Schedule is to be prepared by Project Co. Include in the Work Plans any temporary work required to minimize shutdown time. Schedule the work as required by the Authority to minimize disruption to the Existing Hospital operations. Submit Outage Requests to the Authority for all work requiring shutdowns. Provide sign off sheets for each piece of equipment at site to be added or phased in. This includes equipment used for temporary power requirements. Prepare and submit reports to the Authority as the Project proceeds. Prepare detailed work procedures involving work on energized equipment. Attend the Site during all outages and switching of the electrical distribution. Allow for attending testing and

Commissioning at Site during non-standard and standard working hours as may be required. Identify in the Work Plans “hold points” for required inspections to be completed prior to continuing construction. The training of the Authority’s personnel for the equipment will be completed by the equipment vendors, but the assembly of the Vendors’ training plans, review of these plans will be completed by the Project Co assisted by the ITA. Project Co will be present during these training sessions.

7.9.2.14 Project Co may use his own forces and the forces of his suppliers and Subcontractors for the following tests:

7.9.2.14(1) Test secondary voltage levels of all transformers provided by Project Co and adjust taps to within 2% of the rated operating voltage of the connected equipment unless directed otherwise by the Authority. Report to the Authority, in writing, phase and neutral currents of dry-core transformers.

7.9.2.14(2) Test phase relationships and polarity at all equipment and outlets and devices.

7.9.2.14(3) Test all lighting and heating circuits and all circuits originating from branch distribution panels. Phase balance - When load conditions are commensurate with actual operating conditions, measure the load and the voltage on each phase at each switchboard, splitter, motor control centre, motor distribution centre, distribution panelboard, and lighting and power panelboard and report the results, including neutral currents, in writing to the Authority. Rearrange circuit connections as necessary to balance the load on each phase as instructed by the Authority. After making any such changes, make available to the Authority marked prints showing the modified connections. Motor loading - measure the line current of each phase of each motor provided by Project Co with the motor operating under load and report the results along with the motor nameplate current in writing to the Authority. Upon indication of any unbalance or overload, thoroughly examine the electrical connections and rectify any defective parts or wiring. If electrical connections are correct, overloads due to defects in the driven machines will be reported in writing to the Authority.

7.9.2.14(4) Include in the written reports to the Authority the hour and date on which each load was measured and the voltage at time of test. Control and switching - all circuits will be tested for the correct operation of devices, switches, and controls, including sequenced operation of systems where applicable. Employ the services of the UPS manufacture to provide factory trained technicians to test and commission the UPSs and their associated accessories and provide written documentation including check lists, reports and test data confirming their satisfactory operation before placing the equipment

into permanent service. Use the same personnel to provide Authority training for their operation and maintenance.

7.9.2.15 Start up, prefunctional checklist and initial checkout. Complete the systems and sub-systems so they are fully functional, meeting the Design Objectives of the contract documents. The Commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the Commissioning authority or Authority. Comply with CSA Hospital Standard Z8001. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the Authority. Beginning system testing before full completion does not relieve the Project Co from fully completing the system, including all pre-functional checklists as soon as possible. Before starting up any systems or equipment, provide written verification stating that the specific system or item of equipment is ready for starting and the following conditions have been met.

7.9.2.15(1) Copies of all tests and certificates have been submitted to the Authority.

7.9.2.15(2) All safety controls have been installed, wired, dry tested, and are fully operational.

7.9.2.15(3) The permanent electrical wiring connections have been made to all equipment and that power is available.

7.9.2.15(4) Qualified operating personnel are available and ready to operate the plant.

7.9.2.15(5) All systems have been checked and are physically complete and ready to operate, including all wiring and controls.

7.9.2.15(6) Check that proper overload protection has been provided for all motors, controls, and control circuits.

7.9.2.15(7) All equipment lubrication and pre-start checks have been carried out.

7.9.2.15(8) All control and alarm functions have been checked and are operational.

7.9.2.15(9) Any self-diagnostic packaged control systems have been checked and are operational.

7.9.2.15(10) All start-up verification checks by manufacturers' representatives for switchgear, transformers, sub-meters, etc., have been carried out.

7.9.2.15(11) All deficiencies will be recorded and reviewed by the Commissioning team and will be corrected and verified prior to proceeding to the next Commissioning phase.

7.9.2.16 System Start-up Activation of all systems, sub-systems, and equipment.

7.9.2.16(1) Check out operation of all equipment and machinery. Check rotational direction of all moving equipment.

7.9.2.16(2) Check for any abnormal equipment vibration and noise. Determine cause and rectify.

7.9.2.16(3) Set up and calibrate all controls, instruments, and operators. Place controls systems in operation. Check out sequence of operation step by step.

7.9.2.16(4) Testing and adjusting of all systems and equipment.

7.9.2.16(5) Testing and adjusting of all controls, control equipment, alarms, interlocks, etc.

7.9.2.16(6) Adjust vibration isolators and seismic restraints as required.

7.9.2.16(7) Verification of water tightness of all roof and exterior wall penetrations.

7.9.2.16(8) Testing and verification of fire alarm systems.

7.9.2.16(9) Complete all system identification, labels, nameplates, pipe identification, colour coding, flow arrows, sprinkler signs, hydraulic data plates, etc.

7.9.2.16(10) All deficiencies will be recorded and reviewed by the Commissioning team and will be corrected and verified prior to proceeding further.

7.9.2.16(11) If, in the opinion of the Authority and/or any Authority representative all field operations and testing indicate that any item of equipment or machinery does not meet the specifications, the Authority may request that testing of the equipment in question be carried out by an independent testing laboratory or testing agency. In the event that the tested equipment or machinery proves to meet the specification, the Authority will pay for the independent lab testing. If the equipment or machinery does not meet the specification, Project Co will be responsible to pay the costs of all testing and the costs of all alterations to the equipment or machinery to bring it up to specifications, any subsequent testing, or the complete cost of replacing the equipment or machinery with new equipment or machinery that meets the specifications.

7.9.2.16(12) Recheck operation and calibration of all controls, instruments, and operators.

7.9.2.16(13) Recalibrate as required.

7.9.2.16(14) All set points and schedules will be reviewed and adjusted as required.

7.9.2.16(15) System operations in the emergency power mode will be tested in coordination with Division(s) 26. Obtain a written statement/ certificate of approval of all operations.

7.9.2.16(16) When all the above is complete the Functional Performance Testing phase can proceed.

7.9.2.17 Functional Performance Testing

7.9.2.17(1) The functional performance process will include those tests indicated on the Z8001 test check sheets for specific equipment, and the following:

7.9.2.17(1)(a) Insulation resistance of all systems in accordance with codes or as specified for a particular system;

7.9.2.17(1)(b) Voltage readings (each phase) for each piece of equipment (motors, transformers, etc.) when operating at full load;

7.9.2.17(1)(c) Current readings (each phase) for each piece of equipment (motors, transformers, etc.) when it is operating at full load;

7.9.2.17(1)(d) Current readings for each feeder under normal load to determine system balance;

7.9.2.17(1)(e) Operational test to prove the proper operation of controls and interlocks;

7.9.2.17(1)(f) Ground resistance test (neutral connected and neutral not connected);

7.9.2.17(1)(g) Systems operation tests as described herein;

7.9.2.17(1)(h) Prior to energizing any portion of the electrical system perform Megger tests on all feeders. Results to conform to the Canadian Electrical Code, to the satisfaction of the local inspection authority having jurisdiction, and to the Authority;

7.9.2.17(1)(i) Upon substantial performance, and again immediately prior to final review, check the load balance on all feeders at distribution centres, motor control centres and panelboards. Tests to be performed by turning on all possible loads in the Project and checking load current balance. If load unbalance exceeds 15% reconnect circuits to balance load;

7.9.2.17(1)(j) Make voltage checks throughout the Project after the Project has been in operation for 30 days, and at this time, if directed by the Authority, adjust transformer tap settings. Readings taken will be logged, tabulated and any adjustments made to Building Systems will be suitably incorporated in the operation and maintenance manuals;

7.9.2.17(1)(k) All protective devices to be tested and calibrated on site proper to energizing; and

7.9.2.17(1)(l) Ensure proper operation as calculated on coordination studies provided by equipment suppliers. Testing and calibration to consist of verification of published curves and setting of devices at specified settings. Complete report to be submitted to the Authority within 7 days of completion of testing.

7.9.2.18 Testing Documentation, Non-Conformance and Approvals

7.9.2.18(1) Refer to attached check sheets specific details on non-conformance issues relating to pre-functional checklists and tests.

7.9.2.19 Operations and Maintenance (O&M) Manuals

7.9.2.19(1) Division 26 will compile and prepare documentation for all equipment and systems covered in Division 26, 27, 28. Review of the Commissioning related sections of the O&M manuals will be made by the Authority.

7.9.2.20 Training of Authority Personnel

7.9.2.20(1) Demonstration and Instructions will not proceed until the Functional Performance Testing phase is complete and accepted. Prepare and submit training plans to meet project-specific requirements which include:

7.9.2.20(1)(a) Details provided by the Authority relating to numbers and prerequisite qualifications and skills of trainees, type of training (i.e. observation, hands-on, classroom), etc.

7.9.2.20(1)(b) Provide the Authority with a training plan two weeks before the planned training.

7.9.2.20(1)(c) Provide designated Authority personnel with comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.

7.9.2.20(1)(d) Training will start with classroom sessions, if necessary, followed by hands on training on each piece of equipment, which will illustrate the various modes of operation, including start-up, shutdown, fire/smoke alarm, power failure, etc.

7.9.2.20(1)(e) During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

7.9.2.20(1)(f) The appropriate trade or manufacturer's representative will provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer’s representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.

7.9.2.20(1)(g) The training sessions will follow the format outlined in this section and illustrate whenever possible the use of the O&M manuals for reference.

7.9.2.20(1)(h) Hands-on training will include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and maintenance of all pieces of equipment.

7.9.2.20(1)(i) The electrical contractor will fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.

7.9.2.20(1)(j) Training will occur after functional testing is complete and approved by the Authority through the Review Procedure.

7.9.2.20(1)(k) Provide a detailed schedule indicating how the Project is to be executed. The schedule will show the tasks of each trade and will incorporate expected power system outages. Review the Schedule with the Authority and Authority and revise as requested and resubmit. Provide detailed Work Plans to support scheduled work involving risk to the Existing Hospital such as heavy equipment lifts and moves as well as service outages to electrical and mechanical systems.

7.9.2.20(1)(l) General requirements related to existing building.

7.9.2.21 Related Work

7.9.2.21(1) Electrical General Requirement. Sequencing, Phasing and Scheduling of Work

7.9.2.21(1)(a) Ensure that all work on existing buildings, Facility, services and Utilities is coordinated, sequenced, phased and scheduled with all other work. Refer to the Phasing Drawings and the proposed schedule. Project Co will hire a third-party engineering and testing organization (ITA) with extensive experience in converting Existing Hospital power distribution services to newly installed and commissioned systems. The ITA will provide detailed Work Plans for executing the Project. Work Plans will be reviewed with the Authority. Arrange review for the meetings and set out the proposed plans. Make changes to the plans as requested by Authority. Work Plans will be detailed indicate the task duration, the firm responsible, and if an outage is required the areas of the Existing Hospital affected. Include mark-up drawings showing temporary wiring if required and switching plans to support the Work Plans.

7.9.2.22 Existing Conditions

7.9.2.22(1) Project Co will examine the Site and existing conditions and make due allowance for these conditions. Confirm all locations and routings of any existing services, which might be affected by this installation and allow for such additional work. Indication on the drawings of existing conduit, outlets and other electrical apparatus is based on casual field observations and records of past contracts. As such, this information represents the best data available but is not guaranteed to be full or accurate. Verify that field measurements and circuiting diagrams are as indicated on Drawings and that abandoned wiring and equipment serve only abandoned facilities.

7.9.2.22(2) Report discrepancies to Authority before disturbing existing installation. Where alterations and/or additions to existing equipment or apparatus are required to be made by Schedule 3, it will be assumed that any existing CSA certification may be in jeopardy. Ensure that all changes are made in accordance with the current edition of the Canadian Electrical Code, Part 2, and obtain re-certification. Permit no interruptions to the electric power, fire alarm, telephone, or other similar systems in the existing building during normal working hours. Advise the Authority in writing of any intended interruptions outside of these normal hours, including the time and

duration of outage. Obtain permission from Authority at least 10 working days before partially or completely disabling any of the systems. The Authority may cancel such permission in emergencies at the last minute without penalty or extra cost. Minimize duration of outage.

7.9.2.22(3) Assume full responsibility for any disruption to existing services and systems that is permitted pursuant to this Agreement. Provide all necessary material and equipment and all labour at no extra cost for any temporary connections that may be required to maintain services during work in the existing buildings. Include the removal of such temporary connections at completion of the work.

7.9.2.22(4) Temporary relocation, and re-installation of electrical fixtures, equipment, distribution, panelboards, devices, wiring, raceways, etc., where such work is required due to alterations in or about existing buildings. Where work requires modification, extension, and additions to power and low tension services within the existing building, the wiring required for this work will be installed concealed. In certain cases (e.g., where it is necessary to clear obstructions, or to avoid damage to existing structure and/or finish materials), concealed wiring may not be possible. In such cases, special wiring methods such as mineral-insulated cable or wiremold surface mounted raceway, will be used, provided that, for each specific instance, approval for same is requested from and granted in writing by the Authority through the Review Procedure.

7.9.2.22(5) Remove abandoned wiring to source. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces. In some cases, it will not be acceptable to leave a piece of conduit in the floor. The conduit must be removed completely and the concrete floor repaired to meet fire and structural requirements. Fire stopping will also be required for conduit cut flush with walls above ceiling spaces. Best practice is to remove the conduit entirely and repair the wall, not just patch surfaces.

7.9.2.22(6) Disconnect abandoned outlets and remove devices. Remove abandoned outlets when servicing conduit is abandoned and removed. Blank off all unused outlet boxes.

7.9.2.22(7) Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

7.9.2.22(8) Disconnect, remove and reinstall luminaires where specified. Provide new lamps, brackets, stems, hangers, and other accessories as required.

7.9.2.22(9) Clean and repair existing materials and equipment which remain or are to be reused, as described elsewhere in these Design and Construction Specifications.

7.9.2.22(10) Provide detailed Work Plans for review by the Authority for all work requiring outages to the Existing Hospital's power system. Work Plans will include the following:

7.9.2.22(10)(a) Detailed tasks to be performed.

7.9.2.22(10)(b) Task durations and responsibilities

7.9.2.22(10)(c) Outage duration if applicable and areas/equipment affected.

7.9.2.22(10)(d) Services and equipment required to perform task.

7.9.2.22(10)(e) Lock out procedure required.

7.9.2.22(10)(f) Assist the Project Co to prepare Work Plans for the equipment modifications.

7.9.2.22(11) Apply for and obtain a new CSA certification for the modified existing switchgear once the modifications are made as per the CSA Electrical Code requirements.

7.9.2.22(12) Provide Shop Drawings for approval for all equipment modifications. Drawings to be sealed by BC registered P. Eng.

7.9.2.22(13) The Independent Testing Agency (ITA) will prepare the Work Plan and schedules for work associated with essential power distribution systems. Coordinate the work schedule with the Authority and submit the Work Plans for review and approval prior to undertaking the work through the Review Procedure.

7.9.2.22(14) Include all required temporary power connections for keeping existing equipment energized at all times. Include the cost of all temporary transformers, cables and distribution panels necessary to provide the temporary connections for the duration of the Project.

7.9.2.22(15) All work requiring outages to Existing Hospital services will be done during non-standard working hours. Required Outages within the affected department will be coordinated with the department and FMO representatives via the Authority and it may be required that this work will be done during regular hours of operation. Provide for all hording mobile and fixed as required. The ITA will attend all outages for essential distribution cutovers. Coordinate the work with the Existing Hospital to ensure the Existing Hospital is prepared for the work and has Staff on hand if required to deal with any issues that may arise.

7.9.2.22(16) Phasing & Sequencing of the Work Plan and schedule the work to minimize risk of unplanned outages during construction.

7.9.2.22(17) All work requiring outages, temporary services and risks to the BH will be carefully planned by the Project Co. Project Co will provide detailed Work Plans as noted previously setting out the tasks, the firms responsible, time durations and resources required, and they must be approved by the Authority through the Review Procedure.

7.9.2.22(18) Refer to the Phasing Drawings which set out a proposed basic plan.

7.9.2.22(19) Utilize the services of the ITA to prepare Work Plans, monitor their execution and conduct testing as required by these specifications.

7.9.2.22(20) Coordinate the all work with the Authority and obtain their approval through the Review Procedure prior to undertaking any work requiring a Work Plan.

7.9.3 Post Disaster Design

7.9.3.1(1) Design the electrical and IM/IT rooms to be accessible to authorized personnel only. Provide security measures as required by the Authority including access controls and CCTV for all electrical and Communications Rooms

7.9.3.1(2) Design the electrical systems and equipment to comply with the latest adopted addition of the BC Building Code requirements and other applicable standards for a post-disaster facility.

7.9.3.1(3) Design the electrical systems and equipment to comply with the following post-disaster design requirements:

7.9.3.1(3)(a) Provide new underground Hydro Utility;

7.9.3.1(3)(b) Provide new under ground IM/IT Campus Perimeter Pathway System. See Section 7.10.7 and Appendix 3R [Campus Perimeter Pathway System Technical Specifications];

7.9.3.1(3)(c) All installations to be underground not over-head;

7.9.3.1(3)(d) Electrical rooms to be installed on or above grade. Electrical rooms located on floors below grade will only be permitted to feed electrical loads and equipment on that particular floor, or floors below only in the Parkade. All other electrical rooms will be above grade.;

7.9.3.1(3)(e) Service Rooms to be at least two-hour fire rated;

7.9.3.1(3)(f) Dry Sprinkler fire suppression systems to be installed in the main electrical and Communication Room;

7.9.3.1(3)(g) Provide a dedicated UPS system with 100% redundancy with Hot Sync Technology, double string batteries, double by-pass wrap around manual switches for the telecommunications systems;

7.9.3.1(3)(h) Provide a dedicated UPS system with 100% redundancy with Hot Sync Technology, double string batteries, double by-pass wrap around manual switches for facilities and clinical systems;

7.9.3.1(3)(i) All Security equipment, nurse call system and Fire Alarm System to be on UPS power;

7.9.3.1(3)(j) Specify equipment to comply with ICC – ES AC156 for three-dimension shake table (seismic withstand) tests;

7.9.3.1(3)(k) Specify sprinkler-proof equipment and drainage throughout service areas;

7.9.3.1(3)(l) All equipment specified to be specification grade in general areas and hospital grade in Patient care areas;

7.9.3.1(3)(m) Avoid routing of feeders through non-service areas;

7.9.3.1(3)(n) Ensure adequate separation of power distribution from higher risk mechanical equipment such as boilers; and

7.9.3.1(3)(o) Ensure essential feeders required by code are fire rated and segregated from each other, have limited risk from structural failure and from mechanical services (e.g. steam).

## 7.9.4 Wiring Methods, Materials and Devices

### 7.9.4.1 Basic Requirements

7.9.4.1(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.

7.9.4.1(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. Access is required at all pull boxes, junction boxes, outlet boxes, conduit stub-ups, and lay-in raceways. Lay-in raceways where any section of the raceway in excess of 2m is inaccessible will be deemed inaccessible.

7.9.4.1(3) Seal raceways, luminaires, boxes, penetrations, wiring and other electrical components in all exterior partitions as well as interior partitions for spaces where compartmentalization and pressurization are required. These spaces and partitions include isolation rooms, anterooms, ORs, sterile core, MDRD, Lab, LDR, Maternity, pharmacy area clean rooms, Patient relocation compartments, areas of refuge, contained use areas, and any other areas subject to pressure differential monitoring. Ensure that the sealing forms part of a continuous air barrier around each compartment, coordinated with architectural, mechanical, and all other trades. Sealing is to be done with only certified products approved for the use.

7.9.4.1(4) Do not install conduit or wiring in floor slabs, except where it is impossible to supply the device from the ceiling, or specific approval has been granted by the Authority through the Review Procedure.

7.9.4.1(5) Feeders to panelboards will be routed to the panelboard either above or from below. Panelboards will not be ‘daisy-chained’ through floors. All panelboard feeders will be routed through a pullbox before entering the panelboard. The pullbox must be sized according to the panel size +15%, and not to the current demand.

7.9.4.1(6) Branch circuits from panelboards will be routed to a large pullbox located in the ceiling space immediately above the panelboard for distribution through the above-ceiling service space. The pullbox must be sized according to the panel size +15%, and not to the current demand.

7.9.4.1(7) Colour of power receptacles will be as follows:

7.9.4.1(7)(a) Conditional power – WHITE

7.9.4.1(7)(b) Vital power – RED

7.9.4.1(7)(c) UPS power – GREY

7.9.4.1(7)(d) Delayed Vital – WHITE

7.9.4.1(7)(e) Housekeeping – BLACK

7.9.4.1(8) All power receptacles will be identified with panel and circuit number. Colour of labelling will be in accordance with Authority colour coding standards in section 7.9.4.3 and as follows:

7.9.4.1(8)(a) Vital power - RED with WHITE text

7.9.4.1(8)(b) Delayed vital power - BLUE with WHITE text

7.9.4.1(8)(c) Conditional power - YELLOW with BLACK text

7.9.4.1(8)(d) UPS - GREY with BLACK text

7.9.4.1(9) Project Co will provide room reference bonding in accordance with the Canadian Electrical Code (CEC) Section 24 for all Clinical Spaces as defined within and as defined in CSA Z32-15 Patient Care Area classification. Project Co will provide a dedicated room reference ground bus located in accessible location, typically behind the door to the room. Room reference ground bus will consist of a CSA listed enclosure complete with terminal strips, and mechanical divider to isolated different sources and lamacoid label. All branch circuits will enter the room reference ground bus. Project Co to provide minimum #8 AWG bond conductors for all Clinical Spaces bonding. Project Co will oversize conductors to all branch circuits within the Patient care environment as defined by the CSA Z32-15 to accommodate the voltage drop requirements and to facilitate the code required CSA Z32 testing.

7.9.4.1(10) Provide receptacles and hard-wired connections for every item of fixed and moveable equipment in Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment] in addition to receptacle quantities listed in this Schedule. For the purpose of determining receptacle and connection details, fixed equipment includes plug-in equipment permanently mounted to Facility components or infrequently moved including printers and desktop computers.

7.9.4.1(11) Provide all necessary electrical equipment components as required to complete an installation in accordance with manufacturers installation recommendations and make all connections for Authority-supplied equipment.

7.9.4.1(12) Provide receptacles or hard-wired connections for every item of fixed and moveable equipment required by other provisions of this Agreement, including:

7.9.4.1(12)(a) Kitchen equipment;

7.9.4.1(12)(b) MDRD equipment;

7.9.4.1(12)(c) Diagnostic equipment;

7.9.4.1(12)(d) Mechanical systems;

7.9.4.1(12)(e) IM/IT systems;

7.9.4.1(12)(f) Elevators;

7.9.4.1(12)(g) Pneumatic Tube Systems; and

7.9.4.1(12)(h) Nurse call system.

7.9.4.1(13) All outlets to be installed at a height which allows for good ergonomics and not less than 460 mm AFF unless required by code.

7.9.4.1(14) Outlets and switches will be installed such that the cover plate does not interfere with or conflict with the top edge of wall protection or other architectural items.

7.9.4.1(15) Outlets to be typically installed at 460mm AFF except in, storage rooms, and equipment rooms, MDRD, operating room, and procedure rooms will be mounted at 1100 mm AFF unless noted otherwise or as developed and agreed upon through the Review Procedure.

7.9.4.1(16) Outlets for equipment must be coordinated with Schedule 3 [Design and Construction Specifications] and Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment]. Outlets, connections and data for equipment detailed in Schedule 3 [Design and Construction Specifications], Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment] have not been included in Schedule 3 [Design and Construction Specifications] and Appendix 3B [Minimum Room Requirements] will be provided for. Project Co will coordinate with the Authority and provide as required.

7.9.4.1(17) Final power receptacle types and quantities, branch circuit quantities, outlet power branches, IM/IT device types and quantities, and locations of each device for each space in the Facility will be as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure]. The Authority will review these details and confirm the requirements prior to installation of these elements.

7.9.4.2 Performance Criteria

7.9.4.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment, which form part of the Facility's wiring systems. Minimum conductor size will be #12AWG. Aluminum conductors installed in conduits may be used for feeders larger than #2/0 AWG.

7.9.4.2(2) All conductors #12 AWG and larger will be stranded.

7.9.4.2(3) Power wiring will have insulation of chemically cross-linked thermosetting polyethylene unless otherwise noted.

7.9.4.2(4) Project Co can use Teck cable only 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 with

cable clamps 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. Teck cables will be supported such that connections to moving or vibrating equipment does not transmit the vibration.

7.9.4.2(5) Do not install Teck cable for any other purpose unless approved by the Authority in accordance with the process described in Appendix 2C [User Consultation and Review Procedure].

7.9.4.2(6) Each branch circuit will be provided with a dedicated neutral conductor.

7.9.4.2(7) All Panelboard will come complete with main circuit breakers, except where branch panelboards are located in the same room as the distribution serving them.

7.9.4.2(8) Provide panelboards, feeders and branch circuiting with double neutral(s) capacity where significant non-linear load(s) are anticipated. This includes all offices, open offices, drop-down areas, work stations diagnostic and treatment equipment, and other areas with a medium to high density of personal computers.

7.9.4.2(9) Conceal all wiring and wiring support systems from public view except where approved by the Authority through the Review Procedure.

7.9.4.2(10) 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.

7.9.4.2(11) Provide hospital grade receptacles for all Patient care areas. Receptacles in all other areas will be specification grade. Receptacles will be colour coded.

7.9.4.2(12) Utilize smooth Decora style nylon cover plates for receptacles and switches. Cover plates colour to match receptacle colour. Grouped receptacles and switches will have a single cover plate for the whole group.

7.9.4.2(13) Provide minimum quantity of receptacles as indicated in CSA Z32-15, unless a higher quantity is indicated in this Schedule, as noted in the Appendix 3B [Minimum Room Requirements], Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items], Appendix 2L [Food Services Equipment] and Appendix 3A [Clinical Specifications and Functional Space Requirements] and is

required to support the needs of the equipment or activities being performed in the area.

7.9.4.2(14) Project Co will provide receptacles and connections as directed by the user group to all Authority supplied equipment, including computers, monitors, IV poles, stands, video systems, scanners, monitoring units, electric beds, defibrillators, treadmills and electric chairs and similar equipment as noted in Appendix 2E [Clinical Equipment and Furniture] and Appendix 2J [Construction Items] and Furniture and to accommodate all electrical requirements noted in all Appendix 3A [Clinical Specifications and Functional Space Requirements].

7.9.4.2(15) Project Co will provide power, data and make all connections in accordance with manufacturer's installation recommendations for the following: all light arms, articulation arms, equipment booms, anesthesia booms, auxiliary booms, diagnostic treatment, testing and observation equipment.

7.9.4.2(16) Project Co will make allowances for and ensure coordination with the Authority for the installation of all Authority supplied equipment, surgical and procedure equipment, devices noted in this Schedule, Appendix 3B [Minimum Room Requirements], and for equipment indicated in Room Data Sheets, Appendix 2E [Clinical Equipment and Furniture] and Furniture, Appendix 3A [Clinical Specifications and Functional Space Requirements] as well as based on experience, industry standards and good practice.

7.9.4.2(17) Unless otherwise requested by the Authority or elsewhere in this specification, provide emergency power as per CSA Z32 15 requirements and for 75% of the receptacles within the emergency department. The remainder of the receptacles in the emergency department will be provided with conditional emergency power.

7.9.4.2(18) Allow a maximum connection of three (3) general use receptacles to one 15/20 amp circuit.

7.9.4.2(19) Provide one dedicated circuit and duplex receptacle rated at 15/20A, 125V for all microwaves, coffee makers, refrigerators, ice machines, water dispensers as noted in the Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment], and Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements]. This is in addition to all other receptacles identified in this Schedule and all other relevant references in all other associated Appendix.

7.9.4.2(20) All receptacles to be of the duplex receptacle type unless otherwise noted.

7.9.4.2(21) Provide one duplex convenience receptacle rated at 15/20A, 125V in all rooms. This is in addition to all other receptacles identified in this Schedule.

7.9.4.2(22) Utilize5-20R 15/20Amp style receptacles for printers and copiers. Provide 20A rated dedicated circuits for each printer and copier.

7.9.4.2(23) In Inpatient Units; LDRP Unit washrooms, provide two (2) GFI 15A 120V duplex receptacles minimum with one located above the counter and the others located as directed by the Authority. All outlets connected to conditional or vital power.

7.9.4.2(24) In Staff, public and Patient washrooms, provide one (1) GFCI 15A 120V duplex receptacle above the counter connected to conditional power.

7.9.4.2(25) Utilize 5-20R 15/20Amp style receptacles for housekeeping staggered on alternate sides of the hallways spaced a maximum of 10 meters apart. Provide 20A rated dedicated circuits for each area, to a maximum of 4 receptacles per circuit.

7.9.4.2(26) 15/20A, 120V duplex receptacle and one 20A, 208V twist lock receptacle in Back of House areas spaced at 10 metre centres maximum. Each wall will have minimum one receptacle. Connect these receptacles to the conditional power branch.

7.9.4.2(27) Provide a minimum of one power outlet on each wall in all offices. In single occupancy offices, two outlets will be quadplexes located to serve the location of possible workstations, the other two will be convenience duplexes.

7.9.4.2(28) Provide one USB receptacle per workstation in each office, open office or drop-down work station.

7.9.4.2(29) Provide one USB receptacle in Patient room headwall and visitor area.

7.9.4.2(30) Provide two USB receptacles per public areas, lounges, Staff rooms waiting areas and similar areas.

7.9.4.2(31) Where USB charging ports are specified, provide either dual USB Type-C female ports integrated into a single-gang duplex 5-15R receptacle or a stand-alone 4-port USB Type-C single-gang wall-mounted or desk-mounted device. Each USB port will be capable of simultaneous 100W power output.

7.9.4.2(32) Provide a minimum of two 20Amp circuits per four open office workstations.

7.9.4.2(33) Provide a minimum of one 20Amp circuit per two single person enclosed offices.

7.9.4.2(34) Provide one 15/20A, 120V receptacle for pumps, IV's, etc. in all storage closets.

7.9.4.2(35) Provide two outlets to storage alcoves for charging.

7.9.4.2(36) In each multi-occupancy office provide a minimum of one quadplex receptacles for each desk or workstation and a minimum of one duplex receptacle spaced every 3 meters of open wall space.

7.9.4.2(37) Each administration workstation will have a minimum of two receptacles utilizing one quad receptacle and one duplex receptacle.

7.9.4.2(38) Provide a minimum of five duplex receptacles connected to 3 dedicated circuits in each exam or treatment room, two of which will be fed from vital power.

7.9.4.2(39) Provide a minimum of six duplex receptacles at each clean Utility room, 50% of which will be fed from vital power and the remainder connected to conditional power.

7.9.4.2(40) Provide and commission a networked electric vehicle (EVSE) smart charging system to provide a minimum of 9 parking stalls, or greater if required by the City of Burnaby. Provide infrastructure for the future expansion of not less than 20% of the parking stall capacity. Provide level 2 EV charging stations (208V single phase, 40 EVSE) to accommodate the car charging parking spots. Car chargers are to be designed for exterior installation and will be NEMA 3R rated, equipped with charging cables certified to operate in temperatures between -40 degrees C to 50 degrees C.

7.9.4.2(41) Car chargers to have a LED status indicator and will provide access free of charge or according to a usage fee. Car chargers will come complete with two charging heads and installed at the junction of two successive parking spaces. The smart charging system will be equipped with either 3G communications capabilities to provide wireless communications, secure access and the ability to charge a fee for the specified charging time (electrical capacity) or will achieve the same functionality by a wired low voltage-controlled system. Provide concrete bases for the car chargers. Car chargers to be located as directed by the Authority.

7.9.4.2(42) Electric vehicle smart charging system to integrate information from all meters on a common software platform incorporating the existing

electrical vehicle metering system. EV metering system to have t the capabilities to automatic load shed from the BMS or metering system.

7.9.4.2(43) There are four existing electric double charging EV stations on the existing site. Provide all updates to existing software if required for seamless integration between the new and existing EV metering systems.

7.9.4.2(44) All electrical infrastructure for the EV's (Transformers, Panelboards, Disconnect Switches, etc.) must be enclosed in dedicated electrical rooms and not in an open space in the parking area.

7.9.4.2(45) In each nurse station, and satellite team station provide one quadplex receptacle spaced 1 m on centre below work counters in knee space or above counter if no knee space is provided. 50% of these receptacles will be fed from vital power and the remainder connected to conditional power.

7.9.4.2(46) In each Multimedia Room, break-out room, meeting rooms and similar rooms and as noted in the Appendix 3A [Clinical Specifications and Functional Space Requirements] that are noted as requiring video conferencing capabilities will be provided at a minimum, one 15/20A duplex with USB receptacle spaced every 1 meter of wall space and one 15/20A duplex receptacle and data outlet spaced a maximum every meter above work counters. In addition, provide receptacles for all dedicated equipment. Provide two 15Amp 120 volt receptacles and two data outlets located on the ceiling as directed through user group consultation with the Authority through the Review Procedure. For Multimedia Room electrical requirements see Section 7.10,15.

7.9.4.2(47) Provide one duplex receptacle for each electric bed where applicable in all Patient care areas and connect to vital power. Provide one 15A, 120V dedicated circuit for two Patient beds maximum.

7.9.4.2(48) Provide a minimum of four duplex receptacles at each medication room, connect 50% of these receptacles to vital power.

7.9.4.2(49) Provide one duplex receptacle for every 30 square meters, or portion thereof, of service, housekeeping and storage space. A minimum of two duplex receptacles will be provided per room.

7.9.4.2(50) Provide special receptacles for fixed and moveable equipment as defined in the Appendix 2E [Clinical Equipment and Furniture], Appendix 2J [Construction Items] and Appendix 2L [Food Services Equipment].

7.9.4.2(51) In ORs, surgical rooms, procedures rooms and similar usage rooms and as directed by department representative, provide each articulated arm and boom, with a minimum of 10-15/20A duplex receptacles on 7 dedicated circuits for equipment booms, and 10-15/20A duplex receptacles on 5 dedicated circuits for anaesthesia booms and auxiliary booms. Additionally, provide receptacles and power connections such as 30A, 208V (L6-30R) receptacle on a dedicated circuit and 20A, 208V twist lock duplex receptacle on a dedicated circuit as required by the manufacturer and as directed by the user groups. Connect receptacles on the boom on the vital and UPS branches.

7.9.4.2(52) In operating rooms, and similar usage rooms, provide receptacle for laser on boom(s) and or locate one adjacent to the anesthesia boom at the foot of the bed as required and directed by the Authority through the User Consultation Process and the review procedure described in Appendix 2C [User Consultation and Review Procedure].. Connect laser receptacle to the UPS branch.

7.9.4.2(53) In operating rooms, and similar usage rooms, provide 1-15/20A 120V duplex receptacle at 2 metre centres, connected to Vital and UPS branches as determined by the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure].

7.9.4.2(54) In each operating room, and similar usage rooms and as directed by department representative provide 1-15/20A 120V duplex receptacle for housekeeping outlet in two locations.

7.9.4.2(55) In each operating room, and similar usage rooms as directed by department representative provide 1-20A, 208V twist lock receptacle in two locations.

7.9.4.2(56) Provide a ‘Laser-in-Use’ light above each door of operating rooms, and similar usage rooms. Interlock the laser outlet(s) with the doors to Operating Room. Laser to automatically shut-off when door opens.

7.9.4.2(57) Provide an ‘X-Ray in Use’ light above each door of Surgical suites, OR’s, and similar usage rooms. Provide X-Ray in use lights above both doors to theatres, racetrack corridor and sterile core.

7.9.4.2(58) Provide the Biomedical Engineering department with one 30A, 208V outlet for the department, plus 10 dedicated 20A, 120V circuits per workbench.

7.9.4.2(59) Provide the Electrical Shop, Mechanical Shop, Carpentry Shop and Power Engineers Shop with one 30A, 208V outlet per department, plus 10 dedicated 20A, 120V circuits for the electrical shop, plus 5

dedicated 20A, 120V circuits for the mechanical shop, carpentry shop, power engineer shop, painter shop, and plumbing shop. In addition to these requirements provide 20% more outlets as listed by the equipment list for these departments.

7.9.4.2(60) Provide one 15/20A 120V duplex receptacle for every 5 square meters, or portion thereof, of service and storage space. One GFCI duplex receptacle will be provided, and at a minimum, one 15/20A housekeeping receptacle on each wall in housekeeping rooms and as noted requirements in Appendix 3B [Minimum Room Requirements].

7.9.4.2(61) Utilize weatherproof NEMA 5-20R 15/20Amp style receptacles on the exterior of the Facility. Provide class A type GFCI breakers for all exterior outlets. Additionally, strategically locate receptacles in soffits, overhangs and entrance and exits to the Facility. Locate an additional 10 outlets in consultation with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure].

7.9.4.2(62) Provide one conditional 15A, 120V duplex outlet for every 10 bicycle parking stalls, distributed evenly throughout the bicycle parking areas, with a maximum of two duplex outlets per circuit.

7.9.4.2(63) Provide special receptacles for fixed and moveable equipment. Provide all necessary electrical equipment devices as required to provide an electrical installation in accordance with manufacturers installation recommendations and make all connections for Authority supplied equipment. Provide source of power as directed by department representative. Project Co to increase emergency capacity including ALL additional spare capacity as required to accommodate additional emergency power requirements.

7.9.4.2(64) Provide two digital count up and count down timers on 15A, 120V circuit in each surgical operating and procedure rooms and as directed by department representative.

7.9.4.2(65) Provide 15/20A, 120V delayed vital circuit, low voltage transformers, and junction box for all ceiling lifts and overhead lifting equipment. Make all required connections and install in accordance with the manufacturer’s recommendations.

7.9.4.2(66) Provide 15/20A, 120V duplex receptacles in two locations located on the ceiling of all surgical rooms, and similar usage rooms.

7.9.4.2(67) Provide 15A, 120V circuits, junction boxes, fire alarm interconnections and pathways for all hands-free automatic door operators throughout the Facility. Typically, all surgical suites, medication, Utility rooms, storage rooms, pharmacy rooms and

similar usage rooms will be provided with automatic door operators. Provide power for all automatic door operators as noted in the Appendix 3A [Clinical Specifications and Functional Space Requirements] and as directed by the Authority and the department representative.

7.9.4.2(68) Install approved fire stopping systems to maintain all fire separations and as required by local Governmental Authorities.

7.9.4.2(69) Final location of all receptacles and connections will be determined in user group meetings.

7.9.4.2(70) Utilize nylon cover plates for receptacles and switches. Grouped receptacles and switches will have a single cover plate for the whole group.

7.9.4.2(71) Provide AFCI breakers for receptacles as required by the Canadian electrical code.

7.9.4.2(72) Provide 15A, 125V vital power circuits complete with junction box and receptacle for all heat traced mechanical p-traps. Provide at a maximum 4 p-traps connections per dedicated circuit. Coordinate with the mechanical division for exact locations.

7.9.4.2(73) Provide a 15A, 125V circuit complete with junction box and low voltage transformer and connect to all mechanical trap primers. Provide at a maximum 4 trap primer connections per dedicated circuit. Coordinate with the mechanical division for exact locations.

7.9.4.2(74) Provide heat tracing of all mechanical piping and sprinkler lines as required. Provide 20A, 208V vital power circuits and connect to mechanically supplied CAN/ULC listed heat tracing controllers. Provide 10mA GFCI over-current protection devices for all heat tracing circuits. The Fire Alarm System will monitor power to heat tracing of sprinkler lines.

7.9.4.2(75) All receptacles in the Inpatient Psychiatry Unit, including the Clinical Spaces, and gathering areas will be fed with AFCI breakers located in the panelboard, except where medical equipment is permanently or frequently connected. Project Co will confirm with the Authority to determine the exact areas where medical equipment is permanently or frequently connected.

7.9.4.2(76) Medical Device Reprocessing (MDRD) departmental area will be provided with minimum 1 general use 15/20A 120V duplex receptacle on the walls at 3 metre centres. 50% of these receptacles to be connected to the vital power branch and the other 50% of receptacles to be fed from the conditional power branch. Provide additional receptacles identified in this Schedule, Appendix 3B

[Minimum Room Requirements], and as required by code or applicable standard.

7.9.4.2(77) Kitchen departmental and Servery areas will be provided with minimum 1 general use 15/20A 120V duplex receptacle on the walls at 3 meter centres. 25% of these receptacles to be connected to the delayed vital power branch and the other 75% of receptacles to be fed from the conditional power branch. Provide additional receptacles identified in this Schedule, in minimum room requirements, and as required by code or applicable standard.

7.9.4.2(78) Pharmacy departmental areas will be provided with minimum 1 general use 15/20A 120V duplex receptacle on the walls at 3 meter centres. 50% of these receptacles to be connected to the vital power branch and the other 50% of receptacles to be fed from the conditional power branch. Provide additional receptacles identified in this Schedule, Appendix 3B [Minimum Room Requirements], and as required by code or applicable standard.

7.9.4.2(79) All power systems in the Inpatient Psychiatry Unit, inpatient bedrooms, Treatment Bays and Secure Rooms will be complete with key overrides located outside of the room with a master override located at the Care Team Station. Provide manufactured master control remote toggle switch controller in stainless steel enclosure complete with green and red LED indicating lights.

7.9.4.2(80) Receptacles in the Inpatient Psychiatry Unit will be Extra Heavy Duty Hospital Grade tamper proof type. Refer to Appendix 3B [Minimum Room Requirements].

7.9.4.2(81) All electrical devices and equipment located in the Inpatient Psychiatry Unit with tamper proof type screws and nuts. Refer to Appendix 3B [Minimum Room Requirements]. Tamper proof screws require specific tools to fasten and remove. Commercial screwdrivers and wrenches cannot remove these screws and they require a dedicated tool for mounting and removing. Tamper proof nuts will be stainless steel and can only be removed with a dedicated tool specific to the product.

7.9.4.2(82) All receptacles, devices, outlets and switches in the Inpatient Psychiatry Unit will have extra strength high impact virtually unbreakable nylon faceplates with grade 10 tamper-proof screws. Provide 10 spare grade 10 tamper proof keys per department. Refer to Appendix 3B [Minimum Room Requirements].

7.9.4.2(83) Provide hospital grade receptacles in Clinical Spaces, surgical procedure, testing, observation and medical / treatment areas,

holding areas, stretcher bays and similar usage areas. Receptacles in all other areas, unless otherwise noted, will be specification grade.

7.9.4.2(84) Provide Tamper Resistant receptacles in public areas. Tamper resistance is resistance to tampering (intentional malfunction or sabotage) by either the normal users of a product, package, or system or others with physical access to it. Tamper resistant receptacles will be equal to the LEVITON 8300-SGW series.

7.9.4.2(85) Provide a 30A, 208V, 3 Phase, 4 wire dedicated conditional power circuit complete with NEMA L15-30R receptacle and a 30A, 208V, 1 Phase, 3 wire dedicated conditional power circuit complete with NEMA 6-30R receptacle for future retherm units located in all Food Serveries. Project Co will locate receptacles as directed by the Authority.

7.9.4.2(86) Provide a 15/20A delayed vital circuit for an electronic ‘take a number’ dispenser system in the Patient Registration on level 1 Support Facilities Building. Provide one (1) electronic Qmatic Solo ‘take a number’ system with ticket dispenser.

7.9.4.2(87) Provide a 15/20A delayed vital circuit for an electronic ‘take a number’ dispenser type system at the Registration Cubicles area in the Administration department. Provide two (2) 2-digit electronic ‘take a number’ system with ticket dispenser. ‘Take a number’ ticket dispenser will be a wall-mounted 2-digit system with a 9.1 inch LED display complete with power adapter, mounting brackets and hardware. Provide a counter top ticket dispenser with stand-mounting hardware, 2 hardwired push buttons and wireless infrared remote controller.

7.9.4.2(88) Provide power to lock boxes inside all Inpatient Psychiatry Unit Patient rooms. Receptacles on conditional power.

7.9.4.2(89) Provide power and receptacles to fridges and water dispensers as required. Receptacles on conditional power.

7.9.4.2(90) Provide power and receptacles to dryers in hot rooms. Receptacles on conditional power.

7.9.4.2(91) Provide sufficient power and receptacles to each Patient Room-LDRP for scales, furniture equipment, and a mini fridge in each room. Provide two (2) GFCI receptacles in each washroom. Receptacles on conditional power.

7.9.4.2(92) Provide in the pharmacy compounding non-hazardous room power for three exhaust hoods on conditional power.

7.9.4.2(93) Provide in the pharmacy anterooms power for a GFCI receptacle and scrub sink. Receptacles on vital power.

7.9.4.2(94) Provide in the Open Exercise Area 240V 2P power to seventeen (17) bikes and treadmills in floor boxes throughout.

7.9.4.2(95) Provide in all isolation Patient Ensuite Bathrooms, all Patient Ensuite Bathrooms on Medical Inpatient Unit, and Inpatient Utility Room-Soiled, power for Closed Solid Waste Disposal Units. Refer to Appendix 2E [Clinical Equipment and Furniture] for all locations. Provide an emergency shutoff switch, mushroom style push to reset type located on wall adjacent to the Closed Solid Waste Disposal Units mounted at 1520mm AFF. Provide Lamacoid label identifying the function. Provide power for Closed Solid Waste Disposal Units in other areas of the Facility as required and directed by the Authority. Receptacles on delayed-vital power.

7.9.4.3 Equipment Identification

7.9.4.3(1) All switches, breakers, panelboards and motor starters will be suitably identified with 'Lamacoid' nameplates. Light switches, duplex receptacles, data outlets, telephone outlets, etc., will be provided with 'Brady B30' type nameplates for identification. Panelboards will be supplied with typewritten directories c/w: panelboard name, locations fed from source name, amp main, volt, phase, wire, breaker ratings, feeder ampacity and size.

7.9.4.3(2) Size of nameplates, wording on nameplates and labels will be approved by the Authority through the Review Procedure prior to manufacture.

7.9.4.3(3) Allow for average of thirty-two (32) letters per nameplate and label.

7.9.4.3(4) Pull boxes for lighting, data, communications system, telephone and all other pull boxes will be suitably identified colour coding.

7.9.4.3(5) Label all fire alarm devices as follows:

7.9.4.3(5)(a) Brother Marker on ceiling devices and all wall devices.

7.9.4.3(6) Each junction box for lighting and power wiring will be identified as to circuit number using permanent ink or permanent felt marker.

7.9.4.3(7) Lamacoid will be 3mm thick plastic engraving sheet affixed with screws, sizes and colors as noted below.

| **Nameplate Sizes** | | | |
|---|---|---|---|
| Size 1 | 10 x 50 mm | 1 line | 3 mm high letters |
| Size 2 | 12 x 70 mm | 1 line | 5 mm high letters |

| | | | |
|---|---|---|---|
| Size 3 | 12 x 70 mm | 2 lines | 3 mm high letters |
| Size 4 | 20 x 90 mm | 1 line | 8 mm high letters |
| Size 5 | 20 x 90 mm | 2 lines | 5 mm high letters |
| Size 6 | 25 x 100 mm | 1 line | 12 mm high letters |
| Size 7 | 25 x 100 mm | 2 lines | 6 mm high letters |

7.9.4.3(8) Lamacoid labels for feeder switches, motor starters, disconnect switches, and panelboards will be colour-coded to indicate voltage and system according to the following table:

| Code | Power Source | Label Colour | Label Text Colour |
|---|---|---|---|
| G | Generator | **RED** | WHITE |
| V | Vital | **RED** | WHITE |
| D | Delayed Vital | **BLUE** | WHITE |
| C | Conditional (or Standby) | **YELLOW** | BLACK |
| N | Normal | **BLACK** | WHITE |
| X | Discretional (Non-essential) | **ORANGE** | BLACK |
| U | Uninterruptible Power | **GREY** | BLACK |

7.9.4.3(9) Lamacoid labels will include the following information: (Nameplate Size 4):

7.9.4.3(9)(a) Motor starters disconnect switches:

7.9.4.3.9.(a).1 Name of motor controlled, e.g. Pump P-2;

7.9.4.3.9.(a).2 Voltage characteristics, e.g. 600/3/60, or 120/1/60; and

7.9.4.3.9.(a).3 Motor rating, e.g. 3HP or 3 Amperes.

7.9.4.3(9)(b) Branch circuit panelboards: (Nameplate size 3):

7.9.4.3.9.(b).1 Designation of Panel e.g. Panel '24VPA' (sample).

7.9.4.3.9.(b).2 Voltage e.g. 120/208V, 3 phase/4W.

7.9.4.3.9.(b).3 Power source e.g. Vital. and

7.9.4.3.9.(b).4 Fed from PB-34VP in Electrical Room 24 (sample).

7.9.4.3(9)(c) Feeder switches, or breakers in Distribution Panelboards: (Nameplate Size 5):

7.9.4.3.9.(c).1 Load served, e.g. main switch, or Panel '34VPA', or Elevator EL-1 (sample);

7.9.4.3.9.(c).2 Ampere rating of breaker, or of fuses in fused switch e.g. 150A; and

7.9.4.3.9.(c).3 Location of load.

7.9.4.3(9)(d) Transformer – give transformer name, kVA, primary and secondary voltages and where it is fed from.

7.9.4.3.9.(d).1 “TRANSFORMER, T-PB-34VP (sample);

7.9.4.3.9.(d).2 112.5kVA, 600V – 120/208V; and

7.9.4.3.9.(d).3 FED FROM SD-4V – (ELECTRICAL ROOM 24)” (sample).

7.9.4.3(9)(e) Receptacles:

7.9.4.3.9.(e).1 Size 1, colour-coded in accordance with clause above; and

7.9.4.3.9.(e).2 For all receptacles, provide lamacoid labels indicating the associated circuit number(s).

7.9.4.3(9)(f) Terminal cabinets – Size 2; give name of cabinet and the system it belongs to e.g.: “FIRE ALARM F.A.T.C. #2A”

7.9.4.3(10) Provide "Lamacoid" nameplate identification (Size 3) on all, contactors, relays, time clocks and remote-control devices, giving the device designation and the equipment with which it is associated.

7.9.4.3(11) Provide “Lamacoid” nameplate identification (Size 2) on all control devices and label also all terminal blocks and wiring.

7.9.4.3(12) Provide labels on all devices that have “address” (i.e. code blue, fire alarm, intercom, doctors’ dictation, etc.).

7.9.4.3(13) Provide labels on all ‘GFI’ breaker protected power outlets noting that the outlets are “GFI Protected).

7.9.4.4 Conduit, Cable, Junction Box, Switchboard, and Equipment Identification

7.9.4.4(1) Table of colours and letter identifications - confirm with Health Authorities Standards:

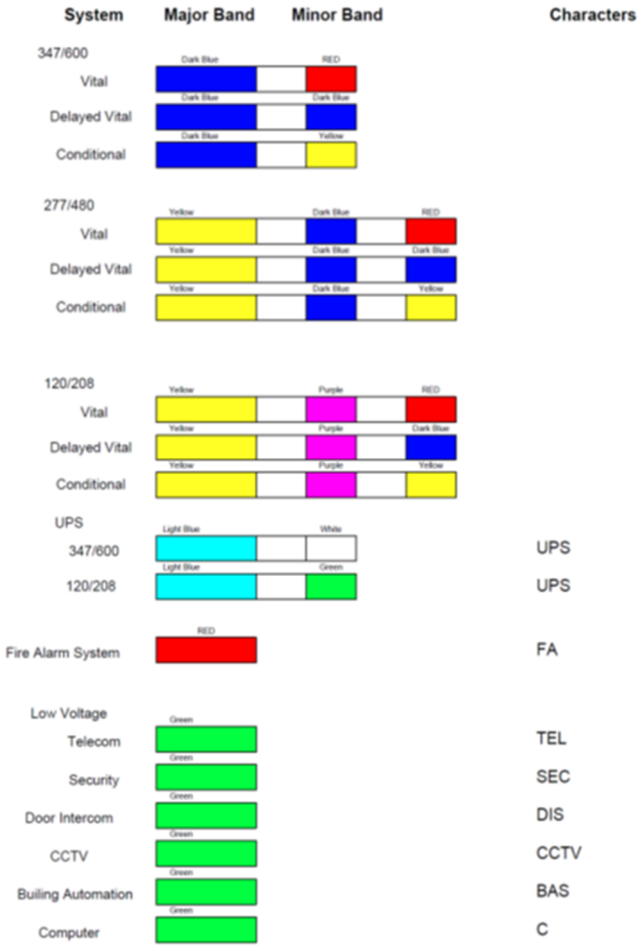
| System | Major Band | Minor Band | Characters |
|---|---|---|---|
| High Voltage | Yellow | Purple | Nominal Voltage |
| 480V (X-Ray) | Gold | | (i.e.: 12,480 volts) |
| 347/600 Normal | Dark Blue | | |
| 347/600V Emerg. | Dark Blue | White | |
| 120/208V Normal | Light Blue | | |
| 120/208V Emerg. | Light Blue | Black | |
| UPS System | Light Blue | White | UPS |
| Fire Alarm System | Red | | FA |
| Telephone | Light Green | | TEL |
| Building Alarm | Pink | | BA |
| Low Level Paging (Ceiling Speaker) | Dark Green | | PA |
| Commercial Television | Dark Brown | | TV |
| AV/TV Systems | Light Brown | | AV/TV |
| Central Dictation | Black | | CD |
| Clock System | Yellow | | CS |
| Radio Pocket Paging | Purple | | PP |
| Doctors Register | White | Dark Green | DR |
| Nurse Call | Orange | | NC |
| Cardiac Arrest | Orange | | CA |
| Patient Emerg. Call | Orange | | EC |
| Intercom Systems | Purple | Green | IC |
| Security Systems | Dark Green | Light Brown | SC |
| Door Intercom/Video | Purple | Yellow | DIV |
| Computer | Black | Yellow | C |

7.9.4.4(2) Provide labels on wiring behind outlets for identification.

7.9.4.4(3) Identify wiring with permanent indelible markings (numbered tape) that identifies phase conductors and branch circuit wiring.

7.9.4.4(4) Where conduits, duct and other raceways are surface-mounted and/or exposed, use masking tape to provide a sharp coloured edge in the FHA Hospital conduit banding colours.

**FH ELECTRICAL PIPE COLOURS**




7.9.4.4(5) Colour identification for conduits, ducts and other raceways will be provided at all junction and pull boxes, all locations where a conduit enters or leaves a partition wall, all locations where a conduit terminates at a cable tray, at both sides of fire walls penetrating ceiling spaces, and where conduits enter or leave floor slabs. Additionally, each service will be identified at intervals along its transit through the space such that each identification is visible from the next and not more than 10 metres apart.

7.9.4.4(6) Identification of junction boxes, pull boxes, conduits, ducts and other raceways will be done on a continuous basis as the rough-in work progresses. Leaving the marking of conduits, raceways and boxes to the end of the rough-in stage will not be permitted.

7.9.4.4(7) Identify concrete duct banks, main service conduits for telephone and power and other spare raceways where they enter or leave the Facility, with engraved wall-mounted stainless steel marker plates

indicating the type of raceway and buried depth. Install marker plates on the exterior wall immediately above point of entry.

7.9.5 Raceways

7.9.5.1 Basic Requirements

7.9.5.1(1) Provide raceways for all wiring and cabling to support, protect and organize all wiring and cabling systems.

7.9.5.1(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.

7.9.5.1(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.

7.9.5.1(4) Raceways will not impede access to other devices, equipment, valves, junction boxes or any other element that a maintenance person may need to access, work on, adjust, remove, replace, maintain. Raceways will not be located such that a maintenance worker needs to reach over, across, under or around the raceway to perform any task. Maintain a minimum of 1000mm horizontal clear working space to any of the aforementioned items.

7.9.5.1(5) Except as noted otherwise, install power wiring in EMT with steel couplings and connectors.

7.9.5.1(6) Install communication system wiring (unless otherwise required by applicable codes and standards) in EMT with steel couplings and connectors and/or cable trays. Install individual steel backboxes for all communication system devices. Conduits connecting to cable trays for communication system wiring will be mechanically connected, completed with grounding bushings.

7.9.5.1(7) EMT is to be surface mounted in service rooms and parkade and concealed in ceiling spaces and partition walls. Do not encase EMT in concrete, unless such installation is permitted by code and is:

7.9.5.1(7)(a) approved by the Authority through the Review Procedure as being necessary to achieve a concealed installation in finished spaces such as exposed concrete stairwells.

7.9.5.1(8) If EMT conduit is encased in concrete, such conduit runs will:

7.9.5.1(8)(a) be as short as possible; and

7.9.5.1(8)(b) emerge from the concrete in the closest adjacent space above suspended ceilings.

7.9.5.1(9) Minimum EMT conduit size for all power are 27 mm (1”).

7.9.5.1(10) Minimum EMT conduit size for all systems and Data Drops are 27 mm (1”).

7.9.5.1(11) Use flexible conduit for all final connections to vibrating equipment such as transformers and motors.

7.9.5.1(12) Minimum flexible conduit size is 27 mm (1”) and maximum length of any flexible conduit run is 1.5 metres.

7.9.5.1(13) Armoured cable (BX) may not be used, except for final drops not exceeding 3 metres to lighting fixtures located in t-bar ceilings.

7.9.5.1(14) Use rigid PVC conduits for the underground portion of services to lighting and power outlets located outside of a building.

7.9.5.1(15) Install individual #6 AWG bonding conductor in each cable tray and data pathway forming part of the cable tray / raceway system.

7.9.5.1(16) Provide cable trays for installation of all telecommunication system wiring for data, telephone, public address and other such systems in accordance with Section 7.10.7.2. Install cable trays from Communication Rooms and above all corridors. If cable trays pass through a wall, provide a non-removable ULC approved firestopping system ‘Hilti Speedsleeve’ of a quantity capable of accommodating the entire capacity of the cable tray.

7.9.5.1(17) Cable trays for communication system wiring for Data, telephone, P/A, and other such systems installed in dropped ceiling spaces will be in accordance with section 7.10.7.2 and will be designed to reserve space in the ceiling space for other services. If more capacity is needed in the cable tray, it will be deeper. Cable trays will be installed as high as practicable and in accordance with the Canadian electrical code in all ceiling spaces. Locate cable tray to ensure the T-bar ceiling will not restrict access to other services in the ceiling space.

7.9.5.1(18) Cable tray will be aluminum or steel basket type for general power and ladder type for all electrical rooms with manufactured fittings. Cable trays for low voltage systems will be in accordance with Section 7.10.7. Provide continuous #6AWG minimum bare copper bonding wire which is connected by split bolt to each length of the cable tray. Provide bare copper bonding jumper between the cable tray and every associated conduit to ensure continuous bond between tray and low tension raceways.

7.9.5.1(19) Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme will be in accordance with the FHA site labelling standards.

7.9.5.1(20) 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 coloured duct tape) at intervals of 10 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. Identify parallel conduit runs at common locations.

7.9.5.1(21) Indicate the location of conductors encased or embedded in concrete or masonry by conspicuous permanent markers set in the walls, floors, or ceilings. Markers will indicate each point at which buried conductors penetrate a wall. Markers will indicate encased or buried conductors every 10 meters and at each change in direction.

7.9.5.2 Performance Criteria

7.9.5.2(1) Construct separate raceways or barriered raceways to isolate systems of different voltages and prevent magnetic interference to low voltage system conductors.

7.9.5.2(2) Design and install raceways without sharp edges or tight bends so that cables can be pulled in or laid in and removed without damage to the cables.

7.9.5.2(3) Provide cable trays with minimum 60% spare capacity for the installation of future cables. For low voltage cable trays provide a minimum 50% spare capacity for future cables. If multiple raceways are required in a group, such as a duct bank or tray system interconnecting two or more major areas, provide matching empty raceway equal to a minimum of 50% of the capacity of the total installed group.

7.9.5.2(4) Provide a minimum of 2 spare 103 mm conduits or pathways with re-entry devices with pull strings from the main electrical room to each sub-distribution room, mechanical room or similar rooms that house electrical distribution.

7.9.5.2(5) Provide a minimum of three (3) spare 75 mm EMT and two (2) spare 53 mm EMT conduits with pull strings from all panelboards to terminate in a collector (gutter) box to be at a minimum 300mm high and 400mm deep (front to back) and the width of the panelboard located in the ceiling mounted splitter box located in the ceiling space immediately above the panelboard in the above-ceiling

service space for future. Install smoke seal and pull string for future. In solid surface ceilings the removable bottom cover of the collector box shall be flush to the GWB ceiling.

7.9.5.2(6) Provide a minimum of three (3) spare 75 mm EMT conduits and two (2) spare 53 mm EMT conduits from all CDPs to terminate in a collector (gutter) box at a minimum 300mm high and 400mm deep (front and back) and the width of the CDP located in the ceiling space immediately above the CDP for future. Install smoke seal and pull string for future. In solid surface ceilings the removable bottom cover of the collector box shall be flush to the GWB ceiling.

7.9.5.2(7) All control conduit will be provided and installed by the electrical contractor. The electrical contractor will coordinate all low voltage installations with the mechanical contractor and provide all pathways, junctions, pull boxes complete with pull-strings and labelling.

7.9.5.2(8) Intentionally deleted.

7.9.5.2(9) Install all conduits in finished areas within finished walls and above finished ceilings.

7.9.5.2(10) Provide pull string and smoke seal all spare and unused conduits. Label accordingly.

7.9.5.2(11) Access Doors, Junctions and Pull-Boxes

7.9.5.2(11)(a) Supply flush-mounted access doors in non-accessible type ceilings and walls where necessary, for access to service and/or to inspect electrical equipment, accessories and Life Safety Systems where specifically indicated.

7.9.5.2(11)(b) Access doors will be installed such that the components services are accessible and fully visual to a worker without the need to reach or stretch in over or around obstructions.

7.9.5.2(11)(c) Unless otherwise noted, access doors will be minimum 600 mm x 600 mm (24” x 24”) for body entry; 300 mm x 300 mm (12” x 12”) for hand entry; 300 mm x 300 mm (12” x 12”) for cleanout access.

7.9.5.2(11)(d) All access doors in rated assemblies to also be fire rated with lockable self-closing, gasketed and self-latching doors.

7.9.5.2(11)(e) All access doors in the Inpatient Psychiatry Unit will have rated assemblies that are fire rated with lockable self-closing, and self-latching doors.

7.9.5.2(11)(f) Provide Vandal Resistant and tamper proof access panels of the Ligature Resistant type for the Inpatient Psychiatry Unit.

7.9.5.2(11)(g) Locate access doors so that all concealed items are readily accessible for adjustment, operation, maintenance and inspection. Locate in service and storage areas wherever possible. Do not locate in paneled, feature or special finish walls or ceilings, without prior approval of the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure].

7.9.5.2(11)(h) Project Co will not locate any junction boxes, pull-boxes, splice boxes, electrical equipment and devices within the Sterile Core. Only junction boxes, pull-boxes, splice boxes, electrical equipment and devices serving the Sterile Core will be permitted to be located in the Sterile Core.

7.9.5.2(12) Codes, Standards and Guidelines

7.9.5.2(12)(a) Refer to 2.3 Standards section of Schedule 3 [Design and Construction Specifications].

7.9.6 Site Utility Power and Emergency Generation Supply

7.9.6.1 Basic Requirements

7.9.6.1(1) Utilize transmission and distribution equipment that are robust, reliable, easily operated, maintained and designed for healthcare facilities. Design with additional capacity to accommodate load growth and equipment additions

7.9.6.1(2) The existing BH BC Hydro utility service is derived from a single BC Hydro service via an overhead pole system that transitions to an underground concrete encased duct bank on the North side of the BH Campus. The duct bank routes under the existing exterior generator building and routes under ground into the Support Facilities Building on level 0 and into the main high voltage electrical room and then routes secondary distribution services that terminate in the Support Facilities Building main electrical normal power distribution. The distribution in the Support Facilities Building currently provides essential power for all the buildings on the Campus including the West Wing, South Block, Cascade Building, Support Facilities Building and Nursing Tower and existing parkade.

7.9.6.1(3) From the existing main high voltage switchgear there are two load break switches, each feeding power transformers T1 and T2 respectively. Transformer T1 consists of three 1MVA 12.kV/600V single phase power transformers located on level zero of the Support Facilities Building in the high voltage entrance room and transformer T2 is a 2MVA with fan cooling 2.66MVA 12.kV/600V three phase transformer and is located on level 1 of the Support Facilities Building in the main electrical room. The utility transformers feed into a common bus system that can utilize one or the other utility transformer.

7.9.6.1(4) The main electrical room located in the Support Facilities Building consists of two existing conditional 1200A, 600V, 3 phase, 3 wire distribution panels, two delayed vital 1200A, 600V, 3 phase, 3 wire distribution panels, and one vital 1200A, 600V, 3 phase, 3 wire distribution panels.

7.9.6.1(5) The main electrical room also house the generator sync board, distribution breakers and bus ducts routed from the sync board to the transfer switches and secondary 600V distribution and load bank connection cabinet. There are automatic transfer switches for the vital, delayed vital and conditional power sources. There are also existing control cabinets, panels and electrical equipment located throughout the main electrical room.

7.9.6.1(6) The peak utility demand load of the Campus was measured at 1.8MVA while the main power transformers have capacity to supply 2.66MVA including fan kit installed or 3MVA respectively. Based on the theoretical project future loads the current BH electrical normal power Utility site servicing is not adequate and is under sized for the estimated loading of the Facility, future Phase 2 and the existing Burnaby Hospital Campus buildings. Upgrades to the existing BC Hydro service is required in order to accommodate the Facility, future Phase 2 and the existing Campus buildings.

7.9.6.1(7) The existing BH emergency power service is derived from two 1MVA diesel powered generators. The generators provide emergency power for the existing BH campus loads. These generators are located in an outdoor rated enclosure on the North side of the Campus between the Cascade building and the Nursing Tower. Emergency power routes under ground from the outdoor generation plant and terminates in the Support Facilities Building main electrical room on the generator sync board. The emergency distribution in the Support Facilities Building currently provides emergency power for all the buildings on the Campus including the West Wing, South Block, Cascade Building, Support Facilities Building and Nursing Tower and existing parkade.

7.9.6.1(8) The existing Campus emergency power peak demand is approximately 1.8MVA. Based on the theoretical project future loads the current BH electrical emergency power system is not adequate and is under sized for the estimated loading of the Facility, future Phase 2 and the existing Burnaby Hospital Campus buildings. Upgrades to the existing emergency service is required in order to accommodate the Facility, future Phase 2 and the existing Campus buildings.

7.9.6.1(9) Project Co will construct a new BH Energy Centre complete with new dual redundant primary BC Hydro utility service including primary and secondary distribution and it will be sized to accommodate the Facility, spare capacity requirements, future Phase 2, and the existing Campus loads. The high voltage distribution system will include load break switches and associated provisions for the future Phase 2 builds. The BH Energy Centre Normal Supply will be utilized to derive the Essential electrical systems and will be the only location of Normal Supply on the Campus. The system will be capable of expansion to accommodate the future Campus utility power requirements including the main switchgear, and distribution systems. The expansion capability requirements for the utility power distribution will be physically co-located within the BH Energy Centre in the same physical location or adjacent to the emergency distribution system.

7.9.6.1(10) Project Co will construct the BH Energy Centre complete with a new emergency power system including primary and secondary distribution and it will be sized to accommodate the Facility, spare capacity requirements, and the Existing Hospital loads. The emergency power system will be capable of expansion to accommodate the future Campus essential power requirements. The expansion capability requirements for the emergency power distribution will be physically co-located within the BH Energy Centre in the same physical location or adjacent to the emergency distribution system.

7.9.6.1(11) The new BH Energy Centre will be expandable to accommodate the future site power requirements and will include for the Existing Hospital, Facility and the future phase 2. The BH Energy Center will be located on the existing BH Campus and will be housed in a post-disaster exterior outbuilding or co-located in the Phase 1A or Phase 1B building in order to future proof the BH Campus and provide a high level of post disaster distribution infrastructure for the site.

7.9.6.1(12) All new services routed within the existing buildings will be constructed with a post-disaster installation method, this will include but is not limited to saw cutting the existing concrete slab to

accommodate the installation of new concrete encased services and repairing the existing surfaces.

7.9.6.1(13) The new BH Energy Centre will be constructed to facilitate future expansion with minimal disruption to Facility operation and continuity. The BH Energy Centre will be constructed with all necessary infrastructure including spare capacity, spare circuit breakers, and physical expansion space, removal panels (knock-outs), and ducts stub from the Facility as required to accommodate any future system expansion or replacement. Project Co will demonstrate how all major equipment can be removed and replaced in future.

7.9.6.1(14) The BH Energy Centre will incorporate design features and practices to reduce arc flash hazards on electrical systems such that routine operations including transfer switch operation, opening and closing distribution breakers, and inspection and maintenance activities require personal protective equipment (PPE) Level 2 as defined in NFPA 70E or requires PPE with an Arc Thermal Performance Value (ATPV) greater than 12 cal/cm2. No activities will expose personnel to arc flash hazards which exceed the protection afforded by PPE Level 2 or a ATPV greater than 12 cal/cm2.

7.9.6.1(15) After the new emergency power distribution system is commissioned, Project Co will remove the redundant emergency power system. Project Co will hand over to the Authority the existing 1MVA generators. Project Co will provide a list of equipment to the Authority for direction on what equipment the Authority wants to keep. All other equipment will be removed and disposed of including electrical equipment and devices, power feeders, including generator sync bus, transfer switches, switchboards, and associated equipment and devices.

7.9.6.1(16) Project Co will remove all existing redundant high voltage transformers, secondary distribution vital, delayed vital and condition power distribution panels, automatic transfer switches, generators, metering, panelboards, feeders and associated equipment and devices after commissioning the new BH Energy Centre and commissioning of all new distribution in the Support Facilities Building, Nursing Tower, Phase 1A and Phase 1B buildings.

7.9.6.1(17) Coordinate the installation with BC Hydro and pay all associated Utility fees to provide a dual 25kV (primary) supply Utility service. Provide an outdoor Vista switch that will facilitate the installation of a second diverse redundant BC Hydro service.

7.9.6.1(18) Coordinate with BC Hydro to supply the two new 25kV service to the Site that will terminate in an outdoor Vista switch and exterior

switchgear and then routes through concrete encased ducts to the BH Energy Centre.

7.9.6.1(19) Coordinate with BC Hydro for underground civil standards, protective device coordination, and other service requirements. Provide electric service information and submit service applications as needed.

7.9.6.1(20) Provide a dedicated free-standing service entrance switchgear for power service terminations. Service entrance switchgear to contain high voltage Utility incoming switchgear (service box) c/w service termination compartment, main circuit breaker, surge arrester and revenue metering instrument transformer compartment for Utility service.

7.9.6.1(21) Project Co will be responsible for providing all onsite civil, architectural and ancillary infrastructure required by BC Hydro to accommodate the service connection and Vista switch. All infrastructure and equipment for the incoming service will be in conformance with the requirements of BC Hydro.

7.9.6.1(22) Underground concrete encased RVPC ducts will route from the BH Energy Centre distribution through duct banks and Pull boxes (manholes).

7.9.6.1(23) Project Co will be responsible for providing all onsite civil infrastructure.

7.9.6.1(24) The design of the Facility will comply with either CleanBC Commercial New Construction Program, and/or, Fortis Commercial New Construction Program. Project Co to assess most suitable program(s), design building to meet program requirements and provide assistance in application and completion for program incentives.

7.9.6.2 Performance Criteria

7.9.6.2(1) Identify the location of existing underground and overhead service lines in the area of the Facility and BH Energy Centre to avoid interference with proposed routing of new services and future services for known expansions. Use latest techniques (ground penetration radar test) to verify and confirm all existing underground services in the direction of service lines to the Facility and in the location of the new BH Energy Centre. In consultation with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure] remove or relocate existing site lighting, branch circuit power and communications to accommodate the Facility. Reconnect all power and controls to electrical and communication circuits affected by the site preparation work.

7.9.6.2(2) BH Energy Centre will be a separate post-disaster outbuilding located on the BH Campus or be located in the new Phase 1A or Phase 1B building. The BH Energy Centre will be fed from the main BC Hydro normal power exterior site service from a minimum two 5.0MVA 25kV:12.5kV, 3P transformers. The BH Energy Centre will include the high voltage switchgear, termination compartment, main circuit breaker, metering, high voltage switchgear, primary 12.5kV and double ended secondary 600, 3P, 4W distribution boards that will provide normal power distribution for the Campus. Project Co will provide Utility demand calculations based on Existing Hospital loads, the Facility, spare capacity requirements and the conceptual design information for the future Phase 2. Project Co to coordinate with Fraser Health Authority for additional information.

7.9.6.2(3) The BH Energy Centre will also house the site emergency power generation plant which will include at a minimum two 3.0MVA 12.5kV, 3P generators, automatic transfer switches and double ended secondary 12.5kV, 3P, 3W distribution boards that will provide vital power, delayed vital power and conditional power for the Existing Hospital and Facility. The BH Energy Centre will be constructed to accommodate additional future generator(s), and essential power distribution system to accommodate the future Phase 2 buildings. The BH Energy Centre to be constructed with an expandability and or modularity with the ability to accommodate the future Campus generation requirements. Project Co to provide emergency power demand calculations based on the Existing Hospital loads, Facility and spare capacity requirements. Including all other requirements of this schedule.

7.9.6.2(4) Design and construct the new BH Energy Centre utility High Voltage service to provide power to all the Existing Hospital loads, Burnaby Hospital Redevelopment Phase 1A and Phase 1B, and future Phase 2 with a minimum of 25% spare capacity and include 25% physical space when sizing all High Voltage distribution equipment.

7.9.6.2(5) Provide emergency power systems capable of supplying power to all the Existing Hospital loads, Burnaby Hospital Redevelopment Phase 1A and Phase 1B essential loads, 100% of the vital and delayed vital and conditional branches, 100% of all cooling, all UPS branch loads and the fire pump(s). In addition, provide 25% spare capacity for future growth. This additional capacity is to be added to the demand code load after all other loads and requirements are accounted for. This capacity will be in addition to any spare capacity included for the mechanical equipment and all other Authority requirements.

7.9.6.2(6) Project Co will provide new under-ground concrete encased secondary services for vital, delayed vital and conditional power will be provided from the new BH Energy Centre to the existing Support

Facilities Building and will be connected to new distribution switchboards.

7.9.6.2(7) New under-ground concrete encased secondary services for vital, delayed vital and conditional power will be provided from the new BH Energy Centre to the existing Nursing Tower building and will be connected to new distribution switchboards.

7.9.6.2(8) All high voltage components of the BH Energy Centre power systems will be rated for operation at 12.47kV.

7.9.6.2(9) Comply with BC Hydro's Distribution Technical Standards and Guides and all the requirements noted in the BC Hydro “Requirements for Customer-Owned Primary Services Supplied at 4kV to 35kV (Primary Guide)”.

7.9.6.2(10) Comply with BC Hydro’s “Interconnection for 10 Second Requirements for Closed-Transition Transfer of Standby Generators”.

7.9.6.2(11) Comply with BC Hydro’s “Requirements for Manually or Remote Read Primary Service Voltage Revenue Metering (4kW to 35kV)”.

7.9.6.2(12) Design the electrical Utility service and electrical rooms to be accessible to authorized personnel only. Onsite underground services will be in concrete-encased duct banks sloped away from the Facility 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.

7.9.6.2(13) Provide high voltage cables for incoming service between the exterior switchgear and the BH Energy Centre main service switchgear.

7.9.6.2(14) Main utility feeder to terminate at the exterior utility power switchgear. Incoming dual 25kV feeder to terminate on VFI switches. Provide for two VFI switches for dual utility connection. These VFI switches, in turn, to feed a dual 25kV:12kV transformers rated and 12.5kV switchboard comprised of:

7.9.6.2(14)(a) two main breakers, a tie breaker, and two feeder breakers configured with two breaker per vertical section;

7.9.6.2(14)(b) draw-out vacuum circuit breakers at mains, tie and outgoing feeder breaker positions;

7.9.6.2(14)(c) revenue-grade digital metering at each of the mains;

7.9.6.2(14)(d) 3-phase, solid-state multi-function type protective relay at each vacuum circuit breaker with ANSI functions 50/51, 50N/51N, 86 and additional functions as required. Protective relay to have integral digital metering capable of displaying V, A, KVA, KW and harmonic parameters;

7.9.6.2(14)(e) Communication port integrated with the Facility's BMS and metering system to indicate status of each breaker;

7.9.6.2(14)(f) 125V DC battery-backed power supply with charger for protective relays and controls; and

7.9.6.2(14)(g) Differential protection for the Utility Incoming Switchgear between the incoming service feeder and outgoing feeders to reduce the arc-flash hazard.

7.9.6.2(15) The utility incoming switchgear will be metal-enclosed type rated for 600A minimum comprising of:

7.9.6.2(15)(a) A oil-immersed VFI main breaker with remote operation capability;

7.9.6.2(15)(b) A dedicated compartment for utility metering instrument transformers;

7.9.6.2(15)(c) A surge arrester to BC Hydro service entrance requirements;

7.9.6.2(15)(d) Separate service entrance compartment and outgoing feeder termination compartment;

7.9.6.2(15)(e) 3-phase digital multi-function type protective relay at the main distribution breakers of the incoming switchgear with ANSI protective functions 50/51, 50/51N and additional protective functions are required. Provide additional protective functions as directed by the Authority; integral digital metering capable of displaying real-time V, A, kVA, kW harmonic parameters with peak demand registers; and a communication port integrated with the BMS and ION metering network to indicate breaker load values and switching status;

7.9.6.2(15)(f) Provide dual 120V AC UPS or dual 125V DC battery-backed power supply with charger for protective relays and controls with the ability for automatic switching between dual power supplies. Incoming switchgear lineups will have their own local independent power supplies within the same room; shared power supplies with the BH Energy Centre switchgear are not permitted.

7.9.6.2(16) The 600V low-voltage power distribution to be derived from 12.47kV – 600V step-down dry-type fan cooled power transformers of equal kVA capacity for each essential system. Main 25kV and 12.5kV Transformers to be sized to carry the maximum anticipated demand load, including all identified future expansions, and all additional Authority requirements and spare capacity will be added to the total calculated load. Additionally, size the Main 25kV power transformers such that in the natural cooled configuration with provision for fan cooled, each transformer will be capable of providing 100% of the ultimate BH Campus power demand.

7.9.6.2(17) Provide clear physical space equal to one vertical switchboard section on both ends of all distribution panels (in addition to required clearance) to permit capability for expansion in the future.

7.9.6.2(18) Prepare and submit to the Authority detailed Protective Device Coordination, Short Circuit and Arc Flash Hazard Studies signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment. The study is to include the Facility, Phase 1A, Phase 1B, the Support Facilities Building, Nursing Tower and electrical distribution located in the BH Energy Centre.

7.9.6.2(19) The detailed Protective Device Coordination, Short Circuit and Arc Flash Hazard Studies to:

- 7.9.6.2(19)(a) Indicate all new and existing service equipment from the point of Utility supply;
- 7.9.6.2(19)(b) Update existing Campus arc flash study completed in 2015 by Little Mountain Engineering Company;
- 7.9.6.2(19)(c) Include all transformers, distribution equipment, Generators, UPS and panelboards. The coordination study will take into account the existing main distribution sections in the Nurse Tower and Support Facilities Building. Project Co will replace all overcurrent devices as required to coordinate with the study. New and existing overcurrent devices will be set up in accordance with the coordination study;
- 7.9.6.2(19)(d) Provide Arc Flash labels for all new and existing equipment; and
- 7.9.6.2(19)(e) Make all changes and recommendations from the Protective Device Coordination, Short Circuit and Arc Flash Hazard Studies at the end of the Project.

7.9.6.2(20) Power transformers:

7.9.6.2(20)(a) to be dry-type cast-coil or FR3 oil filled, with copper or aluminum windings. The kVA capacity indicated to be based on Class 220 degree C insulation, 115 degree C rise.

7.9.6.2(20)(b) to have delta connected primary windings and star-connected secondary windings. The secondary star point to be solidly grounded.

7.9.6.2(20)(c) if dry-type, to 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.

7.9.6.2(20)(d) if FR3 oil filled, to have KNAN/KNAF (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.

7.9.6.2(20)(e) to have four 2.5% full capacity primary taps consisting of two above and two below nominal voltage.

7.9.6.2(20)(f) to have a digital thermometer indicating average coil temperature with two stage alarm contacts connected to the BMS. The first stage to alarm when the fans start up and the second stage to alarm at a higher temperature. Alarms to be indicated on the BMS.

7.9.6.2(20)(g) to have integral intermediate class lightning arrestors connected to the primary terminals.

7.9.6.2(20)(h) to be suitable for interior installation with CSA type 2 ventilated housing with overhanging drip proof louvers. Housing will protect against accidental contact with live parts. Drip proof enclosure to provide a degree of protection against dripping and light splashing of noncorrosive liquids and falling dirt.

7.9.6.2(20)(i) Project Co will meet all the obligations as indicated in the Project Agreement and all other section of the Schedule 3 [Design and Construction Specifications].

7.9.7 Electrical Duct Bank System for BH Campus distribution

7.9.7.1 Basic Requirements

7.9.7.1(1) Provide a concrete-encased underground Electrical Power Duct System around the entire perimeter of the BH campus that will

connect the BH Energy Center with the new Phase 1A, Phase 1B buildings, existing Support Facilities Building, Nursing Tower and the future Phase 2 and Phase 3 buildings. Minimize disruption on the BH Campus by sequencing the construction of the electrical duct bank system and the Campus 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. The concrete encased ducts listed in this clause are not required for interbuilding connections for a combined Phase 1A and Phase 1B from BH Energy Centre power distribution to Phase 1A and Phase 1B.

7.9.7.1(2) Provide physical separated maintenance manhole (pull boxes) along each buried concrete-encased duct bank system including at locations required for power connections to the following buildings:

7.9.7.1(2)(a) BH Energy Center;

7.9.7.1(2)(b) Nursing Tower;

7.9.7.1(2)(c) Support Facilities Building;

7.9.7.1(2)(d) Phase 1A building;

7.9.7.1(2)(e) Phase 1B building;

7.9.7.1(2)(f) To the proposed location of the future building (Phase 2) building;

7.9.7.1(2)(g) To the proposed location of the future building (Phase 3) building; and

7.9.7.1(2)(h) The maintenance manhole listed in clauses 7.9.7.1(2)(d) and 7.9.7.1(2)(e) are not required for interbuilding connections for a combined Phase 1A and Phase 1B building from BH Energy Centre power distribution to Phase 1A and Phase 1B.

7.9.7.1(3) Electrical duct power systems will be routed with separation between vital, delayed vital and conditional power sources. They will not occupy the same duct and will require physical separation when routed within the maintenance manhole (pull box).

7.9.7.2 Performance Criteria

7.9.7.2(1) The electrical duct bank system will be routed around the entire perimeter of the BH Campus and will include under-ground ducts from the BH Energy Center to each of the Phase 1A, Phase 1B buildings, existing Support Facilities Building, Nursing Tower and the future Phase 2 and Phase 3 buildings. The concrete encased

ducts listed in this clause are not required for interbuilding connections for a combined Phase 1A and Phase 1B building from BH Energy Centre power distribution to Phase 1A and Phase 1B.

7.9.7.2(2) Provide a maintenance hole with a drained sump immediately before each duct bank enters (or exits) the Facilities. Slope all ducts towards maintenance holes and install T-drains at low points in ducts.

7.9.7.2(3) Maintenance holes to be minimum 1520mm long x 1520mm wide x 1390mm high with cast-iron covers. Covers to come complete with welded labelling to identify system within. Labelling to be “BH Power” and “BH Telecommunications”.

7.9.7.2(4) All underground duct banks will be identified at the point they enter/exit the perimeter of any building. The markers will be located directly over the buried ducts and indicate the type and depth of each duct bank.

7.9.7.2(5) The electrical duct bank system will be designed to support the anticipated power needs of the future BH Campus. Ducts will be installed from the BH Energy Center to each of the existing Support Facilities Building, Nursing Tower and the future Phase 2 and Phase 3 buildings.

7.9.7.2(6) All new underground power services to be installed with, meet all the requirements of the CPPS system and follow the routing of the CPPS system. Refer to Section 7.10.7 of this Schedule 3 and Appendix 3R [Campus Perimeter Pathway System Technical Specifications].

7.9.7.2(7) PVC ducts to be of the type EB1 or DB2 103mm (4”) nominal diameter.

7.9.7.2(8) Provide ducts stubbed 3m out from the maintenance hole footprint and capped for easy future extension to the future Phase 2 and Phase 3 buildings.

7.9.7.2(9) The EPDS shall be arranged so that the electrical power ducts are located on the outside of the CPPS ducts.

7.9.7.2(10) Locate the maintenance manholes for the EPDS so that they do not interfere with the CPPS maintenance manholes. Provide adequate separation between systems to allow for maintenance vehicles assess without interfering with the CPPS manhole.

7.9.8 Low Voltage Distribution (600 Volts and below)

7.9.8.1 Basic Requirements

7.9.8.1(1) Project Co will replace all existing Support Facilities Building 1200A, 600V, 3 phase 3 wire vital, 1200A, 600V, 3 phase 3 wire delayed vital and conditional 1200A, 600V, 3 phase 3 wire distribution boards with new distribution equipment. Replace all 600:102/208V transformer and transformers 25 years or older including the primary and secondary feeders and associated electrical equipment and devices. All circuit breakers in the emergency systems replacement distribution boards will be molded case when 400A or less and breakers will be draw-out type circuit breakers when greater than 400A. New distribution boards will provide for new breakers to accommodate all existing breakers. Intercept and extend all the existing feeder conductors to new distribution boards. Project Co. shall replace the existing distribution 25 years or older including Switchboards, CDPS, Branch panels and existing feeders within the distribution systems as follows:

7.9.8.1(1)(a) (Level 0) Switchboard Delayed Vital (DV-1) 1200A, 600V, 3P, 3W, Federal Pioneer (42kia);

7.9.8.1(1)(b) (Level 0) Switchboard Delayed Vital (DV-2) 1200A, 600V, 3P, 3W, (800Aa Main) Federal Pioneer (42kia);

7.9.8.1(1)(c) (Level 0) Switchboard Conditional (C-1) 1200A, 600V, 3P, 3W, Federal Pioneer (42kia);

7.9.8.1(1)(d) (Level 0) Switchboard Conditional (C-2) 1200A, 600V, 3P, 3W, Square D (42kia);

7.9.8.1(1)(e) (Level 0) Switchboard Vital (V) 1200A, 600V, 3P, 3W, Federal Pioneer (42kia);

7.9.8.1(1)(f) BSF- O1A (Level 1): CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(g) BSF- O1B (Level 1) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(h) BSF- O1C (Level 1) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(i) BSF- O1D (Level 1) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(j) BSF- O2A (Level 2) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(k) BSF- O2B (Level 2) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(l) BSF- O2C (Level 2) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE, TX 30 KVA, 600:208/120V, 3P Polygon, CDP 225A, 347/600V, 3P, ITE;

7.9.8.1(1)(m) BSF- ELEC 004 (Level 2) TX 45 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(n) BSF- O3A (Level 3) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(o) BSF- O3B (Level 3) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(p) BSF- O3C( Level 3) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(q) BSF- O4A (Level 4) CDP 225A, 347/600V, 3P, ITE, TX NEW – NO REPLACEMENT REQUIRED, CDP 400A, 120/208V, 3P, ITE;

7.9.8.1(1)(r) BSF- O4B (Level 4) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE; and

7.9.8.1(1)(s) BSF- O4C (Level 4) CDP 225A, 347/600V, 3P, ITE, TX 75 KVA, 600:208/120V, 3P Polygon, CDP 400A, 120/208V, 3P, ITE.

7.9.8.1(2) All circuit breakers in the Support Facilities Building will have the required interrupting rating and breaker settings in accordance with the new coordination study. New CDPs installed to replace the old equipment must meet the requirements of the Project Agreement listed in all other articles in the Schedule 3 [Design and Construction Specifications]. There are also existing control cabinets, panels and electrical equipment located throughout the main electrical room that will require relocation, modification or replacement to suit the new distribution layout. Project Co will provide temporary generator

power and work arounds as required to maintain power to the existing loads. All required shutdowns will be kept to under 4 hours of duration.

7.9.8.1(3) Project Co will construct a new electrical room in the existing Nursing Tower and will provide new distribution panels for vital 1200A, 600V, 3 phase 3 wire, delayed vital 1200A, 600V, 3 phase 3 wire and conditional 1200A, 600V, 3 phase 3 wire power sources. Project Co will design in conjunction with the Authority the new electrical room and perform on site review with the Authority to confirm the exact location of the new main electrical room in the Nursing Tower. Project Co will remove all the existing Nursing Tower level zero distribution panels, including all existing 600:208/120V transformers and transformers 25 years or older with new. Remove all existing feeders from the Support Facilities Building routed thru the tunnel and into the Nursing Tower. New distribution boards will provide for new breakers to accommodate all existing Nursing Tower feeder breakers. Intercept and extend all the existing feeder conductors to new distribution boards. Project Co shall replace the existing distribution 25 years or older including Switchboards, CDPS, Branch panels and existing feeders within the distribution systems as follows:

7.9.8.1(3)(a) (Level 0) MCC GOJ 600A, 600V, Westinghouse c/w 5KVA TX and 240/120v panel K;

7.9.8.1(3)(b) (Level 0) CDP GOA 225A, 347/600V, 3P, ITE, TX GOA, 75 KVA, 600:208/120V, 3P Polygon, CDP GOB 400A, 120/208V, 3P, ITE, CDP GOC 120/208V 225A, 120/208V, 3P, ITE; and

7.9.8.1(3)(c) (Level 0) TX GOL, 150 KVA, 600:208/120V, 3P Hammond, CDP GOL 600A, 120/208V, 3P, ITE.

7.9.8.1(4) All circuit breakers in the Nursing Tower emergency systems distribution boards will be molded case when 400A or less and breakers will be draw-out type circuit breakers when greater than 400A. All circuit breakers will have the required interrupting rating and breaker settings in accordance with the new coordination study. New CDPs installed to replace the old equipment must meet the requirements of the PA listed in all other articles in the Schedule 3 [Design and Construction Specifications]. There are also existing control cabinets, panels and electrical equipment located throughout the main electrical room that will require relocation, modification or replacement to suit the new distribution layout. Project Co will provide temporary generator power and work arounds as required to maintain power to the existing loads. All required shutdowns will be kept to under 4 hours of duration.

7.9.8.1(5) The main electrical rooms in the BH Phase 1A , Phase 1B and Nursing Tower will be designed and constructed to facilitate 25% Future Expansion with minimal disruption to Existing Hospital and Facility operations and continuity. Construct with all necessary infrastructure including spare capacity, spare circuit breakers, and physical expansion space. Provide pull-pits, sleeves, housekeeping pads, wiring, controls, distribution routes, ventilation and overhead lift and as necessary to accommodate electrical distribution replacement.

7.9.8.1(6) Provide electrical power transmission and distribution from the main sources of supply to meet all requirements of the Existing Hospital, Facility and the Clinical Specifications. Provide electrical equipment to establish a building distribution voltage of 600V and 120/208V.

7.9.8.1(7) Design the distribution system to provide security of supply and the flexibility to allow concurrent safe maintenance without impacting the Existing Hospital operations. Provide tie breakers with key interlocking devices on all main and secondary distribution. Provide double by-pass automatic switches.

7.9.8.1(8) In accordance with Appendix 2D [Energy and Carbon Guarantees] separate the Existing Hospital and 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.

7.9.8.2 Low Voltage Distribution Performance Criteria

7.9.8.2(1) Design and construct with a minimum of 25% spare capacity and include 25% physical space and 1 spare breaker of each size of breaker installed or 10% spare breakers which ever is greater for future devices when sizing all distribution equipment.

7.9.8.2(2) Protect the electrical rooms from ground water infiltration and separate it from plumbing and mechanical equipment. Provide raised housekeeping pads, drainage and sump pumps (on vital power) as required in electrical service areas to mitigate the risk of flooding. Design the electrical room to be readily accessible, secure, well ventilated and free of corrosive or explosive fumes, gases or any flammable material. Establish routes clear of obstruction to and from the electrical room which facilitate the addition and removal of the largest current and future components located within the room.

7.9.8.2(3) 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 or with an arc thermal performance value (ATPV) of greater than 12 cal/cm2. No activities will expose personnel to arc flash hazards which exceed the protection afforded by PPE Level 2.

7.9.8.2(4) Utilise 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. Have arc-overcurrent protection relays, with optical sensors extending through each breaker compartment, bus compartment and cable compartment, which will provide a trip signal to de-energize the main bus within 8 milliseconds of detecting an arc flash. Utilize point type and/or fibre optic type optical sensors to ensure proper coverage within compartments. Tripping may occur at the secondary main breaker provided that the line side components of the breaker are fully isolated from the rest of the switchgear lineup by a fixed metallic barrier;

7.9.8.2(5) The feeders fed from vital, delayed vital and conditional branches will be kept entirely independent of each other and will not occupy the same maintenance hole, pull pit, junction box, pull box, cable tray, fire rated shaft, enclosure, etc., except where mechanical protection is provided or where required to connect power sources at tie breakers and transfer switches.

7.9.8.2(6) Prepare and submit to the Authority detailed Protective Device Coordination, and Short Circuit study signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment.

7.9.8.2(7) Prepare and submit to the Authority a detailed arc flash study signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling on all electrical distribution which forms part of the study indicating available energy levels and level of PPE required when servicing the equipment.

7.9.8.2(8) Prepare and submit to the Authority a detailed distribution coordination study signed and sealed by a professional engineer registered in British Columbia.

7.9.8.2(9) The Facility will distribute 600V and 120/208V locally. Each building including the Phase 1A, Phase 1B, and Support Facilities Building will have a main electrical room with double-ended 600V main switchgear lineups (vital, delayed vital, conditional) and each of the switchgear lineups will be interconnected with an interlocked tie

breaker such that vital can be powered from either the delayed vital or conditional power systems and any power source can supply the other two sources.

7.9.8.2(10) All switchgear and CDP (including 600V and 120/208V equipment) will have prepared bus links or a set of spare lugs to easily extend the bus to a future section. This also allows for temporary connections should they be needed in future. Links will be bolted to the inside lower portion of the cubicle to which they will be extending the bus from.

7.9.8.2(11) All distribution branches will be arranged such that any part of one branch can be safely isolated for maintenance without affecting another branch or depriving any area of electrical power.

7.9.8.2(12) Provide a minimum clear physical space (or spare section) equal to one complete/full size vertical switchgear section at each switchgear lineup to allow expansion in the future. Such that future sections will be provided sufficient space for an easy installation.

7.9.8.2(13) In accordance with Section 7.9.10 Metering, separate the Facility electrical loads into ‘metered load category groupings’ and ‘non-metered load category groupings. Provide dedicated panelboards, MCCs, CDPs, and feeders as needed to segregate the electrical load category groupings for metering. Alternatively, metering information may be obtained from individual circuit metering, equipment data or calculated values where explicitly permitted.

7.9.8.2(14) Prepare and submit to the Authority a detailed distribution coordination study signed and sealed by a professional engineer registered in British Columbia.

7.9.8.2(15) Design the distribution system to provide security of supply and the flexibility to allow concurrent safe maintenance without impacting the Existing Hospital operations. Provide tie breakers with key interlocking devices on all main and secondary distribution.

7.9.8.2(16) 600V Distribution Equipment will be configured as double-ended with one main breaker and two tie-breakers and feeder breakers as required. Key interlocks or electrical interlocks will be in place between the tie breaker.

7.9.8.2(17) The conditional power 600V Distribution Equipment will directly feed:

7.9.8.2(17)(a) 600V Centralized Distribution Panels (CDPs). Provide a minimum of one CDP on each electrical room for conditional branches when 600V loads other than 120/208V transformer are required; alternative solution is

to provide main 600V disconnect to transformer in lieu of 600V CDP;

7.9.8.2(17)(b) Surge Protection Device;

7.9.8.2(17)(c) Motor Control Centres (MCC);

7.9.8.2(17)(d) Central Distribution Panels (CDP);

7.9.8.2(17)(e) Large individual loads. Example: chillers;

7.9.8.2(17)(f) Automatic power factor correction systems, with one on each side of the switchboard.

7.9.8.2(18) Provide individual dry-type step-down 600V – 120/208V transformers in the main electrical room and all secondary electrical rooms for conditional distribution branch: Additional 600V 120/208V transformers to be located as required by the design.

7.9.8.2(19) The individual step-down transformers will be fed from a 600V Centralized Distribution Panel and located in an electrical room.

7.9.8.2(20) Centralized Distribution Panels located on the same floor will have tie breakers to at least one other system CDP.

7.9.8.2(21) All CDPs to utilize electronic adjustable trip circuit breakers. Breakers will have adjustable on-breaker trip units for all breaker trip functions including pickup and time delay settings. Breakers will have on-breaker back lit displays to indicate load currents and energy parameters. Provide 24 Vdc power for each breaker trip unit. Breakers will be easily removed and installed from their switchgear without bus adapters within a minimal amount of time.

7.9.8.2(22) 600V Centralized Distribution Panels for power to feed 120/208V Centralized Distribution Panels in electrical rooms. These 120/208V CDPs to feed panelboards on each floor. Additional 120/208V panelboards will be installed throughout the Facility as required by the design.

7.9.8.2(23) The emergency power distribution equipment will be configured to feed double-ended 600V distribution panels for vital power, delayed vital power and conditional power. These Distribution Panels are to be arranged with one main breaker and two tie-breakers and feeder breakers as required. Tie breakers are to be arranged so that the switch gear will be inter-connected with key inter-locked breakers such that the vital system can be powered from either the delayed vital or conditional power distribution systems and any source can be power from the other distribution systems.

7.9.8.2(24) Each double-ended emergency 600V Distribution Panel to directly feed:

7.9.8.2(24)(a) 600V Centralized Distribution Panels (CDPs). Provide a minimum of one CDP for each of the vital, and delayed-vital branches;

7.9.8.2(24)(b) MCCs;

7.9.8.2(24)(c) Surge Protection Device; and

7.9.8.2(24)(d) Large individual loads.

7.9.8.2(25) Provide individual dry-type step-down 600V – 120/208V transformers in the main electrical room for each of the following distribution branches: vital and delayed-vital. Additional dry-type step-down 600V 120/208V transformers to be located as required by the design. Provide individual dry-type step-down 600V – 120/208V transformers in all secondary electrical rooms for the vital distribution branch.

7.9.8.2(26) The individual step-down transformers will be fed from a 600V Centralized Distribution Panel and located in an electrical room.

7.9.8.2(27) Centralized Distribution Panels located on the same floor will have tie breakers to at least one other system CDP.

7.9.8.2(28) CDPs for Vital, Delayed Vital and UPS to use MCCB draw-out breakers for main electrical rooms and 600V riser or UPS distribution. MCCB’s draw-out breakers not required for sub-electrical room CDP breakers 400A or less.

7.9.8.2(29) 600V Centralized Distribution Panels for Vital and delayed vital to feed 120/208V Centralized Distribution Panels in sub electrical rooms when 600V loads other than 120/208V transformer are required; alternative solution is to provide main 600V disconnect to transformer in lieu of 600V CDP. These 120/208V CDPs to feed panelboards on each floor. The 600V Delayed Vital CDP will feed 120/208V CDPs or panelboards in the same location. Additional 120/208V panelboards will be installed throughout the Facility as required by the design.

7.9.8.2(30) Provide a minimum of two electrical riser rooms on each floor level to house electrical equipment serving that floor, unless it can be demonstrated and approved by the Authority through the Review Procedure that one will suffice. If it is demonstrated to the Authority that one electrical room on a floor level will suffice, then Project Co will centrally locate the electrical room on the floor plate to the Authority’s approval through the Review Procedure. Vertically stack

the electrical rooms on all floors throughout the height of the Facility. If a third electrical room is required on any floor, spatially separate the remaining two rooms on plan and position these in different architectural fire-compartments and such that each room can serve one half of the floor plate.

7.9.8.2(31) The main Automatic Transfer Switches (ATS) serving vital, delayed-vital and conditional branches to be closed-transition transfer type with integral dual-source bypass and isolation features. These transfer switches to be similar and have identical voltage and short-circuit withstand ratings; the ampacity (current) rating of the ATS serving the delayed-vital and conditional branches are required to be identical, as is the rating of the ATS serving the vital branch. The preferred source input of each of these transfer switches to be directly connected to a separate air-circuit breaker on the main normal power 12.5kV distribution equipment. The alternate source input of each of these transfer switches to be directly connected to a separate air-circuit breaker on the generator synchronizing switchboard.

7.9.8.2(32) Configure the distribution downstream of the main ATS feed a 12.5kV to 600V Transformer and 600V distributions panels. One feeds double-ended 600V distribution panel for Vital power, one feeds a double-ended 600V distribution panel for delayed vital power, and one feeds a double-ended 600V distribution panel for conditional power. Provide two such 600V Distribution Panels for emergency power. One of these Distribution Panels to be arranged with one main breaker and one tie-breaker and to feed the vital branch plus load breakers. The second emergency 600V distribution panel will be arranged with one main breaker and two tie breakers and to serve the delayed-vital branch loads plus load breakers; the tie breakers to provide redundancy to the vital bus and the conditional bus.

7.9.8.2(33) 600V Switchgear Distribution Panels:

7.9.8.2(33)(a) Will be designed, factory-assembled and tested in accordance with CSA C22.2 No.31-10 and ANSI C37.20.1 “Switchgear Assemblies”;

7.9.8.2(33)(b) Will be provided with motorized draw-out type power circuit breakers complying with ANSI/IEEE C37 at mains, ties, and outgoing feeder breaker positions and labeled to work continuously at 100% rated current. Fuses will not be used;

7.9.8.2(33)(c) 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 to 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 to be connected to the existing site Schneider SCADA overall metering system and the building management system to indicate operational status, position, trip events and ground fault detection for each breaker.

7.9.8.2(33)(d) Breakers 200A and larger will be electronic adjustable trip, and breakers 400A and larger will be LSGI electronic trip fully adjustable selective breakers;

7.9.8.2(33)(e) Will have circuit breaker auxiliary contacts connected to the building management system and ION metering system to indicate operational status of each breaker;

7.9.8.2(33)(f) Complete with insulated bus;

7.9.8.2(33)(g) Breakers greater than 100A to have built in lock out capability.

7.9.8.2(33)(h) Come complete with thermographic scanning ports;

7.9.8.2(33)(i) Will have a coloured Lamacoid mimic bus single line diagram riveted on the front;

7.9.8.2(33)(j) Will have coloured engraved Lamacoid nameplates for cubicle and circuit identification on front and rear sections;

7.9.8.2(33)(k) Will be coloured red for Vital, blue for Delayed Vital, yellow for Conditional, and grey for UPS;

7.9.8.2(33)(l) Breakers are to be sized and set to coordinate with the distribution equipment that they will feed, achieving selective coordination of protective devices (for phase and ground elements) and minimizing arc flash incident energy levels;

7.9.8.2(33)(m) Switchboard rated 2000A and greater will use Motorized draw-out breakers including remote draw-out system;

7.9.8.2(33)(n) Switch boards rated between 600A and less than 2000A will be free standing (Wall mount panels not acceptable) (Min 400 mm (16”)) and have adjustable electronic breakers that are easily removed and installed from the switchgear without bus adapters within a minimal amount of time; and

7.9.8.2(33)(o) Switchboards rated less than 600A will have molded case breakers that are easily removed and installed from the switchgear without bus adapters within a minimal amount of time.

7.9.8.2(34) Each double-ended emergency 600V Distribution Panel to directly feed:

7.9.8.2(34)(a) 600V Centralized Distribution Panels (CDPs). Provide a minimum of one CDP for each of the normal, vital, delayed-vital, conditional, branches;

7.9.8.2(34)(b) Motor Control Centres;

7.9.8.2(34)(c) Surge Protection Device; and

7.9.8.2(34)(d) Large individual loads.

7.9.8.2(35) Locate the main electrical room(s) above the flood plain and in a separate room from any plumbing and mechanical equipment. Design the main electrical room to be readily accessible, well ventilated and free of corrosive or explosive fumes, gases or any flammable material. Provide a minimum of two entrances/exits from the main electrical room and doors sized to allow removal of large electrical equipment. Provide knock-outs and over sized doors and overhead doors in service rooms sized for the electrical equipment and devices within the room to facilitate the removal and or replacement of electrical equipment and devices.

7.9.8.2(36) Locate major electrical equipment to minimize run length of feeders and branch circuits and locate within the Facility so as to provide a clean, dry, safe, and accessible installation protected from unauthorized access.

7.9.8.2(37) Locate and design electrical equipment for ease of maintenance and with due regard for future expansion and renovation.

7.9.8.2(38) Provide a ground fault protection scheme such that ground faults are selective between the transformer and generator main circuit breakers and the downstream breakers sized 200A and larger.

7.9.8.2(39) Rate all distribution devices to handle available fault duty at line terminals. Perform a computer-generated fault study to ensure that all devices are properly rated. All circuit breakers 100A and larger will be fully selective.

7.9.8.2(40) Design and install protection equipment so that the initial electrical installation, future additions and modifications will be fully coordinated to isolate only the faulty portion of the system.

7.9.8.2(41) 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.

7.9.8.2(42) Provide a networked digital metering system to monitor electrical loads and quality of power in the Facility. System to be part of the central electrical metering and monitoring system or Building Management System (BMS).

7.9.8.2(43) Provide automatic power factor correction equipment within the building to ensure the Facility power factor does not fall below the 95% lag threshold. Coordinate capacitors with adjustable frequency drives and other harmonic generating equipment to avoid resonance conditions.

7.9.8.2(44) Provide dedicated transformation equipment for diagnostic imaging equipment as required by the imaging equipment vendors.

7.9.8.2(45) Provide circuit breaker type panelboards fully rated to handle calculated fault current level. Series rating of breakers and panelboards is not acceptable.

7.9.8.2(46) Oversize neutral(s) for panelboards, feeders and branch circuiting where significant non-linear load(s) are anticipated, such as in open office and other areas with a high density of personal computers. Provide extra neutral terminal bus in such panels to accommodate dedicated neutrals in branch circuit wiring.

7.9.8.2(47) Construct flush mounted panelboards with a collector (gutter) box located in the ceiling space above including three spare 75 mm conduits and two 53 mm conduits stubbed into the collector (gutter) box. Collector (gutter) box to be at a minimum 300 mm high and 400 mm deep (front to back) and at minimum the width equal to the width of the panelboard. In solid surface ceilings the removable bottom cover of the collector box shall be flush to the GWB ceiling.

7.9.8.2(48) Construct surface mounted panelboards with a collector (gutter) box located in the ceiling above including three spare 75mm and two spare 53 mm conduits stubbed into the collector (gutter) box. Collector (gutter) box to be at a minimum 300 mm high and 400 mm deep (front to back) and at minimum the width equal to the width of the panelboard. In solid surface ceilings the removable bottom cover of the collector box shall be flush to the GWB ceiling.

7.9.8.2(49) Provide electronic grade panelboards to serve electronic equipment susceptible to electrical transients.

7.9.8.2(50) Provide panelboards with integral surge protective devices to serve all electronic equipment and equipment susceptible to electrical

transients including patient care areas, offices and communication equipment. Surge protection devices to be connected to the metering system for remote monitoring.

7.9.8.2(51) Panelboards serving the main equipment room and the on-floor communication riser rooms to have integral surge protective devices in addition to panels intended to provide power to electronic equipment. Surge protection devices to be connected to the metering system for remote monitoring.

7.9.8.2(52) Install CDPs and Panelboards on the same floor as the loads they serve and located inside of electrical rooms.

7.9.8.2(53) All low voltage distribution panelboards and on-floor panelboards to have minimum of 40% spare capacity and 25% spare physical space after all connected loads have been installed. Provide metered documentation that proves that the 40% spare capacity has been provided once all loads are connected to the panelboard. Provide metered documentation to the Authority for review and approval through the Review Procedure.

7.9.8.2(54) Location of panelboards and related electrical panels within MDRD and within Operating Rooms is not acceptable unless approved by the Authority through the Review Procedure. Project Co will demonstrate with sound reasoning that installing panelboards and related electrical panels within these areas are required.

7.9.8.2(55) Provide one 200A 60 circuit 120/208V 4W 3Ph Vital power panel, one 200A 60 circuit 120/208V 4W 3Ph conditional power panel and one 100A 30 circuit 120/208V 4W 3Ph UPS power panel outside Operating Room to be shared between two operating rooms maximum. All panels supplying power to sensitive electronic equipment will have integral SPDs.

7.9.8.2(56) Provide a 400A 84 circuit 120/208V 4W 3Ph conditional power panel for the retail space and a 200A 42 circuit 120/208V 4W 3Ph normal power panel for the gift shop. Each panel to be metered with revenue quality meters.

7.9.8.2(57) Provide individual enclosed motor starters for individual motors. Utilize motor control centres for groups of four or more motors that require individual motor starters.

7.9.8.2(58) Motor starters 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. Provide “power on” and “running” LED type indicators on each motor starter.

7.9.8.2(59) 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 2 HP or more will be 600 volt 3 phase.

7.9.8.2(60) Provide voltage transient / surge protection for the main 600V and 120/208V switchgear loads and all other panels serving sensitive electrical loads including diagnostic equipment, lab equipment and adjustable frequency drives.

7.9.8.2(61) All panelboards, CDPs and Switchgear will be coloured red for Vital, blue for Delayed Vital, yellow for Conditional, and grey for UPS.

7.9.8.2(62) All panels and electrical equipment will be identified with (Lamacoid) labels.

7.9.8.2(63) With bevelled edges.

7.9.8.2(64) Mechanically attached with self-tapping stainless steel screws.

7.9.8.2(65) Components of the transmission and distribution systems in any public, clinical, administrative or staff area will have long life expectancy without perceptible deterioration and a good appearance. Design and install to permit easy and complete cleaning. Such equipment will be lockable.

7.9.8.2(66) Provide surge protection for the main 600V and 120/208V CDPs and all other panelboards serving sensitive electrical loads including diagnostic equipment and adjustable frequency drives.

7.9.8.2(67) Locations of receptacles to comply with all applicable codes and standards and the requirements for each program area as described in Appendix 3A [Clinical Specifications and Functional Space Requirements].

7.9.8.2(68) Distribution Transformers:

7.9.8.2(68)(a) UPS transformers will be harmonic mitigating type.

7.9.8.2(68)(b) Distribution transformers will be sized for the connected CDP load or the CDP total load connected through tie breakers, whichever is greater, plus 20% spare based on this combined load.

7.9.8.2(68)(c) Capable of being individually isolated for maintenance purposes without outages to any loads other than the ones directly served by that transformer.

7.9.8.2(68)(d) Class H 220°C insulation with temperature rise not exceeding 150°C maximum in 40°C ambient.

7.9.8.2(68)(e) High-efficiency type, with tested minimum efficiency meeting the U.S. Department of Energy (DoE) 2016 final rule (CFR Title 10 Part 431) and NRCan 2019 requirements.

7.9.8.2(68)(f) Will have 5th and 7th harmonics treated by introducing different phase shifts in pairs of transformers such that these currents subtract at the common bus.

7.9.8.2(68)(g) Electrostatic Shielding: Each winding is independently single shielded with a full-width copper electrostatic shield.

7.9.8.2(69) Install 600:120/208V dry type transformers for small equipment loads in electrical rooms on concrete pads or suspend from structure. Install transformers so that removal can be facilitated without removal of any other equipment or conduit serving the room. Utilize sound and vibration mitigation installation methods for all transformers.

7.9.8.2(70) Install 600:277/480V dry type transformers in electrical rooms connected to 480V equipment supplied by the Authority. These transformers will be fed from the 600V Centralized Distribution Panels or the 600V Distribution Panels depending on the size.

7.9.8.2(71) Panelboards:

7.9.8.2(71)(a) Provide bolt on type breakers for all panelboards;

7.9.8.2(71)(b) Provide main breakers complete with lock out device;

7.9.8.2(71)(c) Neutral with same ampere rating as mains unless noted otherwise;

7.9.8.2(71)(d) Hinged door with two-point latch and locks;

7.9.8.2(71)(e) Panelboards are to be fed from either above or below;

7.9.8.2(71)(f) Select, configure, locate and install all components of power 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;

7.9.8.2(71)(g) All electrical distribution equipment such as panelboards will be located in locked service rooms or locked electrical closets;

7.9.8.2(71)(h) Branch panelboards will only feed branch circuits on the same floor and department where they are located;

7.9.8.2(71)(i) Provide at least one vital and one UPS panelboard in each Communication Room to service all equipment installed in these rooms and to service all future known equipment loads including future cabinets. Size these panelboards to carry any automatically switched loads including dual-corded power supplies in the event of an outage to one of the power branches; and

7.9.8.2(71)(j) Do not daisy-chain or sub-feed panelboard feeders. All panelboard feeders will be directly fed from a CDP.

## 7.9.9 Emergency Power

### 7.9.9.1 Basic Requirements

7.9.9.1(1) Project Co will construct a new BH Energy Centre with an Emergency power distribution system.

7.9.9.1(2) The Existing Hospital emergency power peak demand is approximately 1.8MVA which is provided by two 1MVA generators located in an exterior rated plant located on the existing BH Campus. After the new emergency power distribution system is commissioned, Project Co will remove the redundant emergency power system. Project Co will hand over to the Authority the existing 1MVA generators and remove and dispose of all other electrical equipment and devices, including generator sync bus, transfer switches, switchboards, and associated equipment and devices as directed by the Authority.

7.9.9.1(3) The BH Energy Centre will house the site emergency power generation plant which includes at a minimum two (2) 3MVA 12.5kV, 3P generators, automatic transfer switches and double ended secondary 600, 3P, 3W distribution boards that provide vital power, delayed vital power and conditional power for the Existing Hospital and Facility.

7.9.9.1(4) In order to future proof the BH Campus and provide a level of post disaster distribution infrastructure for the site the new BH Energy Centre will provide individual concrete encased vital, delayed vital, and condition power services to the existing Support Facilities Building, existing Nursing Tower and the new Phase 1A, Phase 1B buildings. The concrete encased ducts listed in this clause are not required for interbuilding connections for a combined Phase 1A and Phase 1B building from BH Energy Centre power distribution to Phase 1A and 1B. The concrete encased ducts listed in this clause

are not required for interbuilding connections for combined buildings from Energy Centre power distribution to Phase 1A and 1B.

7.9.9.1(5) Project Co will provide an Emergency Power System capable of supplying power to all the existing Campus loads, Burnaby Hospital Redevelopment Phase 1A and Phase 1B essential loads, 100% of the vital and delayed vital and conditional branches, 100% of all cooling, all UPS branch loads and the fire pump. In addition, provide 25% spare capacity for future growth. This additional capacity is to be added to the demand code load after all other loads and requirements are accounted for. This capacity will be in addition to any spare capacity included for the mechanical equipment and all other Authority requirements. Project Co will provide the above redundancy and spare capacity requirements and will be demonstrated to the Authority in real time after CX of the Facility is complete. Mechanical loads will be simulated via the BMS. Project Co will provide a reactive load bank to simulate all linear and nonlinear demand loads that cannot be simulated by the BMS, plus the 25% spare capacity. Plug and lighting loads will be in accordance with the energy model calculations, and mechanical equipment not activated by the BMS will be accounted for in demand load and approved by the Authority through the Review Procedure.

7.9.9.1(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).

7.9.9.2 Performance Criteria

7.9.9.2(1) Provide an Emergency power generation system that has the capability of restoring and sustaining a supply of electricity if the normal utility supply is lost.

7.9.9.2(2) Design and construct the BH Energy Centre with a minimum of two separate 2-hour fire rated generator rooms for system redundancy in the event of a catastrophic generator failure.

7.9.9.2(3) Locate the main emergency distribution equipment such as 600V CDPs in the BH Energy Centre to provide a fire separation between the main distribution equipment for emergency power and conditional power such that a catastrophic failure in one system does not affect the other system.

7.9.9.2(4) Design the system with redundant power paths to maintain full and continuous service to clinical operations at all times, including during system maintenance.

7.9.9.2(5) With one generator offline, the remaining generator capacity will be sufficient to supply power to 100% of the peak vital, and delayed vital power demand for the Facility, including the 25% spare capacity.

7.9.9.2(6) The generator paralleling switchgear will be metal-clad type.

7.9.9.2(7) The double-ended paralleling switchgear design will be devoid of single points of failure and interconnected by one common bus.

7.9.9.2(8) The double-ended generator paralleling switchgear will have:

7.9.9.2(8)(a) Two generator main breakers;

7.9.9.2(8)(b) Intentionally deleted;

7.9.9.2(8)(c) Feeder breakers providing emergency power input to Automatic Transfer Switches;

7.9.9.2(8)(d) Intentionally deleted; and

7.9.9.2(8)(e) One feeder breaker for a load bank connection, rated for 100% of a single generator's full load prime power rating.

7.9.9.2(9) Each circuit breaker position in the Generator Paralleling Switchgear will be equipped with a draw-out circuit breaker including:

7.9.9.2(9)(a) 3-phase digital multi-function type protective relay with ANSI protective functions 50/51, 50N/51N, and additional protective functions as required;

7.9.9.2(9)(b) Integral digital metering capable of displaying V, A, KVA, KW with peak demand registers; and

7.9.9.2(9)(c) A communication port integrated with the BMS and ION metering system to indicate breaker load values and switching status.

7.9.9.2(10) Two fully redundant master control systems will be provided, each arranged to control one of the engine-generators. The master control systems will be designed to have no single-point-of-failure and will include:

7.9.9.2(10)(a) Redundant PLC controllers operating in a hot/standby arrangement;

7.9.9.2(10)(b) Redundant power supplies;

7.9.9.2(10)(c) Separate enclosures to house redundant control equipment;

7.9.9.2(10)(d) Dual HMI touchscreen display panel located in the BH Energy Centre and FMO office;

7.9.9.2(10)(e) Dual IP networks with CAT 6 shielded cabling;

7.9.9.2(10)(f) All network equipment will be rack mounted or din rail;

7.9.9.2(10)(g) All network equipment will be monitored for failure of power supplies, routers and switches;

7.9.9.2(10)(h) Dual power supplies on all network equipment, switches and routers; and

7.9.9.2(10)(i) If any powered network device does not have dual power supply, then a method must be installed to switch to the alternate power source if one of the power sources fails.

7.9.9.2(11) Master control systems will include paralleling controls and load management controls. Paralleling controls may be distributed and integrated into genset-mounted control systems only if they provide the same level of redundancy as controls integrated into a central master control system.

7.9.9.2(12) Emergency power system will have the ability to use open transfer, soft transfer (10sec) or fast transfer (10ms).

7.9.9.2(13) Each transfer switch will have a switch at the transfer switch to control: Open transition. Closed fast and closed soft transfer.

7.9.9.2(14) Each transfer switch will have a control switch with: Test, auto, manual.

7.9.9.2(15) Master control will have a 4-position switch with the following operation:

7.9.9.2(15)(a) Operation Run: run generators,

7.9.9.2(15)(b) Auto: system in auto;

7.9.9.2(15)(c) Test: system will start and perform a test based on how the transfer switches are set; and

7.9.9.2(15)(d) Manual: System will stay in the state it was before switched. System ability to manually synchronize the generators.

7.9.9.2(16) Provide a manufacturer remote temporary load bank enclosure with colour coded cam-locks located on the outside of the Fcaility to connect a load bank or temporary generator. Provide a remote load bank connection that is rated at 50% of one generator. This will

provide the ability to do annual load test with Facility load and provide an easy load drop if the generator fails during the test. Controls to be set to drop the load if the test generator is to fail.

7.9.9.2(17) The generators will normally operate in parallel and provide features including load sharing and base loading. It will be possible to select the generators and use the Facility load as a base load for annual load testing.

7.9.9.2(18) Master control panel to be equipped with dual power supplies and have redundant processors for redundancy. The master control panel will monitor all set points listed as required and optional in CSA 282 as well as, it will monitor all parameters of the emergency power system, pumps, fuel level, dampers, and transfer switches.

7.9.9.2(19) The BMS and ION metering system will monitor and record emergency loads and provide alarms and systems status associated with the generator plant and transfer switch system. The generator control system is a stand-alone system on all points of operation and all external communications will utilize a firewall.

7.9.9.2(20) Generators are to be located indoors where they are not 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.

7.9.9.2(21) Diesel generators to have inline radiator fans for cooling the engine including a fuel cooling system. 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. The ambient capacity of the radiator cooling system will be 50 degrees Celsius or 122 degrees Fahrenheit.

7.9.9.2(22) Install the generator set(s) in an area that can be quickly reached for repair and service in case of malfunction. Service entrances will be large enough to permit service of components such as engine, radiator or generator in the event major overhaul or replacement is needed. All items requiring routine maintenance or attention, or inspection will be made easily accessible and serviceable, including the following service points: air cleaners, primary fuel filters, secondary fuel filters, lube oil dipstick, oil filters, radiator and coolant overflow tank fill points, starting batteries, starting motors, battery chargers, voltage regulators, generator, control systems, engine block heaters and pumps, and HMI panels. Provide spare parts inventory including one complete set of fan belts, one set of fuel filters, one set of oil filters, one set of engine air filters, one set of coolant filters for each engine.

7.9.9.2(23) Provide full factory service and repair manuals for the diesel engines in hard copy and in electronic format. Manuals will be printed to refer only to the specific engines that were installed, manuals will not be a generic manual that refer to various different versions of engines.

7.9.9.2(24) Provide removable fitted fibreglass insulation blankets over hot parts to prevent inadvertent contact and to comply with safety requirements of WorkSafe BC and other authorities.

7.9.9.2(25) Provide flexible fuel lines and mating fittings for fuel supply and return lines for main and auxiliary engine-mounted fuel systems

7.9.9.2(26) Generator supplier must meet following conditions:

7.9.9.2(26)(a) The firm is routinely involved in the sale and servicing of new larger engine generators for prime power applications of the type described herein;

7.9.9.2(26)(b) The firm directly employs as staff personnel factory certified repair and maintenance facilities capable of full engine generator major overhauls;

7.9.9.2(26)(c) The firm maintenance and repair facilities will be equipped with large machinery such as lathes, presses, drills, dynamometers etc., as required to perform the work. Service facilities will include large engine performance testing equipment and engine testing bays. The firms will have local service offices in the BC Lower Mainland area and will be capable of providing service personnel to the BH Hospital within 3 hours' notice; and

7.9.9.2(26)(d) The firm directly employs staff service personnel who are certified by the engine manufacturer to undertake warranty repairs to the engine generator assembly. This work will include performing engine management software and firmware upgrades and engine diagnostic work.

7.9.9.2(27) Diesel engines and generators will have an extended 5 year, unlimited hours, full comprehensive warranty. Warranty will cover cost of temporary replacement generator(s) for the duration of the warranty. Warranty period will begin at Substantial Completion Date and after the generator system has been fully commissioned.

7.9.9.2(28) Do not run engines at less than 30% of the nameplate rating during testing and commissioning. Except in an emergency do not shut off engines until they have reached normal operating temperature.

7.9.9.2(29) Each generator diesel engine will be equipped with a heat recovery (heat pump) block heater in addition to the manufacturer's jacket

water heater. The heat recovery heater will act as the primary heater with the standard jacket water heater as the back up.

7.9.9.2(30) Provide diesel engines that are designed to run on ultra low sulphur #1 or #2 diesel fuel.

7.9.9.2(31) Provide an engine oil test kit for each engine. The engine supplier will perform the first engine oil sampling and testing after one hour of operation as a reference sample.

7.9.9.2(32) Diesel engines will be equipped with coolant filtration systems

7.9.9.2(33) Design the emergency power generation plant so that the sound levels that it will create at the facades of neighbouring buildings within the Facility, or at exterior spaces associated with the Facility (including walkways, entryways, balconies or patios) will not exceed the levels specified in Appendix 3C [Acoustic and Noise Control Measures] and the Burnaby City noise bylaw, whichever is more stringent.

7.9.9.2(34) Project Co will retain a professional acoustical consultant to assess generator plant noise levels at the facades of neighbouring buildings within the Facility and of nearby residential buildings and to develop noise control measures that 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.

7.9.9.2(35) Generator will be mounted on spring isolators and/or inertia bases as deemed necessary and sufficient by Project Co's professional acoustical consultant so as to adequately control the transmission of vibration into the Facility structure so that the resulting vibration and noise levels experienced throughout the Facility do not exceed those in Section 5.9.6 Vibration Limits and the background sound limits provided in Appendix 3C [Acoustic and Noise Control Measures].

7.9.9.2(36) Diesel generator exhaust emissions at full load on 100% diesel fuel will not exceed the Environmental Protection Agency Non-Road 'Tier 2' limits, Vancouver Regional District Non-road Diesel Engine Emission Regulation bylaw 1161, and Burnaby regional emissions limits. Locate the diesel generator exhaust outlet above roof level and away from Facility openings to prevent re-entrainment of emissions into air-intakes of existing and future buildings planned onsite.

7.9.9.2(37) Provide 25% spare capacity for future growth. This additional capacity is to be added to the demand code load after all other loads and requirements are accounted for. This capacity will be in addition to any spare capacity included for the mechanical equipment and all

other Authority requirements. Project Co will provide the above redundancy and spare capacity requirements and will demonstrate to the Authority in real time after Commissioning of the Facility is complete. Mechanical loads will be simulated via the BMS.

7.9.9.2(38) Plug and lighting loads will be in accordance with the energy model calculations, and mechanical equipment not activated by the BMS will be accounted for in demand load and approved by the Authority through the Review Procedure.

7.9.9.2(39) Essential power branches will serve essential loads as defined by CSA Z32-15 and as required to meet the Clinical Specifications, including:

7.9.9.2(39)(a) Vital branch loads;

7.9.9.2(39)(b) Path of egress lighting;

7.9.9.2(39)(c) Exit signs;

7.9.9.2(39)(d) Stair and ramp lighting;

7.9.9.2(39)(e) Receptacles and lights at service rooms for emergency distribution;

7.9.9.2(39)(f) Medical gas alarm panels;

7.9.9.2(39)(g) Elevator cab and machine room lighting;

7.9.9.2(39)(h) Fire alarm system and sprinkler system;

7.9.9.2(39)(i) Smoke venting fans and smoke control fans;

7.9.9.2(39)(j) Telecommunications systems and network equipment in all IT Communications Rooms;

7.9.9.2(39)(k) 75% of lighting, receptacles and all permanently connected equipment in ORs unless otherwise noted;

7.9.9.2(39)(l) 50% of receptacles and lights in all Patient care rooms;

7.9.9.2(39)(m) 50% of lights and outlets in Care Team Station;

7.9.9.2(39)(n) Telephone switchboard;

7.9.9.2(39)(o) Intercom System;

7.9.9.2(39)(p) Paging System;

7.9.9.2(39)(q) Nurse call system power supplies;

7.9.9.2(39)(r) Medical vacuum pumping systems;

7.9.9.2(39)(s) Pharmacy dispensing areas;

7.9.9.2(39)(t) All equipment in MDRD (Central Sterilization) area Minimum one of each categories:

7.9.9.2.39.(t).1 Steam Sterilizer in MDR;

7.9.9.2.39.(t).2 Steam sterilizer in OR;

7.9.9.2.39.(t).3 Low Temperature sterilizer;

7.9.9.2.39.(t).4 Cart washer;

7.9.9.2.39.(t).5 Instrument washer;

7.9.9.2.39.(t).6 Ultrasonic Cleaner;

7.9.9.2.39.(t).7 Heat Sealer;

7.9.9.2.39.(t).8 Tube Dryer;

7.9.9.2.39.(t).9 Automatic Endoscope Reprocessor; and

7.9.9.2.39.(t).10 ALL Dry Block Incubators.

7.9.9.2(39)(u) Emergency generator related equipment including ventilation, battery charger or air compressor for starting engine and derangement signals;

7.9.9.2(39)(v) Medication rooms and other similar dispensing areas as directed by the Authority;

7.9.9.2(39)(w) Equipment indicated on Appendix 2E [Clinical Equipment and Furniture] as requested by the Authority during user group meetings. 7.9.8.1(14)(s);

7.9.9.2(39)(x) Hands-free sinks with electronic operators;

7.9.9.2(39)(y) Heat Tracing System;

7.9.9.2(39)(z) Centralized UPS system; and

7.9.9.2(39)(aa) Selected elevators within the Facility will operate on vital power.

7.9.9.2(40) Delayed vital branch loads including:

7.9.9.2(40)(a) Centralized UPS system;

7.9.9.2(40)(b) 100% of all Ventilation systems;

7.9.9.2(40)(c) Sump pumps and sewage ejector pumps;

7.9.9.2(40)(d) Medical air pumping systems;

7.9.9.2(40)(e) Fume hoods;

7.9.9.2(40)(f) Selected elevators within the Facility will operate on delayed vital power.;

7.9.9.2(40)(g) 100% of all heating, ventilation and plumbing systems;

7.9.9.2(40)(h) Medical Imaging Equipment as per Appendix 2E [Clinical Equipment and Furniture] and Furniture and Equipment and Appendix 3A [Clinical Specifications and Functional Space Requirements];

7.9.9.2(40)(i) Surgical Services Medical Equipment as per Appendix 3G [Clinical Equipment List] and Furniture and Equipment and Appendix 3A [Clinical Specifications and Functional Space Requirements];

7.9.9.2(40)(j) Radiology and ultrasound equipment as per Appendix 2E [Clinical Equipment and Furniture] and Appendix 3A [Clinical Specifications and Functional Space Requirements];

7.9.9.2(40)(k) Alarmed freezers and refrigerators;

7.9.9.2(40)(l) Pneumatic Tube System;

7.9.9.2(40)(m) 100% of all Ventilation and air conditioning/cooling equipment serving the main cross-connect room, on-floor communication riser rooms and 24x7 cooling loads;

7.9.9.2(40)(n) 100% of all Ventilation and air-conditioning/cooling equipment serving the main electrical room, electrical riser rooms on each floor and the central UPS room; and

7.9.9.2(40)(o) Fire pump and jockey pump via dedicated transfer switch.

## 7.9.10 Uninterruptible Power Supply (UPS) Systems

### 7.9.10.1 Basic Requirements

7.9.10.1(1) Provide a main centralized Uninterruptible Power Supply (UPS) system arranged in a redundant N+1 configuration for FMO and Clinical systems to serve all areas, equipment and systems that require a continuous and uninterrupted source of power as per the

requirements of this Schedule, Appendix 3A [Clinical Specifications and Functional Space Requirements] and Appendix 3B [Minimum Room Requirements], and for the following additional outlets, equipment and systems:

7.9.10.1(1)(a) 25% of lighting, room receptacles, and permanently connected equipment, and 100% of receptacles in Booms in Operating Rooms;

7.9.10.1(1)(b) 100% of the engineer control room lighting and 25% of the power receptacles;

7.9.10.1(1)(c) 100% of the Operating Room surgical task lights;

7.9.10.1(1)(d) Provide UPS capacity allowance to add up to 25% of the initial quantity of lights, receptacles and equipment as requested by the Authority during design consultation phase through the review procedure described in Appendix 2C [User Consultation and Review Procedure];

7.9.10.1(1)(e) The Building Management System;

7.9.10.1(1)(f) Wired panic system;

7.9.10.1(1)(g) Electronic access control systems;

7.9.10.1(1)(h) Intrusion detection system;

7.9.10.1(1)(i) IP video surveillance system;

7.9.10.1(1)(j) Medical equipment which is deemed a Life Safety System; and in accordance with the Authority user groups requirements. Coordinate with Authority representative to confirm exact requirements;

7.9.10.1(1)(k) All equipment and systems located in electrical and service rooms, and including:

7.9.10.1.1.(k).1 Wireless communications system;

7.9.10.1.1.(k).2 Nurse call system;

7.9.10.1.1.(k).3 Paging system;

7.9.10.1.1.(k).4 Intercom;

7.9.10.1.1.(k).5 Patient wandering system; and

7.9.10.1.1.(k).6 RTLS systems.

7.9.10.1(1)(l) Connect, at a minimum, 20% of the lighting in Clinical Spaces and rooms and areas used by the public to the UPS system.

7.9.10.1(2) Provide a separate Telecommunications dedicated centralized Uninterruptible Power Supply (UPS) system arranged in a redundant N+1 configuration in addition to the above FMO and Clinical system UPS that meets the requirements specified in the telecommunications section of this Schedule to serve;

7.9.10.1(2)(a) All equipment and systems located in Communication Rooms, main equipment room (MER), entrance facility (EF), each telecommunication room (TR), and including:

7.9.10.1.2.(a).1 Network equipment for the wired and wireless networks;

7.9.10.1.2.(a).2 Servers;

7.9.10.1.2.(a).3 IT Switches;

7.9.10.1.2.(a).4 Wireless access points;

7.9.10.1.2.(a).5 Cellular;

7.9.10.1.2.(a).6 PBX and other telephone equipment;

7.9.10.1.2.(a).7 Wireless communications system; and

7.9.10.1.2.(a).8 Other systems as directed by the Authority

7.9.10.2 Performance Criteria

7.9.10.2(1) The UPS systems will be certified as suitable for post-disaster facility and be seismically rated.

7.9.10.2(2) Each UPS systems will have:

7.9.10.2(2)(a) External maintenance bypass switch for servicing;

7.9.10.2(2)(b) Fully rated internal static bypass switch to bypass UPS in the event of UPS failure;

7.9.10.2(2)(c) Fully redundant UPS bypass breaker arrangement; and

7.9.10.2(2)(d) Two battery strings (fully redundant batteries), each with an individual battery monitoring system.

7.9.10.2(3) UPS loads will be circuited from a UPS distribution panel and will be rated for the connected load plus a minimum 25% spare capacity.

7.9.10.2(4) Connect UPS units to an emergency generator circuit and provide adequate batteries rated for a minimum of 15 minutes at full UPS capacity.

7.9.10.2(5) Where vital functions are connected to a UPS circuit, include an audible warning in the vital function area 10 minutes before the UPS battery supply is exhausted. Provide additional monitoring by the BMS.

7.9.10.2(6) The UPS will be capable of providing adequate fault clearing current for a 100A circuit breaker without operation of the static bypass switch.

7.9.10.2(7) Centralized UPS systems:

7.9.10.2(7)(a) Refer to the telecommunications section of this schedule for demand calculations for the centralized IM/IT UPS system;

7.9.10.2(7)(b) To have modular architecture with no system-level single-point-of-failure;

7.9.10.2(7)(c) To have two (2) or more UPS modules connected in parallel providing N+1 redundancy, to ensure UPS power to support 100% of the initial load and 25% spare capacity when one UPS module is unavailable. The IMIT UPS connected load and future capacity needs to be calculated based on section 7.10.8.6(4);

7.9.10.2(7)(d) To have a dedicated battery string for each UPS module rated to provide 15 minutes of back up time when the UPS module is carrying 100% rated load;

7.9.10.2(7)(e) To be online, double-isolation type having output power factor of minimum 0.9;

7.9.10.2(7)(f) To have input filter at each UPS module to limit the total harmonic current distortion to 5% when the UPS module is carrying 100% rated load;

7.9.10.2(7)(g) To have static bypass to automatically bypass the UPS in the event of UPS failure;

7.9.10.2(7)(h) To have external maintenance bypass switching cabinet for servicing the UPS system;

7.9.10.2(7)(i) Each UPS module and the static bypass to have a dedicated input feeder connected to the delayed-vital branch; and

7.9.10.2(7)(j) Will have a network connection to the metering system for monitoring, will have hard wired alarms and will indicate any alarms to the BMS.

7.9.10.2(8) The main distribution panel that is fed from the UPS system output to have an alternate input that can be energized directly from the main delayed vital distribution equipment in the event of a UPS system-failure. Provide interlock controls such that the UPS must be in by-pass or disconnected before the second input can be energized. Only one input feeder can be energized at any one time.

7.9.10.2(9) Provide modular UPS systems with the capacity of the modular UPS such that the addition of future modules in the UPS will not require an upgrade to the electrical equipment infrastructure.

7.9.10.2(10) Provide a modular UPS system with the ability of modular growth capacity for 100% for FMO and clinical UPS systems

7.9.10.2(11) Provide a modular UPS system with the ability of modular growth capacity of 100% for the Telecommunications UPS system.

7.9.10.2(12) Size breakers, electrical equipment and conductors feeding the UPS unit and the conductors and immediate electrical equipment connected on the load side of the UPS to the maximum capacity of the modular UPS such that the addition of future modules in the UPS will not require an upgrade to the electrical equipment infrastructure.

7.9.10.2(13) Provide a telecommunications system UPS branch panelboard and a vital branch panelboard in the main cross-connect room (main telecommunications equipment room) and in each on-floor communication room. Each panelboard to be capable of independently supporting all the telecommunication equipment in the respective room. All active equipment (example: servers, IT switches) to be dual-corded with dual power supplies and simultaneously connected to the UPS branch panel and the vital or delayed vital branch panel such that an interruption in either power branch will not affect the telecommunication equipment.

7.9.10.2(14) Provide a FMO and Clinical system UPS branch panelboard in the main electrical room, generator room, FMO office and in each on-floor electrical room. Each panelboard to be capable of independently supporting all the equipment in the respective room.

## 7.9.11 Metering

### 7.9.11.1 Basic Requirements

7.9.11.1(1) Provide networked, digital microprocessor metering to provide detailed information about power quality and power consumption at key points throughout the Facilities power distribution systems.

7.9.11.1(2) Refer to section 7.5.10.1 for M&V and LEED Gold targets for requirements and separate metering for Phase 1A and Phase 1b energy end-uses.

7.9.11.1(3) Ensure that metering is provided to record total energy consumed by lighting fixtures. Integrate information from all meters of the metering system on a common software platform residing on a dedicated electrical metering server.

7.9.11.1(4) Metering will be provided on all, vital, delayed vital, conditional and UPS power branches.

7.9.11.1(5) Ensure that sufficient metering is provided to record the energy consumed by all major mechanical equipment including chillers, steam consumption, fan and pump motors, medical air and vacuum.

7.9.11.1(6) Implement a networked metering system with terminals for maintenance and plant administration, and data transfer to the Facility's BMS. Provide network software, hardware, licensing to provide remote monitoring and third-party assistance, re-programming and troubling shooting.

7.9.11.1(7) Connect electrical demand and consumption meters to the BMS.

7.9.11.1(8) Include trend logging equipment sensors to comply with and fulfill energy measurement and verification requirements. Logged information will not be overwritten and will be archived.

7.9.11.1(9) Provide additional meters required to measure energy performance. The PMS will use Ethernet as the high-speed backbone network for device communications. The high-speed network will allow direct access to data provided by the power monitoring devices for implementing automatic control.

7.9.11.1(10) Data and analytics provided by the PMS system for centralized display, analysis, logging, alarming, event recording, and other PMS operations will be accessible from a computer workstation with supported operating system and interface software. All metering devices will be UL 508 listed, CSA approved, and have CE marking.

7.9.11.1(11) The metering system will include the following:

7.9.11.1(11)(a) Electrical energy, power and power quality meters;

7.9.11.1(11)(b) Digital protective relays or electronic trip units with integral metering functions, associated with circuit breakers;

7.9.11.1(11)(c) Mechanical or lighting controls equipment with metering capabilities;

7.9.11.1(11)(d) Separation between Phase 1A and Phase 1B metering to validate the M&V and Energy Targets;

7.9.11.1(11)(e) Device communication interface hardware;

7.9.11.1(11)(f) Ancillary equipment including CTs, PTs, servers, terminals, and displays; and

7.9.11.1(11)(g) Software, licensing and programming.

7.9.11.1(12) All components of the digital metering system will be fully compatible with each other and integrated into a single seamless PMS network, which aggregates and stores all electrical and mechanical meter data for the Facility indefinitely, with software included to enable remote viewing and analysis of meter data.

7.9.11.1(13) The BH Campus existing power metering system currently resides on a Schneider metering platform. Project Co will intergrade all new meters into the existing metering platform and provide all upgrades to ensure seamless integration to provide a fully functional metering system with complete functionality between the two systems.

7.9.11.1(14) Integrate information from all new and existing meters on a common software platform residing on an existing dedicated electrical metering server. Existing software is the Integrated Intelligent Building Management System (iBMS) Eco Struxure by Schneider Electric. Provide all updates to existing software and hardware as required for seamless integration between the new and existing metering systems.

7.9.11.1(15) Provide a qualified iBMS system supplier (identified as the Master System Integrator or MSI) to supplement the system supplier’s work as necessary to provide a complete and fully operable system. Project Co will coordinate the metering equipment and systems, provided that interface with the iBMS to ensure interconnections and compatibility are provided for the required functionality of the iBMS.

7.9.11.1(16) The iBMS system supplier will not duplicate work specified under Divisions other than Division 25 but will be responsible for the integration, communications and functionality of those systems as specified herein. This will include the augmentation (configuration, programming, etc.) of those systems provided by others to provide the specified integrated cross-system functionality. System suppliers under Divisions other than Division 25 are required to provide their specified system functionality, system access to the iBMS system

supplier for the purpose of providing the iBMS and interface coordination for the integration specified herein.

7.9.11.1(17) Revenue metering (Measurement Canada approved) to be installed for the following points and load category groupings:

7.9.11.1(17)(a) Each retail tenant panel feeder.

7.9.11.1(18) Power quality metering capable of measuring individual voltage and current harmonics (up to 31st), total harmonic distortion, fast transient surges, and event waveform capture to be installed for the following points and load category groupings:

7.9.11.1(18)(a) Each UPS system output (paralleled UPS outputs may be metered as a group);

7.9.11.1(18)(b) At the CDP main breaker/main lugs of the 120/208V CDPs serving the 120/208V receptacle and lighting panels if the ASHRAE 90.1 2016 requirements for individual metering of receptable, lighting and mechanical loads can be met. Power and Lighting Panelboards at 600V and 120/208V;

7.9.11.1(18)(c) MCCs;

7.9.11.1(18)(d) Panelboards feeding mechanical equipment and elevators;

7.9.11.1(18)(e) All other requirements of ASHRAE 90.1 and LEED Gold and LEED v4 Energy Atmosphere credit Advanced Energy Metering;

7.9.11.1(18)(f) High Voltage mains;

7.9.11.1(18)(g) Each Secondary switchboard mains;

7.9.11.1(18)(h) Each CDP mains; and

7.9.11.1(18)(i) Each MCC mains.

7.9.11.1(19) Energy information metering to be installed for the following points and load category groupings:

7.9.11.1(19)(a) Each panelboard feeder;

7.9.11.1(19)(b) Each surge protection device;

7.9.11.1(19)(c) Each chiller feeder;

7.9.11.1(19)(d) Cooling (including cooling towers, split systems, CRAC units, hydronic cooling circulation pumps);

7.9.11.1(19)(e) Heating (including boilers, electric heating, heat tracing, hydronic heating circulation pumps);

7.9.11.1(19)(f) Ventilation (including supply, return, exhaust, make-up and pressurization fans);

7.9.11.1(19)(g) Pumps;

7.9.11.1(19)(h) Elevators (metering will be capable of directional power measurements);

7.9.11.1(19)(i) MDRD;

7.9.11.1(19)(j) Kitchen (including all outlets and equipment within Kitchen and servery areas);

7.9.11.1(19)(k) IM/IT Equipment;

7.9.11.1(19)(l) Interior lighting;

7.9.11.1(19)(m) Exterior lighting; and

7.9.11.1(19)(n) Plug loads (including all outlets not included in other load categories).

7.9.11.1(20) Energy information metering will use meters with voltage and current measurements on each phase, 0.5% ANSI energy accuracy class, except for these load category groupings, which may use calculated values based on control system data, single-phase current-only measurements, or addition/subtraction of multiple meter points:

7.9.11.1(20)(a) Interior lighting;

7.9.11.1(20)(b) Cooling;

7.9.11.1(20)(c) Heating;

7.9.11.1(20)(d) Ventilation;

7.9.11.1(20)(e) Pumps;

7.9.11.1(20)(f) Imaging Equipment;

7.9.11.1(20)(g) IM/IT Equipment; and

7.9.11.1(20)(h) Plug loads.

7.9.11.1(21) The following load categories will be sub-divided into department-level groupings of their energy and power consumption in the EPMS network analytics:

7.9.11.1(21)(a) Interior lighting;

7.9.11.1(21)(b) Plug loads;

7.9.11.1(21)(c) MDRD; and

7.9.11.1(21)(d) Kitchen.

7.9.11.1(22) Mechanical equipment with nameplate ratings less than 100W or emergency-only operation including VAV boxes, fire pumps, stairwell pressurization fans, etc., may be excluded from metering and included in the plug load grouping where fed from the same panel.

7.9.11.1(23) All types of meters except those integrated into EV chargers, lighting controls, or mechanical controls equipment will locally display the measured values at each of the above-noted equipment in addition to transmitting the measured values for data aggregation and long-term storage.

7.9.11.1(24) Provide to the Authority sufficient device licenses to enable remote terminal access to the EPMS system. These licences will enable the Authority to access real-time, peak demand, trend data, etc., to produce custom reports on:

7.9.11.1(24)(a) Energy performance optimization;

7.9.11.1(24)(b) Power demand, reliability and availability;

7.9.11.1(24)(c) Sustainability metrics; and

7.9.11.1(24)(d) Power quality.

7.9.11.1(25) Metering will be provided on all normal, vital, delayed vital, conditional and UPS power branches.

7.9.11.1(26) Connect electrical demand and consumption meters to the BMS.

7.9.11.1(27) Provide additional meters required to measure energy performance in order to determine performance in accordance with Appendix 2D [Energy and Carbon Guarantees]

7.9.11.2 Performance Criteria

7.9.11.2(1) The metering system will provide easily read locally displayed information for all distribution at primary voltage and for each secondary distribution switchboard.

7.9.11.2(2) Metering intervals will be set as needed from 1 second to 5 minutes.

7.9.11.2(3) Design the metering system network to store historical data and to have the capability to generate user configurable electronic and printed reports on demand.

7.9.11.2(4) 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.

7.9.11.2(5) The metering system will, at a minimum, provide the following information about each metered circuit: Phase-to-Phase Voltage (all phases), Line-to-Neutral Voltage (all phases), Phase Demand and Peak Current (all phases and neutral), KW (peak and average), KVA (peak and average), Power Factor, KWH, VAR, hours and frequency. The metering system will also provide current and voltage harmonic information at the mains of each CDP.

7.9.11.2(6) Utilize power quality type meters for monitoring harmonics and surges / sags. Provide power quality meters capable of monitoring harmonics on the normal, vital, delayed vital and conditional Distribution Panels.

7.9.11.2(7) Draw-out circuit breakers on the 600V main normal and emergency Distribution Panels will be provided with trip units with integral 3 phase true RMS digital meter with local LCD display to indicate the phase current for each phase, kW and kVA.

## 7.9.12 Energy Management

### 7.9.12.1 Basic Requirements

7.9.12.1(1) Provide an integrated energy management system to monitor, record, analyse, report on and control energy consumption from all sources that supply energy to the Facility. This system to be connected to the BMS.

7.9.12.1(2) Design the system to provide sufficient information to enable the Authority to make Facility-wide “demand-side management” decisions relating to overall energy demand, with the intent of reducing overall energy consumption and demand throughout the Facility. Incorporate data from the digital meters required by Division 25. Provide and coordinate with the Authority’s representative to provide IP address for energy management monitoring capabilities.

7.9.12.1(3) Provide a system and equipment that is flexible, controllable, and will form an integral part of the Facility.

### 7.9.12.2 Performance Criteria

7.9.12.2(1) Design the energy management system to be accessible from any networked computer using appropriate software.

7.9.12.2(2) Provide a minimum of 20 dedicated site software licenses.

7.9.13 Grounding and Bonding

7.9.13.1 Basic Requirements

7.9.13.1(1) Provide grounding and bonding for all electrical equipment and systems in the Facility 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 boding as required by all applicable standards.

7.9.13.1(2) Provide supplementary grounding per CSA Z32 in areas identified by the Authority as Patient care areas.

7.9.13.2 Performance Criteria

7.9.13.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the Facility.

7.9.13.2(2) Provide solid system grounding including conductors and bussing.

7.9.13.2(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.

7.9.13.2(4) Provide equipotential grounding systems and equipment for all Patient care areas. Provide a copper bond that is sized in compliance with the CEC section 24 and Z32-15 from the panelboard to each room reference ground bus RRGB in each Patient care area. RRGB will be located in a flush mounted enclosure, installed below the ceiling on the left hand side of the door upon entering the room. All branch circuits serving the Patient care area will be routed through the RRGB enclosure. Provide a stainless steel cover over the enclosure with an identification label on it.

7.9.13.2(5) 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.

7.9.13.2(6) Provide a solidly grounded system including conductors and bussing. Provide equipotential grounding systems and equipment for

all Clinical Spaces, including a common ground bus for each Patient bed location as required by CSA Z-32-15 or latest edition.

7.9.13.2(7) Bond all exposed non-current carrying components of communication, radio or television equipment in Clinical Spaces to ground using a properly sized equipment bonding conductor.

7.9.13.2(8) Provide a ground bus in each electrical and communication room connected to the central grounding system.

7.9.13.2(9) Provide a copper ground conductor within all raceways for feeders and branch circuit wiring.

7.9.13.2(10) Provide a ground bus in each electrical and Communications Room connected to the main building ground electrode, of sufficient size to double the number of grounding and bonding conductors initially connected without adding additional busbars or multi-conductor lugs or drilling new holes. Ground buses and the grounding/bonding conductors interconnecting them to be sized and installed in accordance with CEC and ANSI/TIA-607-C requirements. Ground buses and risers for electrical rooms and Communications Rooms to be completely independent and bonded together only at the main unit substation room ground buses

7.9.13.2(11) Provide a minimum #4/0 AWG copper ground conductor to be run to the Telecommunications Main Bus Bar and bond communications systems in accordance with ANIS/TIA 607 requirements. Communications grounding and bonding to be in accordance with the latest addition of the PHSA standards.

7.9.13.2(12) Label all grounding and bonding conductors and bus bars consisting of the ‘bonding backbone’ with printed labels.

7.9.13.2(13) Complete a lightning protection study for the Facility, such study to be done by a specialist in lightning protection work and to be signed and sealed by a professional engineer registered in British Columbia. Provide a lightning protection system for the Facility buildings if required by the study. Lightning protection system for the Facility’s buildings and structures to the requirements of CAN/CSA-B72-M87 and the NFPA 780 Standard for the Installation of Lightning Protection Systems, the more stringent clause will apply.

7.9.13.2(14) Bond all electrical equipment located on the roof level, including antennas, satellite receivers, and luminaires, to the lightning protection system. Bond all antenna hardware to the minimum requirements of the DAS carrier.

7.9.13.2(15) Provide lightning protection for propane storage tanks, flammable storage cabinets, new and existing diesel storage tanks and similar systems as directed by the Authority.

7.9.13.2(16) Where installed in conduit, lightning protection conductors will be installed in PVC conduit.

7.9.13.2(17) Lightning protection system to be commissioned by third party.

7.9.14 Seismic Requirements for Electrical and IM/IT Systems

7.9.14.1 Basic Requirements

7.9.14.1(1) Provide seismic restraint for all electrical and IM/IT equipment and components of electrical systems. Design the electrical systems and its associated equipment to comply with the BC Building Code for a post-disaster facility.

7.9.14.1(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.

7.9.14.1(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.

7.9.14.1(4) Provide seismic restraint systems and methods that coordinate with the Facility's structural seismic joints and separations between buildings. Project Co to provide seismic joints for all electrical and systems including raceways, conduit, and any services that penetrates and routes through a structural seismic joint and or as new services are routed between the new and existing buildings. Provide fixed pullbox, junction box or similar on either side of the penetration and utilize flexible conduit or raceway between fixed pull boxes or junction boxes. Flexible connection to be installed to provide 50mm of movement up and 50mm of movement down to accommodate any seismic movement. 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.

7.9.14.2 Performance Criteria

7.9.14.2(1) 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.

7.9.14.2(2) 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.

## 7.9.15 Power Quality

### 7.9.15.1 Basic Requirements

7.9.15.1(1) 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.

7.9.15.1(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.

7.9.15.1(3) Meet or exceed relevant standards for power quality where deemed necessary by the Authority and IEEE.

7.9.15.1(4) Provide harmonic mitigation equipment, as necessary, to ensure that power quality does not fall below 95% lag and meets or exceeds recommendations in IEEE, including standard 519. Prevent vacuum circuit breaker switching-induced transients from affecting dry-type 12kV transformers nor pose a leading power factor to the upstream generators. For the purposes of measuring the harmonic distortion, the "Point of Common Coupling" will be any of the two main transformers. As part of Commissioning, confirm compliance to tables 10-2 and 10-3 of IEEE 519 by field measurements after building occupancy and under normal operating conditions.

7.9.15.1(5) The electrical distribution system will be protected from the disruptive effects of:

7.9.15.1(5)(a) Lightning strikes;

7.9.15.1(5)(b) Current surges (causing voltage drops);

7.9.15.1(5)(c) Voltage surges;

7.9.15.1(5)(d) Overvoltage;

7.9.15.1(5)(e) Undervoltage;

7.9.15.1(5)(f) Harmonic currents;

7.9.15.1(5)(g) Ferroresonance; and

7.9.15.1(5)(h) Switching transients.

7.9.15.1(6) Provide individual harmonic filters ahead of and coordinated with variable speed drive for every motor greater than 7.5 HP.

7.9.15.2 Performance Criteria

7.9.15.2(1) Provide adequate equipment, such as filters, SPD (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 and Existing Hospital. Adverse power quality conditions include voltage spikes, dips and droops, transients, harmonics, EMI, power factor and radio frequency interference. SPDs are only required for 600V & 120/208V Centralized Distribution panels when serving sensitive electronic equipment, and for 120/208V branch panels when serving sensitive electronic equipment. Electronic grade panelboards require an integrated SPDs and 200% neutral copper bus only when serving sensitive electronic equipment.

7.9.15.2(2) 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.

7.9.15.2(3) The voltage phase imbalance will not exceed 3 percent between phases A, B, C anywhere within the power distribution system.

7.9.15.2(4) Provide station class lighting arrestors on the primary side of the 12.47kV-600V main step down transformers. Provide integral surge protective devices (SPD’s) on all 600V Centralized Distribution Panels, all120/ 208V Centralized Distribution Panels. 120/208V Panelboards supplying power to sensitive electronic equipment will also have integral SPDs and dedicated neutrals for electronic equipment.

7.9.15.2(5) Provide phase detection/protection at all Centralized Distribution Panels feeding mechanical equipment, elevator equipment and medical equipment.

7.9.15.2(6) Provide a third party specializing in power quality systems to fully test and commission all power quality systems. Submit the reports with the Commissioning documents.

## 7.9.16 Lighting

### 7.9.16.1 Basic Requirements

7.9.16.1(1) Provide complete lighting solutions that align with the requirements and recommendations of the BCBC, WSBC OHS Regulation (General Conditions, Illumination, Section 4.64 – 4.69), ANSI/IES RP-29-16, IES Lighting Handbook (10th Edition), and CSA Z317.5-17. Where the recommendations vary among these standards, whichever illuminance levels are greatest and whichever requirements apply to LED lighting will govern unless otherwise approved by the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

7.9.16.1(2) Lighting design in Communications Rooms and Multimedia Rooms to also comply with requirements in Communications (Division 27).

7.9.16.1(3) Provide luminaires that are easily maintainable and accessible. In Patient areas utilize luminaires that include the ability to replace drivers and lamps / LED modules 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 can be used in non-Patient areas where T-bar ceilings allow access to the drivers.

7.9.16.1(4) Provide luminaires that require minimal cleaning and permit practical and easy access and disassembly by authorized Staff. In locations where it is necessary to locate luminaires in locations not routinely accessible without fall restraint / staging (for example high Enclosed Atrium), utilize long life luminaires.

7.9.16.1(5) 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 ambience feel while providing Vandal Resistant and Ligature Resistant performance in all areas accessible to Patients in Mental Health Areas.

7.9.16.1(6) Provide appropriate luminaires to support the Authority's infection control policies and procedures including minimizing accumulation of dust and debris. Locate luminaires such that they can be easily cleaned. In critical Patient care areas, MDRD, Kitchen, server, Pharmacy and other similar areas provide NSF-2 listed luminaires.

7.9.16.1(7) 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 adequate video capture from the video surveillance system.

7.9.16.1(8) As architectural features, design lighting in exterior areas, lobbies, waiting areas, the Main Entrance Lobby, and Enclosed Atrium with high quality products aesthetically pleasing to the public and Staff.

7.9.16.1(9) Project Co will utilize LED technology for all lighting. Utilize hospital grade luminaires in all clinical and general hospital areas and specification grade quality luminaires in Utility and storage closets. All luminaires to be selected with emphasis on energy efficiency, aesthetics, glare reduction and high colour rendering.

7.9.16.1(10) All lighting will be dimmable and will provide various lighting levels to accommodate individual control and comfort. Healthcare luminaires will be appropriate to the unique requirements of each application, including the following.

7.9.16.1(10)(a) Examination lighting to provide high powered lighting for Patient exams;

7.9.16.1(10)(b) Task lighting to support a variety of tasks requiring enhanced illumination as noted in Appendix 3A [Clinical Specifications and Functional Space Requirements] and as determined through the Review Procedure;

7.9.16.1(10)(c) Chart lights to support caregiver notations on Patient progress as noted in Appendix 3A [Clinical Specifications and Functional Space Requirements], Appendix 3B [Minimum Room Requirements] and as determined through the Review Procedure;

7.9.16.1(10)(d) Wayfinding – night lights in Patient rooms and areas to promote overall Patient wellness as noted in Appendix 3A [Clinical Specifications and Functional Space Requirements], Appendix 3B [Minimum Room Requirements] and as determined through the Review Procedure. lighting will provide maximum uniformity.

7.9.16.1(10)(e) Provide a low voltage or distributed lighting control system that combines a broad selection of energy-efficient LED luminaires that controls the lighting system in compliance with the latest energy codes. Provide lighting fixtures with dual technology occupancy/vacancy and daylight harvesting sensors for all public areas, including general corridors, all department corridors, waiting areas and similar areas.

7.9.16.1(10)(f) Utilize harm Prevention fixtures throughout the Inpatient Psychiatry Unit as per Appendix 3B [Minimum Room Requirements] and in other areas as determined and directed by any other specification section or reference document. Provide recessed or surface mounted Tamper Resistant or institutional Vandal Resistant type luminaires.

7.9.16.1(11) All Operating Rooms, treatment rooms, Patient rooms, Patient bays, stretcher bays and similar room luminaries will be rated to the TM-30 standard for the elevation of light source colour rendition by quantifying fidelity and gamut of a light source.

7.9.16.1(12) Provide aesthetically pleasing, exceptional visual comfort luminaires with dimming and scene setting as detailed in this section.

7.9.16.1(13) Specify luminaire construction based on the specific risks and needs of the space into which the luminaires are being installed, including Vandal Resistant and Tamper Resistant luminaires, fasteners and fittings.

7.9.16.1(13)(a) Surface mounted luminaires in public lobbies exterior areas and the parkade will be Vandal Resistant and Tamper Resistant, when mounted below 3500 mm AFF.

7.9.16.1(13)(b) Surface mounted luminaires in stairwells, exercise rooms, public washrooms and any public locations below 3000 mm AFF will be Vandal Resistant and Tamper Resistant, except in Staff-only areas.

7.9.16.1(13)(c) Luminaires in any locations below 2750 mm AFF will be Vandal Resistant and Tamper Resistant, except in Staff-only areas.

7.9.16.1(14) Provide colour changing (tunable) (Circadian lighting) lighting fixtures for the LDRP and NICU department including LDRP rooms, corridor, observation rooms, bassinette room, all intermediate Care Areas and bays. Control system will include a continuous circadian program cycle that will control the tunable white fixtures in the birthing rooms. An over-ride bypass switch in each room will allow the system to be bypassed to allow for manual control and dimming by the medical Staff. An over-ride bypass switch in each nurse’s station or similar area will allow the system to be bypassed to allow for manual control and dimming by the medical Staff. The fixtures can easily be returned to the circadian cycle at any time. Provide all hardware, configuring tools, faceplates and associated wiring as required to provide a complete and fully functional system. Provide data connection to BMS to record and display the lighting energy consumption for each switching zone. Provide a direct/indirect

lighting solution that takes into account all the necessary lighting levels and illumination required for observation, care and visual Task Lighting within these areas. Provide a lighting layout in consultation with the Authority and as determined through the Review Procedure.

7.9.16.1(15) All Operating Rooms, treatment rooms, procedure rooms and similar room luminaries will be NSF2 listed IP65 rated UL certified IP65 per IEC 60598. Provide non-electronic interfering luminaires rated to MIL-STD 461 in all operating rooms, and any other room with diagnostics and treatment equipment.

7.9.16.1(16) Provide FED-STD-209E/Class 1 Clean rooms and conducted emissions controlled as per MIL-STD-461F luminaires for all operating rooms and Patient washroom downlights.

7.9.16.1(17) Cashier areas provide multilevel, manual on/off and dimmable control of 4 zones of lighting control for the space. Provide specialty lighting (suspended) fixture above retail counter. Provide LED under cabinet, and track lighting for all display racks & cove lighting.

7.9.16.1(18) Cart Washer: Provide occupancy sensor with manual on auto off lighting control. Provide multi zoned lighting control. Provide hand hygiene sink light. Provide sealed and gasketed lighting for visual tasks of low contrast or very small size. Provide lighting between cart washers.

7.9.16.1(19) Compound areas; provide occupancy sensor with auto on auto off lighting control. Provide lighting for visual tasks of high contrast or medium size. Provide hand hygiene sink light. Provide sealed and gasketed lighting.

7.9.16.1(20) Tub areas provide separately switched tub light.

7.9.16.1(21) All Patient room washrooms to have occupancy-controlled night light.

7.9.16.1(22) Computer training area: room has the ability to be separated into two complete rooms with separate lighting control. Provide sensors to monitor the room usage and to provide automatic lighting control from one room to two individual rooms. Provide 6 zone lighting controllers at both entrances.

7.9.16.1(23) Care Team Stations to be provided with master zone lighting controller to provide multilevel, manual on/off and dimmable to provide master control of all public spaces in the department. Provide a combination of ambient and Task Lighting separately controlled that allows for visual tasks of medium contract to very small. Provide aesthetically pleasing specialty lighting for all Care Team Stations, kiosks, and other areas as noted in Appendix 3B

[Minimum Room Requirements]. Specialty lighting will consist of suspended fixtures above Millwork, LED cove lighting in bulkhead and architectural clouds and wall washing down lights for feature walls and similar locations.

7.9.16.1(24) Provide 1 hand hygiene sink light per 3 bay and separately switch downlight between assessment/prep/recovery bays.

7.9.16.1(25) Ambient lighting to promote overall Patient wellness.

7.9.16.1(26) Before finalizing lighting layouts and ordering luminaires, a manufacturers luminaire data sheet will be provided for each proposed luminaire type for Authority approval. A sample luminaire will be provided for specific fixture types identified by the Authority for all typical room required mock-ups.

7.9.16.1(27) Luminaries, lamps and LED modules will have the following characteristics:

7.9.16.1(27)(a) LED colour temperature of 3500K for general area lighting unless otherwise as directed by the Authority;

7.9.16.1(27)(b) LED colour temperature to 4100K for exam lighting unless otherwise directed by the Authority; and

7.9.16.1(27)(c) Areas with a Color Appearance (and Color Contrast) of Very Important as listed in Table 3B of the IESNA RP 29-06 will be 4100K and have a TM-30 of 90.

7.9.16.1(28) LED drivers and addressable control modules to meet the following requirements:

7.9.16.1(28)(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;

7.9.16.1(28)(b) Input power factor greater than 0.90 from 20% to 100% rated load; and

7.9.16.1(28)(c) Input current THD less than 20% from 20% to 100% rated load.

7.9.16.1(29) Comply with IEEE 1789 recommended practices for minimizing flicker effects and ensure systems have no visible flicker when tested with a flicker wheel, including dimming systems across the full dimming range.

7.9.16.1(30) Minimum operating temperature:

7.9.16.1(30)(a) -20˚C (-4˚F) for interior applications; and

7.9.16.1(30)(b) -40˚C (-40˚F) for exterior applications.

7.9.16.1(31) Metallic enclosure for optimal thermal performance.

7.9.16.1(32) Compatible with the dimming system.

7.9.16.1(33) Class A sound rating.

7.9.16.1(34) 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.

7.9.16.1(35) For linear luminaires: slim profile with height ≤ 25 mm (1 inch) and width ≤ 30 mm (1.2 inch). Wider luminaires can be used only where necessary for broader light distribution, higher illuminance or desired aesthetic effect.

7.9.16.1(36) Integral colour-coded connectors.

7.9.16.1(37) Free of any PCBs.

7.9.16.1(38) Labelled compliant with the latest edition of the following standards:

7.9.16.1(38)(a) CSA-C22.2 No. 223, Power Supplies with Extra-Low Voltage Class 2 Outputs; and

7.9.16.1(38)(b) CSA C22.2 No 250-13, LED Equipment for use in Lighting Applications.

7.9.16.1(39) RoHS compliant.

7.9.16.1(40) Warranty: 5 years.

7.9.16.1(41) LEDs will meet the following requirements:

7.9.16.1(41)(a) Care areas provide luminaires with CRI ≥ 90 and R9 and R13 > 50;

7.9.16.1(41)(b) Where luminaires are used for Patient observation, examination (i.e. where examinations occur but separate articulating arm exam or surgical luminaires are not installed), or bloodwork, provide luminaires with R9 and R13 > 80;

7.9.16.1(41)(c) Comply with IESNA LM-79 testing procedures;

7.9.16.1(41)(d) Maximum temperature at the base of the “LED cap” mounted to the substrate to be controlled to ensure full lamp life;

7.9.16.1(41)(e) Minimum lumen maintenance of L70 @ 50,000 hours. Comply with IESNA LM-80 and LM-21 testing procedures;

7.9.16.1(41)(f) LEDs of the same type to be from the same manufacturing batch and labelled with bin information sufficient to allow future colour matching of replacement luminaires;

7.9.16.1(41)(g) Capable of continuous dimming, flicker and noise free, from 1% -100% of rated lumen output; and

7.9.16.1(41)(h) Provide certified test results for each type of luminaire, driver, and control device used on the Project, including compatibility tests for any combination of these devices used on the Project (e.g. dimming compatibility).

7.9.16.1(42) Provide standalone battery-operated emergency unit lighting in the security rooms, at the CACF, EOC, electrical rooms, IM/IT rooms, ORs, and UPS rooms.

7.9.16.1(43) Utilize low glare recessed luminaires, direct/indirect or architectural troffers, specifically designed to eliminate direct glare in treatment rooms, offices, reception areas, Care Team Stations and areas where computer terminals or similar screens are used.

7.9.16.1(44) 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).

7.9.16.1(45) Place a luminaire outside all corridor-accessible single occupant Patient Washrooms, controlled by a washroom ceiling mounted occupancy sensor to alert Staff that the washroom is occupied. Connect to vital power. Luminaire off delay on washroom vacancy to be 30 seconds or less.

7.9.16.1(46) Provide luminaires and controls functions appropriate to each room type as detailed in the minimum room requirements. For rooms without associated room templates, provide luminaires and controls in accordance with the general requirements of this Schedule.

7.9.16.1(47) Patient room lighting will accommodate the needs of both Patient and caregiver. Lighting requirements within the Patient rooms differ based on the task being performed, including testing, Patient examination, charting, reading and Wayfinding. Additionally, the Patient room will optimize Patient comfort with a residential inspired design. Provide multi-function lighting, night lighting, chart lighting and head wall illumination.

7.9.16.1(48) Patient room lighting will consist of a multi-function headwall luminaire to provide ambient and exam lighting. Provide examination and general area lighting above bed or stretcher with 1% - 100% dimming. Provide a dimmable reading lamp in the headwall design. In addition, provide general overhead room lighting. Provide LED night lights for Wayfinding switched from Patient pillow control and at entrance to room. Provide LED charting lights at the headwall location to accommodate charting. Provide dimmable down lights for Patient visitors area separately switched for convenience. Provide a separately switched wall mounted vanity luminaire above all Patient washroom sinks, a separately switched dimmable down light above the toilet and a downlight in Patient washrooms with a shower.

7.9.16.1(49) Corridors / Care Team Station and similar area lighting to meet performance requirements as follows:

7.9.16.1(49)(a) Intentionally deleted;

7.9.16.1(49)(b) Appropriately placed lighting for tasks;

7.9.16.1(49)(c) Wayfinding capabilities;

7.9.16.1(49)(d) Dependable and effective signage exit and emergency lighting;

7.9.16.1(49)(e) Provide suspended pendant mounted cylinder type fixtures mounted above the Care Team desk and similar locations;

7.9.16.1(49)(f) Provide colour changing RGBW LED cove lighting in all bulkheads, architectural clouds and similar drop ceiling features above the Care Team area and similar locations;

7.9.16.1(49)(g) Provide recessed wall washing down lights for feature walls;

7.9.16.1(49)(h) Provide master override dimming control for at least one fixture in all inpatient bedrooms and observation rooms;

7.9.16.1(49)(i) Provide master override dimming control in all observation alcoves to control at least one fixture in all inpatient bedrooms and observation rooms;

7.9.16.1(49)(j) Corridor lighting primary requirement is the ability to ease transitions to adjacent areas;

7.9.16.1(49)(k) Provide down lights in alcoves and similar locations to deliver soothing corridor illumination; and

7.9.16.1(49)(l) Provide under cabinet Task Lighting proposal to support a variety of caregivers' duties.

7.9.16.1(50) Provide operating, surgical imaging and Urology lighting to performing requirements as follows:

7.9.16.1(50)(a) Non-ferrous;

7.9.16.1(50)(b) Mitigation of electromagnetic interference (EMI);

7.9.16.1(50)(c) Conducted emissions controlled as per MIL-STD-461G;

7.9.16.1(50)(d) Sealed and gasketed for infection control;

7.9.16.1(50)(e) All Luminaires will have Two operating modes complete with 405nm wavelength disinfection patented technology;

7.9.16.1(50)(f) Will be NSF2 splash/non-food zone;

7.9.16.1(50)(g) UL certified IP65 per IEC 60598;

7.9.16.1(50)(h) Provide FED-STD-209E/Class 1 (ISO 3) Clean rooms;

7.9.16.1(50)(i) Dimmable LED technology for enhancing operational safety and Patient control;

7.9.16.1(50)(j) Designed for ease of maintenance;

7.9.16.1(50)(k) Healing lights to optimize Patient comfort; and

7.9.16.1(50)(l) Provide aesthetically pleasing, exceptional visual comfort, dimming and scene setting.

7.9.16.1(51) Provide Patient room washroom, area lighting to the performance requirements as follows:

7.9.16.1(51)(a) Conducted emissions controlled as per MIL-STD-461G. The Authority will accept the luminaires noted in clause 7.9.16.1 (51) that do not meet the MIL-STD-461G standard.;

7.9.16.1(51)(b) Sealed and gasketed for infection control;

7.9.16.1(51)(c) Will be NSF2 splash/non-food zone;

7.9.16.1(51)(d) UL certified IP65 per IEC 60598;

7.9.16.1(51)(e) Multi-function capability;

7.9.16.1(51)(f) Aesthetic appeal;

7.9.16.1(51)(g) Ease of maintenance and cleanability; and

7.9.16.1(51)(h) Dimmable lighting.

7.9.16.1(52) Provide luminaires and light sources that enhance safety and allow personnel to circulate throughout spaces and perform required tasks.

7.9.16.1(53) Design lighting with the objective of creating a comfortable working environment and an environment conducive to healing and recovery.

7.9.16.1(54) Lighting power density levels will be lower than the latest adopted version of the ASHRAE Standard 90.1 by 20% and the lighting installation will meet the requirements of Appendix 3A [Clinical Specifications and Functional Space Requirements] and ASHREA standard 90.1.

7.9.16.1(55) Provide a low voltage lighting control system complete with power management system. Provide addressable occupancy, vacancy, daylight sensor, dimmers and switches where lighting control is required. Provide connections to the BMS and energy management system.

7.9.16.1(56) An electrically powered LED "Laser In Use" sign will be located outside any room in which a laser is anticipated to be used, such as all operating and procedure rooms. The sign will be connected to an internally illuminated switch inside the room label "Laser". The switch will be interlocked with the laser equipment such that the equipment will not operate with the switch in the “off” position. The “Laser In Use” sign will be interlocked with the doors to the operating room and the laser will not function while the doors are open. Internal illumination of the switch will be on only when the “Laser In Use” sign is illuminated.

7.9.16.1(57) An electrically powered LED "X-ray In Use" sign will be located outside any room in which fixed or mobile x-ray equipment is anticipated to be used, such as the OR. The sign will be connected to an internally illuminated switch inside the room label "X-ray". The switch will be interlocked with the x-ray equipment such that the equipment will not operate with the switch in the “off” position. The “X-Ray In Use” sign will be interlocked with the doors to the operating room and the X-Ray machine will not function while the doors are open. Internal illumination of the switch will be on only when the “X-ray In Use” sign is illuminated.

7.9.16.2 Performance Criteria

7.9.16.2(1) Provide luminaires that require minimal cleaning and permit practical and easy access and disassembly. All luminaries will be ULC listed, provided with anti-microbial finish, and rated for intended usage.

Provide infection control rated luminaires throughout all ORs and Patient room washrooms. All lighting components to be specification or hospital grade.

7.9.16.2(2) Utilize LED lighting. Use wall sconces or down lighting for decorative purposes. Do not use incandescent, fluorescent, compact fluorescent or HID lighting.

7.9.16.2(3) Light emitting diodes (LEDs) will be minimum 1.2 to 3W per LED. For colour temperature consistency, LEDs to be from the same bin number. To ensure a full lamp life, control the maximum temperature at the base of the “LED cap” mounted to the substrate. LEDs will be measured to LM79 standards and tested to LM80 and L70 using TM-21 standards.

7.9.16.2(4) Minimize use of battery-operated unit emergency lighting. Battery-operated emergency lighting may be an acceptable alternative as a second level of emergency lighting as directed by any other specification section or reference document, code or standard. Remote heads will utilize LED technology.

7.9.16.2(5) Connect, at a minimum, 20% of the lighting in Clinical Spaces and rooms and areas used by the public to the UPS system.

7.9.16.2(6) 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.

7.9.16.2(7) Utilize harm Prevention fixtures throughout the Psychiatry Inpatient Unit as per Appendix 3B [Minimum Room Requirements] and in other areas as determined and directed by any other specification section or reference document. Provide recessed or surface mounted Tamper Resistant or institutional Vandal Resistant type luminaires as directed.

7.9.16.2(8) Tamper resistant type luminaires will be durable with minimum 16-guage housing, high impact resistant clear polycarbonate lenses (6mm thick), tamper-proof hardware and ligature proof when wall or surface mounted.

7.9.16.2(9) Institutional Vandal Resistant type luminaires will provide a maximum security & durable construction with minimum 14-gauge housing, high impact resistant clear polycarbonate lenses (9.5mm thick), tamperproof hardware and ligature-proof when wall or surface mounted.

7.9.16.2(10) Utilize recessed indirect LED luminaries in offices, reception areas, Care Team Stations and other areas where computer terminals and

similar screens are present. Provide lighting control in accordance with ASHREA 90.1 latest adopted addition. Provide dual technology occupancy sensors with manual on/auto off in offices. Utilize 1% - 100% dimming control or multi-level switching and daylight dimming where appropriate.

7.9.16.2(11) Design lighting in Multimedia Rooms as described in Section 7.10.15 Multimedia Room Lighting.

7.9.16.2(12) Design lighting in the BH Lecture room as described in Appendix 3T [Lecture Room Requirements].

7.9.16.2(13) Provide special Task Lighting designed for the types of procedures conducted for rooms and areas where treatment is provided, including medication rooms, Care Team Stations and rooms and areas where specialized analytical or diagnostic work is carried out, e.g., sterile core, biomed, birthing units, inpatient bedrooms, Triage/Observation, surgical, operating, procedure rooms and similar.

7.9.16.2(14) As architectural features, design lighting in main lobbies, waiting areas, Staff lounges, and the main entrance will be provided with high quality products aesthetically pleasing to the public and Staff. Staff areas and rooms will have multiple switching and dimming controls. Wall sconces will be ADA compliant and will be an LED 1%-100% dimming fixture.

7.9.16.2(15) Where Patients are being transferred and/or lying on a stretcher provide volumetric or indirect lighting to limit glare to Patients.

7.9.16.2(16) Where Patients are being transferred and/or lying on a stretcher provide indirect lighting separately controlled by a master multi-zone low voltage controller located in the Care Team Station and observation alcoves. Areas include stretcher bays, stretcher recover bays in higher acuity, recovery and operating room support areas, and other similar areas.

7.9.16.2(17) Provide LED under counter lights on a dedicated switch for all above counter cabinets.

7.9.16.2(18) Provide an LED wall mounted vanity light on a dedicated switch for all hand hygiene sinks.

7.9.16.2(19) Where multi-level lighting is required, each luminaire will have multiple levels of lighting. Switching of different luminaires on and off will not constitute multi-level lighting control.

7.9.16.2(20) Utilize daylight dimming for lighting at exterior glazing.

7.9.16.2(21) Controls to be to ASHRAE 90.1 requirements. Occupancy and Vacancy sensors to be dual technology and designed for the application in which they are used.

7.9.16.2(22) Provide luminaires and light sources that enhance safety and allow personnel to circulate throughout spaces and perform required tasks. Tamper resistant fixtures will be provided in the Inpatient Psychiatry Unit.

7.9.16.2(23) Lighting levels for the parkade will comply with IESNA RP-20-14 Lighting for Parking Facilities and CSA Z317.5 Illumination Systems in Health Care Facilities.

7.9.16.2(24) Lighting design will consider the light pollution reduction requirements as outlined in LEED to eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environment. Fixtures for exterior area will be mounted at a height no more than 10m above ground surface being illuminated.

7.9.16.2(25) Outdoor spaces will have luminaires to assure full cut off photometric to prevent light leakage into the Facility 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. Public streets to be lit as per City requirements.

7.9.16.2(26) Provide low level lighting, bollards, wall-mounted and post top lighting along all exterior pathways, sidewalks and where needed to provide safe, well-lit walkways, parking areas and roads.

7.9.16.2(27) All exterior lighting will have a colour temperature of 4100 K.

7.9.16.2(28) Utilize Vandal Resistant and dark sky compliant exterior luminaires. Comply with LEED requirements for light trespass and light pollution.

7.9.16.2(29) Utilize LED type edge lit green pictogram exit signs in finished areas, and steel in unfinished areas. All exit signs will be LED type powered by the vital system. Provide exit signs as required by code. Additional exit signs will be provided to provide Wayfinding to all exit doors and paths of egress from all internal corridors and corridor intersections even if not required by code. Provide direction to two paths of egress from ALL corridors and intersections.

7.9.16.2(30) Operating/Surgical Rooms

7.9.16.2(30)(a) Provide maximum uniformity between zones in all surgical and operating rooms. Provide illumination as recommended by CSA Standard Z317.5-17 Illumination Systems in Healthcare Facilities. Provide minimal

luminance contrast between zones to allow surgical teams to work effectively and in maximum comfort for extended time periods. Provide optical systems design to achieve maximum luminance uniformity between all three zones;

7.9.16.2(30)(b) Provide IP65 rated UL certified IP65 per IEC 60598 and K230 rated luminaires suitable for a "Clean Room" environment;

7.9.16.2(30)(c) Luminaires will meet the MIL Standard 461E/462/463 for EMI and RF. Filter to eliminate RFI from power supply and line feedback. Minimum attenuation 30 to 60dB common and transverse mode;

7.9.16.2(30)(d) Connect Surgical Procedure Lights to the UPS branch;

7.9.16.2(30)(e) Provide infrastructure services (power, raceway, grounding, wiring, etc.) for all special Operating Room lighting provided by vendors. Project Co to supply/install, set-up, test and commission all Authority supplied equipment. Provide all necessary devices/equipment and provide all connections and installation in accordance with manufacturers' requirements;

7.9.16.2(30)(f) Provide separately switched 1% - 100% dimmable 1' x 4' recessed surgical luminaires around the perimeter of the room;

7.9.16.2(30)(g) Provide separately switched 1% - 100% dimmable down lights above the Nurses desk, Anaesthetist's Work Area and Storage areas;

7.9.16.2(30)(h) Provide separately switched 1% - 100% dimmable 1' x 4' recessed LED surgical luminaires above the surgical field. Connect these luminaires to the Vital and UPS branch;

7.9.16.2(30)(i) Provide, at a minimum, a 6 zone lighting controller to provide pre-set lighting zones to control all general lighting. Locate, at a minimum, 1 master and 2 slave controllers located at nurses' desk and entrances to rooms.

7.9.16.2(31) Control Rooms

7.9.16.2(31)(a) Provide volumetric or indirect recessed fixtures;

7.9.16.2(31)(b) Provide for under counter lighting at workstations on a separate switch;

7.9.16.2(31)(c) Provide dimming for room lighting.

7.9.16.2(32) Medical Devices Reprocessing and Sterile Core

7.9.16.2(32)(a) Provide separately switched Task Lighting at each of the workstations in addition to room/area lighting;

7.9.16.2(32)(b) In computer workstation/monitor locations, provide indirect lighting and position ceiling luminaires to avoid direct and reflected glare.

7.9.16.2(33) Offices and Workrooms

7.9.16.2(33)(a) Provide uniformly luminous, recessed mounted indirect luminaires;

7.9.16.2(33)(b) Position ceiling luminaires to avoid direct and reflected glare;

7.9.16.2(33)(c) Provide multi-level or dimming lighting controls, dual technology occupancy sensors with manual on/auto off and daylight sensing.

7.9.16.2(33)(d) Provide under counter luminaire for above sinks and under upper cabinetry. Provide separate switching for these lights.

7.9.16.2(34) Multimedia Rooms.

7.9.16.2(34)(a) Provide uniformly luminous, recessed mounted volumetric or indirect luminaires or linear luminaries mixed with down lights. Provide appropriate luminaires where videoconferencing will take place to illumine faces while minimizing glare.

7.9.16.2(34)(b) Position ceiling luminaires to avoid direct and reflected glare.

7.9.16.2(34)(c) Provide under counter luminaire above sinks and under upper cabinetry. Provide separate switching for these lights.

7.9.16.2(34)(d) Quality: Lighting is to provide an evenly lit space with minimal glare and shadowing. LED lamp technology will be utilized.

7.9.16.2(34)(e) Colour temperature will be 3500K suitable for video production.

7.9.16.2(34)(f) 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%.

7.9.16.2(34)(g) Controls to Type 1, 2, 3, 4 and Type 6 Multimedia Room to be via a Crestron wall mounted touch screen.

7.9.16.2(34)(h) 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.

7.9.16.2(34)(i) Multimedia Rooms with eight (8) or more seats require dimmable wall washers.

7.9.16.2(34)(j) A separate key light is to be provided for a podium/ lectern/ presenter location in Multimedia Rooms with 25 or more seats.

7.9.16.2(34)(k) Lighting is to have multiple pre-set scenes to support meetings, televised interviews, AV presentations, video conferencing and Virtual Care (Telehealth) activities.

7.9.16.2(34)(l) Lighting controls are to be integrated with the equipment controls and control panels in the rooms so that the meeting chairperson or the VC manager can vary the lighting to suit different activities.

7.9.16.2(34)(m) Lighting controls in Multimedia Rooms will be interfaced to the Building Management System to enable automatic overrides necessitated by fire alarms or forced evacuations.

7.9.16.2(34)(n) Provide for all other requirements for Multimedia Room lighting requirements as described in Section 7.10.15.8.

7.9.16.2(34)(o) Provide for BHH Lecture room requirements in accordance with Appendix 3T [Lecture room Requirements].

7.9.16.2(35) Public Areas, such as Reception, Waiting, Lobby and Seating.

7.9.16.2(35)(a) Provide decorative lighting for visual interest, and lighting that illuminates feature wall and specialty signage, design features, and special features of the area.

7.9.16.2(35)(b) Wall sconces will comply with ADA requirements.

7.9.16.2(35)(c) Provide low voltage master controls and dimmers at reception, Care Team Stations and other similar areas not available to the public for lighting controls for these areas. Provide master dimmable control of all corridors, stretcher bays and general area lighting.

7.9.16.2(36) Care Team Stations, Decentralized Care Team Stations

7.9.16.2(36)(a) Provide volumetric or indirect recessed lighting and down lighting;

7.9.16.2(36)(b) All lighting to be dimmable;

7.9.16.2(36)(c) Provide decorative lighting;

7.9.16.2(36)(d) Provide specialty lighting;

7.9.16.2(36)(e) Provide dual technology occupancy sensors with manual on/auto off and daylight sensors where appropriate and required by ASHRAE;

7.9.16.2(36)(f) Provide dimming controls for the corridor holding bays, stretcher bays and Care Team Station lighting at the Care Team Stations;

7.9.16.2(36)(g) Provide an override on/off dimmer switch for all Patient bay lighting at the Care Team Stations; and

7.9.16.2(36)(h) Provide master dimming controls for at a minimum one luminaire within Inpatient rooms.

7.9.16.2(37) Staff and Public Washrooms

7.9.16.2(37)(a) Provide down lighting for general illumination and aesthetically pleasing vanity light above sink;

7.9.16.2(37)(b) Provide ceiling mounted dual technology occupancy sensor.

7.9.16.2(38) Public and Non-Public Corridors

7.9.16.2(38)(a) In publicly accessible corridors, provide indirect recessed asymmetrical lighting solution. Corridor lighting will consist of a continuous recessed slimline fixture down one side of the corridor that illuminates the corridor with an asymmetrical distribution and in corridors not accessible by the public provide lensed recessed lighting;

7.9.16.2(38)(b) Provide daylight dimming sensors for corridors with exterior glazing. Provide dimming controls of corridors.

Lighting in corridors to be reduced to 50% at each fixture during night time except where directed otherwise by the Authority; and

7.9.16.2(38)(c) Corridor lighting to be 45% normal power, 45% vital power and 10% UPS power. UPS powered luminaires to be located at corridor intersections and corners.

7.9.16.2(39) Patient Preparation/Holding Bays, Triage/Observation and Patient Stretcher Bay, (including Isolation and Bariatric rooms).

7.9.16.2(39)(a) Provide two asymmetrical1'x4' (flanking the Patient bed) ceiling mounted Patient exam lights with antimicrobial finish. Patient exam room lights will function as exam light and ambient light with no glare and be architecturally pleasing;

7.9.16.2(39)(b) Provide an amber LED nightlight that is switched inside the room at the entrance from the corridor and through the Patient-controlled nurse call pillow speaker;

7.9.16.2(39)(c) Provide separate controls for the Patient exam fixtures at each of the following locations:

7.9.16.2.39.(c).1 inside the room at the entrance from the corridor; and

7.9.16.2.39.(c).2 the headwall.

7.9.16.2(39)(d) Provide a multi-function bedhead luminaire with different illumination levels for tasks, including ambient room, Patient exam, Patient charting, Patient reading and night light. Provide controls at the headwall and entrance locations;

7.9.16.2(39)(e) Provide a wall mounted vanity luminaire above all hand hygiene sinks in Patient rooms separately switched;

7.9.16.2(39)(f) Lighting in recovery bays to be dimmable;

7.9.16.2(39)(g) Lighting in inpatient rooms will be dimmable, with at a minimum one fixture being controlled from the Care Team Station; and

7.9.16.2(39)(h) Provide a separately switched dimmable down light for each bay.

7.9.16.2(40) Post Anaesthetic Care Unit (PACU)

7.9.16.2(40)(a) Provide a wall or ceiling mounted exam light for each PACU bay. Locate as directed by the Authority;

7.9.16.2(40)(b) Provide separate controls for the Patient exam light at each of the following locations:

7.9.16.2.40.(b).1 The entrance to the PACU bay; and

7.9.16.2.40.(b).2 On the Patient side.

7.9.16.2(40)(c) Provide an amber LED nightlight that is switched from the column at each PACU bay;

7.9.16.2(40)(d) Provide a vanity luminaire above all hand hygiene sinks in PACU bays separately switched;

7.9.16.2(40)(e) Lighting in recovery bays to be dimmable;

7.9.16.2(40)(f) Lighting in PACU bays will be dimmable, with at a minimum one fixture being controlled from the Care Team Station; and

7.9.16.2(40)(g) Provide a separately switched dimmable down light shared between two bays. Locate as directed by the Authority.

7.9.16.2(41) Patient Rooms (including Isolation and Bariatric)

7.9.16.2(41)(a) Provide two dimmable, asymmetrical, 1'x4' (flanking the Patient bed) ceiling mounted Patient exam lights with antimicrobial finish. Patient exam room lights will function as exam light and ambient light with no glare and be architecturally pleasing;

7.9.16.2(41)(b) Provide two amber LED night lights that are switched and dimmed inside the room on occupancy, complete with an override at the entrance from the corridor, in the anteroom and through the Patient-controlled nurse call pillow speaker or headwall system;

7.9.16.2(41)(c) Provide a multi-function headwall luminaire to provide ambient and exam lighting. Include for a dimmable reading lamp in the headwall system;

7.9.16.2(41)(d) Provide dimmable down lighting at visitor areas;

7.9.16.2(41)(e) Provide separate dimming controls for all fixtures separately at the following locations:

7.9.16.2.41.(e).1 inside the room at the entrance from the corridor;

7.9.16.2.41.(e).2 the headwall;

7.9.16.2.41.(e).3 the Patient-controlled nurse call pillow speaker; and

7.9.16.2.41.(e).4 the anteroom if required.

7.9.16.2(41)(f) Provide at a minimum at least one fixture within the Patient room to be controlled from the nurses' observation/charting alcove or nurses' station.

7.9.16.2(41)(g) Provide Task Lighting in the respective anteroom and general area recessed lighting.

7.9.16.2(42) Patient Washrooms (including Bariatric and Isolation)

7.9.16.2(42)(a) Provide an amber LED night light in each Patient Washroom. Night light to illuminate on occupancy, complete with override. Provide a dimmable aesthetically pleasing wall mounted vanity light over the sink and dimmable general area lighting utilizing down lights switch together. Night light to illuminate on photocell only.

7.9.16.2(43) Patient Rooms and washrooms (including Inpatient Psychiatry Unit)

7.9.16.2(43)(a) Provide Tamper Resistant or Institutional Vandal Resistant type ceiling mounted or wall mounted luminaires throughout the Inpatient Psychiatry Unit as per Appendix 3B [Minimum Room Requirements] and as directed by the Authority. The fixtures will dim 0-100%.

7.9.16.2(43)(b) Provide master dimming controls for at a minimum one luminaire within Inpatient rooms.

7.9.16.2(43)(c) Provide remote override switch for lighting located outside of room.

7.9.16.2(44) LDRP/NICU Rooms

7.9.16.2(44)(a) Provide connection and controls for Patient Exam Light.

7.9.16.2(44)(b) All lighting in LDRP and NICU room to have fixtures capable of adjustment for circadian rhythm.

7.9.16.2(44)(c) Overrides and master control for lighting at nurse stations.

7.9.16.2(44)(d) Provide effective illumination with colour tunable lighting fixtures and control system (Circadian Rhythm) in each LDRP and NICU room, corridor, and Patient bays. The system will achieve the following functions:

7.9.16.2(44)(e) Programmable colour temperature variability across a range from 2400°K to 6500°K.

7.9.16.2(44)(f) Programmable dimming from a maximum lighting intensity at 1000lux average down to a minimum of >0%, plus OFF.

7.9.16.2(44)(g) Programmable astronomic, 365 day/year, automatic time-of-day control of on/off, lighting intensity and colour temperature with a minimum of four schedule settings. Suggested colour temperature settings for initial set up:

7.9.16.2.44.(g).1 morning 7AM to 2PM 6000°K

7.9.16.2.44.(g).2 afternoon 2PM to 6PM 4100°K

7.9.16.2.44.(g).3 evening 6PM to 8PM 2700°K

7.9.16.2.44.(g).4 night-light 8PM to 7AM 2400°K

7.9.16.2(44)(h) System to allow scheduled program settings to be manually overridden through a local control station at Care Team Station.

7.9.16.2(44)(i) Colour temperature and lighting intensity program changes to fade smoothly across a programmable time period so illumination changes are not abrupt.

7.9.16.2(45) Inpatient Psychiatry Unit Patient Rooms

7.9.16.2(45)(a) Provide wall mounted or recessed ceiling mounted fixture separately switched.

7.9.16.2(45)(b) Provide Vandal Resistant, ligature proof, and dimmable luminaires.

7.9.16.2(45)(c) All dimmer switches for lighting will be located outside of the room.

7.9.16.2(45)(d) Luminaries are to be locate away from other equipment that could assist in gaining access.

7.9.16.2(45)(e) Provide downlights to offset the illumination minimum/maximum.

7.9.16.2(45)(f) Provide Vandal Resistant amber night light at low level with photocell control.

7.9.16.2(46) Inpatient Psychiatry Unit Washrooms

7.9.16.2(46)(a) Provide Vandal Resistant amber night lights at low level with photocell control such that when light is turned on in washroom, night light turns off automatically. Night light will be located near the toilet and sink such that toilet and sink are visible without turning on ceiling light.

7.9.16.2(46)(b) Provide flush ceiling mounted or wall mounted, Vandal Resistant, vanity lighting in washroom.

7.9.16.2(46)(c) Provide Vandal Resistant amber night light at low level with photocell control.

7.9.16.2(47) Secure Room

7.9.16.2(47)(a) Provide ceiling recessed or corner mounted, Vandal Resistant, ligature proof, and dimmable luminaires.

7.9.16.2(47)(b) All dimmer switches for lighting in secure room will be located in the Anteroom.

7.9.16.2(47)(c) Luminaries will be Vandal Resistant, locate away from other equipment that could assist in gaining access.

7.9.16.2(47)(d) Provide remote shutoff located outside secure room anteroom.

7.9.16.2(48) Exam Rooms and Similar Rooms

7.9.16.2(48)(a) Provide dimmable, asymmetrical, volumetric or indirect 2’x4’ ceiling mounted recessed lights with antimicrobial finish. The fixtures will dim 1-100%.

7.9.16.2(48)(b) Provide connection and controls for Patient Exam Light.

7.9.16.2(48)(c) Provide dual technology occupancy sensor.

7.9.16.2(49) Parkade Lighting

7.9.16.2(49)(a) Provide LED fixtures suitable for underground parking use with low glare.

7.9.16.2(49)(b) Control parking lighting to ASHRAE 90.1 requirements. Provide a minimum average maintained illumination level of 50lux. Do not provide each fixture with occupancy sensor controls. Provide occupancy sensors zoned such

that lights are turned on ahead of traffic and people. Lighting in underground parking to only be reduced at each fixture; do not shut lighting off.

7.9.16.2(49)(c) Connect parking lighting to the BMS system. All underground parking lights to turn 100% on upon activation of any panic button within the underground parking or 2nd stage fire alarm.

7.9.16.2(49)(d) Provide parking lighting selection criteria, and lighting illuminances in accordance with the Canadian Parking Association CPA ACS Technical bulletin No. 8 Parking Lighting, IESNA RP-20-14 Lighting for Parking Facilities and CSA Z317.5 Illumination Systems in Health Care Facilities and all other referenced criteria.

7.9.16.2(50) Exterior Lighting

7.9.16.2(50)(a) Provide LED fixtures suitable for exterior use with full cut off and Vandal Resistant. Provide low level lighting, bollards, wall mounted and post top lighting where directed, as required by CPTED principles and as needed to provide safe, well-lit walkways, parking areas and roads.

7.9.16.2(50)(b) Exterior lighting to be connected to the vital and conditional power sources. Mix lighting sources so no area is dark with loss of one source of power.

7.9.16.2(50)(c) Control exterior lighting to ASHRAE 90.1 requirements.

7.9.16.2(50)(d) Comply with LEED requirements for light trespass and light pollution.

7.9.16.2(50)(e) Connect Exterior lighting to the BMS system. Exterior lights to be controlled via astronomical time clock and photocell.

## 7.9.17 Lighting Control System

### 7.9.17.1 Basic Requirements

7.9.17.1(1) Provide a low voltage addressable lighting control system throughout the Facility for lighting control of all luminaires except where non-addressable controls are permitted.

7.9.17.1(2) Lighting control system 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.

7.9.17.1(3) Lighting controllers will be hard-wired with IP ethernet connectivity, except for the NICU and LDRD departments as noted in section 7.9.15.1(14).

7.9.17.1(4) Luminaires for each space will be circuited from a single junction box per power branch and per control circuit in the corridor outside the entrance to the space, to minimize the disruption of future lighting renovations on adjacent spaces. Daisy-chaining circuits between rooms is not permitted.

7.9.17.1(5) Lighting controls are to exceed ASHRAE 90.1-2016 requirements by 20%.

7.9.17.1(6) Utilize a combination of natural light, high-efficiency luminaires, dimming, occupancy sensing and daylight harvesting controls to maximize energy savings.

7.9.17.1(7) Provide daylight sensors and luminaires to maximize daylight use throughout the Facility. Install and design in accordance with manufacturers' recommendations. Optimize daylight sensor response and control operation during Commissioning.

7.9.17.1(8) Protect lighting controls from unauthorized operation when required to be located in areas accessible to the public.

7.9.17.1(9) Consult with the Authority when designing the lighting operation (controllability, zones, and timing) of the Facility through the process described in Appendix 2C [User Consultation and Review Procedure].

7.9.17.2 Performance Criteria

7.9.17.2(1) Lighting control system:

7.9.17.2(1)(a) Will be extra-low voltage type.

7.9.17.2(1)(b) Will have local on/off control and local dimming control of the lighting in each room, space, and lighting control zone, unless noted otherwise.

7.9.17.2(1)(c) System to permit override '100% on' and night set back control. Lighting program to be established by the Authority and Project Co to address different conditions such as power outage and fire alarm.

7.9.17.2(1)(d) All manually operated lighting controls to be of a type, which can be completely cleaned and disinfected without

requiring any disassembly. Manually operated controls will not be deteriorated or otherwise adversely affected by frequent cleaning and disinfections.

7.9.17.2(1)(e) Lighting controls in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration are to be rated specifically for the application.

7.9.17.2(1)(f) Locate all lighting control panels and relay devices within electrical rooms and not within ceiling spaces. Provide dedicated lighting panels for all lighting. Do not mix lighting loads with power loads.

7.9.17.2(1)(g) Provide lighting control schedules that respond to individual departmental requirements and occupancy/use. Design a schedule of lighting control and include in the design specifications. Review controls with the Authority.

7.9.17.2(1)(h) Lighting in open areas and common areas to be zoned and subdivided to permit energy management control and variation of light levels.

7.9.17.2(1)(i) Provide zone control of lighting for all corridor, circulation, waiting and gathering areas. Zoning control will include floor by floor and department by department, as a minimum. Provide master switches to control groups of lighting zones with the capability of direct on/off control or on/flick-then-off control (‘flick-then-off’ function is that the lights will flick prior to turning completely off). Any master switch which could cause an occupant to be left in the dark will have the ‘flick-then-off’ warning function.

7.9.17.2(1)(j) Dual Technology Occupancy Sensors in ceilings will be automatic on/off type and will control both room lighting and HVAC systems (via sensor contact interface to BMS).

7.9.17.2(1)(k) Dual technology occupancy sensors on the wall to be manual on/automatic off type and will control both lighting and HVAC systems (via sensor contact interface to BMS).

7.9.17.2(1)(l) Vacancy sensors, a subset of occupancy sensors, manual on/off/dimming, automatic off type.

7.9.17.2(2) Daylighting to meet the following performance criteria:

7.9.17.2(2)(a) Overhead lights within the space to be dimmed as low as possible (or turned off) while satisfying above criteria (a).

7.9.17.2(2)(b) Occupancy sensors and daylighting controls to be extra-low or line voltage type; and where low voltage will be integrated into the lighting control system and located on ceilings to avoid interference with furniture. Occupancy sensors will typically be dual technology with other types to suit application.

7.9.17.2(2)(c) Exterior lighting to be controlled via BMS and photocell.

7.9.17.2(3) All exterior luminaires will be switched from the Facility lighting control system via programmed astronomical time signals or photocell inputs to produce four channels of control as follows:

7.9.17.2(3)(a) Channel 1 - Dusk to Dawn;

7.9.17.2(3)(b) Channel 2 - Dusk to Preset;

7.9.17.2(3)(c) Channel 3 - Preset to Preset; and

7.9.17.2(3)(d) Channel 4 - Preset to Dawn.

7.9.17.2(4) The exterior lighting system will be divided into logical zones. Include the following zones as the minimum:

7.9.17.2(4)(a) Private Roadways (per roadway);

7.9.17.2(4)(b) Surface Parking Areas (per parking area);

7.9.17.2(4)(c) Outdoor spaces Night Illumination and Enhanced Security Illumination (separate);

7.9.17.2(4)(d) Pathway/Walkway lighting;

7.9.17.2(4)(e) Facility entrances, including exterior stairs and ramps; and

7.9.17.2(4)(f) “ALL ON” single point control.

7.9.17.2(5) 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.

7.9.17.2(6) Integrate controls in Multimedia 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. Detailed requirements for lighting and controls in Multimedia Rooms are further described in Section 7.10.15.

7.9.17.2(7) Provide manually operated lighting controls that can be completely cleaned and disinfected without requiring any disassembly, and which will not deteriorate or be otherwise adversely affected by frequent cleaning and disinfection.

7.9.17.3 Basic Requirements

7.9.17.3(1) Lighting controls are to meet or exceed ASHRAE 90.1 and CSA Z317.5 requirements.

7.9.17.3(2) All of the lighting in a space to be capable of being switched at all entrances to the space.

7.9.17.3(3) Integrate the lighting control system with the Building Management System and energy management.

7.9.17.3(4) Staff and Patients to have the ability to control the lighting in their environment. All Clinical Spaces to have Staff and Patient lighting control. All other rooms to have Staff lighting control.

7.9.17.3(5) Patient to have the ability to control the lighting levels in their room or bay directly and easily from their beds

7.9.17.3(6) Dual Technology Occupancy Sensors, Vacancy Sensors and daylight dimming control systems to be utilized to maintain light levels at levels based upon the occupancy of the room and the quantity of daylight. On/off daylight controls are not permitted.

7.9.18 Mechanical Equipment Connections

7.9.18.1 Basic Requirements

7.9.18.1(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 in the Facility.

7.9.18.2 Performance Criteria

7.9.18.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.9.18.2(2) Design connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration to accommodate the vibration.

7.9.18.2(3) Design connections to mechanical equipment to easily permit removal and replacement of the equipment.

7.9.18.2(4) 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.

7.9.18.2(5) Utilize motor control centres when four 3-phase motors that require a starter are located within 50 m of each other and provide 3-phase motor installation in accordance with CEC 28-502.

7.9.18.2(6) Provide labelling on MCC's to match motors.

7.9.18.2(7) Provide wring diagrams of each starter type.

7.9.18.2(8) Provide full size starters.

7.9.18.2(9) For motors 20 hp. and above, provide reduced current starters. Provide integral harmonic cancellation devices to limit harmonics to 5% current harmonics (iTHD) of the full load fundamental current if solid-state starters are employed. Provide neutral conductors rated at the same ampacity as the phase conductors.

7.9.18.2(10) Starters and MCC's to be indoor sprinkler-proof, type 2 enclosures. Arc Flash reducing type will be utilized for 600V MCCs.

7.9.18.2(11) Provide individual control transformers for each starter.

7.9.18.2(12) Starters or MCC's connected to emergency and normal power to be coloured to match the corresponding system colour. All interiors to be white.

7.9.18.2(13) Electrical connections and power-paths to mechanical equipment must reflect the redundancy considerations of the corresponding mechanical system or portion of the mechanical system serving an area.

## 7.9.19 Major Medical Equipment

### 7.9.19.1 Basic Requirements

7.9.19.1(1) Provide all electrical requirements for connection, operation and monitoring and control of any supplied major medical equipment.

### 7.9.19.2 Performance Criteria

7.9.19.2(1) Each item of equipment to be installed and electrically connected for proper and full operation.

7.9.19.2(2) Electrical characteristics of this equipment, including voltage, wattage, phase, demand, inrush, frequency, connection method and control and monitoring requirements to be confirmed by the designer and provided for.

7.9.19.2(3) Space, access and ventilation requirements and other operation critical characteristics of this equipment to be provided for and outlets and connection points to be located correctly for installation and to permit proper and safe isolation for servicing and disconnection for removal or replacement.

7.9.19.2(4) Any motorized equipment is to be equipped with a local lockable disconnect switch.

7.9.19.2(5) Feed all major medical equipment (imaging, procedure, OR) from a dedicated transformer.

## 7.9.20 Medical Service Headwall Units Systems

### 7.9.20.1 Basic Requirements

7.9.20.1(1) Incorporate headwall power, communications, equipment mounting, medical gases, nurse call and lighting control into the medical service units specified under another division. Provide data, power, nurse call and lighting control systems as describe within and as noted in Appendix 3B [Minimum Room Requirements] and as directed by user group consultation.

7.9.20.1(2) Provide the minimum quantity of power outlets in Patient care areas in accordance with the Authority and CSA Z32-15 Table 5 and the classification of loads and branches in accordance with CSA Z32-Table 6.

7.9.20.1(3) Provide the minimum quantity of data outlets in accordance with TIA-1179-A Healthcare Facility Telecommunications Infrastructure Standard and as described in Review Procedure.

### 7.9.20.2 Performance Criteria

7.9.20.2(1) Provide horizontal or vertical type medical service headwall units as directed by department representative and identified in Appendix 3A [Clinical Specifications and Functional Space Requirements] and User Consultation Groups.

7.9.20.2(2) Coordinate and install the required electrical services, including nurse call, normal, emergency and UPS power, Patient entertainment, Patient information, communications outlets, exam light, and reading light and switches, in the medical service units.

7.9.20.2(3) Conceal within walls all of the mechanical and electrical services feeding the medical service units.

7.9.20.2(4) Outlet location to be developed and approved by the Authority through Review Procedure.

7.9.20.2(5) Each medical service unit to have 25% spare capacity for additional power and communications outlets. Medical service units to be reviewed and approved by the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure].

7.9.20.2(6) Avoid back to back installations between bedrooms that could compromise acoustic rating of such assembly. Where back to back installations are unavoidable, acoustic isolation will be provided.

7.9.20.2(7) Exact medical service unit dimensions and configurations to depend on the room layout and the available space. Generally, the medical service unit length will suit the quantity and location of outlets and all outlets will be clear from the width of the bed.

7.9.20.2(8) Project Co will note that if an area behind the bed is free of services that these services be placed on the side of the bed;

7.9.20.2(9) Concealed headwalls will be provided in the Inpatient Psychiatry Unit.

## 7.9.21 Specialty Systems

### 7.9.21.1 Basic Requirements

7.9.21.1(1) Special electrical and communications systems are required in the Facility (as described in this Schedule) and form essential parts of the building. Provide power supply, specially conditioned power and communication conduits and other electrical operational support equipment to meet all requirements of these special electrical and electronic systems.

### 7.9.21.2 Performance Criteria

7.9.21.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware to make connection to special equipment and to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.9.21.2(2) Provide connections to special equipment that easily permit removal and replacement of the equipment.

## 7.9.22 Clock System

7.9.22.1 Basic Requirements

7.9.22.1(1) Provide a site-wide synchronized wireless clock system to assure accurate, consistent time is available in the Facility and Existing Hospital. The system will provide automatic correction for daylight savings time and self-correct if power fails.

7.9.22.1(2) Wireless clocks within the Facility to be compatible with the existing BH GPS wireless clock system and to work with the signal received from the existing central controller.

7.9.22.1(3) Provide master time controllers and all clocks by a recognized industry leader with all components by the same manufacturer.

7.9.22.1(4) Provide new master time controllers and repeaters in the Existing Hospital to ensure seamless integration between the Facility and the Existing Hospital.

7.9.22.1(5) All synchronized clocks to incorporate the Authority's logo on the face to identify the clock as a synchronized clock. Provide analog clocks throughout the Facility.

7.9.22.1(6) Provide two (2) digital synchronized clocks located as directed by the Authority in all Operating rooms, procedure rooms, and similar areas as directed by the Authority.

7.9.22.1(7) Provide digital synchronized clocks and analog in the Mental Health Resuscitation room and similar areas as directed by the Authority.

7.9.22.1(8) The finish and appearance of the clocks are to complement the architectural finishes and be flush mount type within rooms.

7.9.22.1(9) Provide clocks in all anterooms of Secure Rooms, as noted in the Appendix 3B [Minimum Room Requirements] and as directed by the Authority.

7.9.22.2 Performance Criteria

7.9.22.2(1) Install receptacles for plug-in type operated analog type synchronized clocks that will receive correction signals from the master clock(s).

7.9.22.2(2) Provide synchronized clocks minimum 300 mm in diameter with sweeping second hand and 24-hour numbering. Numbering to include hours 1-12 in large numbers on outer ring and hours 13-24 in smaller numbers on inner ring.

7.9.22.2(3) Locate synchronized clocks so that the faces are clearly visible to users in areas indicated in Appendix 3B [Minimum Room Requirements] and in other areas as required to ensure that Staff

are able at all times to view a clock when caring for Patients, whether in a room or down a corridor.

7.9.22.2(4) In the event of a power loss, the control system will continuously maintain proper internal time.

7.9.22.2(5) Provide local satellite transmitters to provide signals to all clocks in the Facility and Existing Hospital where required.

7.9.22.2(6) The clock system to have an independent wiring system and raceway system to any other Building Systems.

7.9.22.2(7) Clock system in the Facility will match the existing Primex GPS clock system and will integrate into the Existing Hospital clock system. Project Co to provide a third party to perform an attenuation survey of the site wide system and provide additional receivers, expanders, and transmitters throughout the Existing Hospital as required to ensure signal strength throughout the Existing Hospital and Facility. Provide seamless integration between the existing and new systems. Existing Primex clocks are model number 14306-9, 120V and 12.5".

## 7.10 Communications (Division 27)

### 7.10.1 Principles and Guidelines

7.10.1.1 Communications infrastructure, networks and systems identified in this division are key enablers for modern health care service delivery.

7.10.1.2 Fraser Health IM/IT representatives will provide leadership and direction as it relates to the Design and Construction of the communications infrastructure, networks and systems in the Facility.

7.10.1.3 The responsibilities of the Authority and Project Co as it relates to communications infrastructure, networks and systems are summarized in the Appendix 3K [Systems Responsibility Matrix].

### 7.10.2 Information Management Guidelines

7.10.2.1 The management of the Staff and Patients' information is the responsibility of the Authority.

7.10.2.2 The Authority's primary health care information system software application package is Meditech.

7.10.2.3 IM/IT Equipment in the Facility will be provided by the Authority unless stated otherwise in this Agreement. Refer to Appendix 3F [Equipment List IM/IT]

7.10.2.4 The Facility will include adequate space, communications infrastructure, wall backing, cable management, power, and TOs with sufficient Data Drops for all IM/IT Equipment and networks identified in this Agreement.

7.10.2.5 Project Co's proposed systems must be proven technologies designed for use in modern acute care hospital applications.

7.10.2.6 Project Co's proposed systems will use the latest version of equipment and software at the time of procurement.

7.10.2.7 Project Co will not, without the Authority's prior agreement, install or use any operating system, application or database software that resides on, accesses or otherwise interacts with the Authority's network(s).

7.10.2.8 Project Co will complete to the Authority's satisfaction Software Assessment Forms (SAF) for each system, solution and or applications it is providing under this Agreement eight months prior to the Substantial Completion of the Project unless otherwise approved by the Authority through the Review Procedure. Project Co will commence the process of engaging IM/IT on the completion of the SAF forms no later than one year in advance of the Substantial Completion of the Project.

7.10.3 Information Technology Guidelines

7.10.3.1 Project Co will consult and collaborate with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure] regarding the design and construction of the communications infrastructure, networks and systems and meet all the policies, standards and requirements stated in the documents forming this Agreement.

7.10.3.2 Project Co will ensure that the Facility's IT communications infrastructure, networks and systems are not encumbered with outmoded materials, equipment, systems and processes.

7.10.3.3 Unless stated otherwise or approved by the Authority through the Review Procedure, the design and construction of the communications infrastructure, networks and systems will strictly comply to the requirements identified herein and to the standards and specifications detailed in the PHSA Communications Infrastructure Standards and Specifications.

7.10.3.4 The communications infrastructure, networks and systems in the Facility will be an extension of the campus wide systems operating in the Existing Hospital. Project Co is responsible to ensure that communications infrastructure, technology, systems, and equipment it is providing under this Agreement is:

7.10.3.4(1) Compatible with the communications infrastructure, technology, systems, and equipment used in the Existing Hospital; and

7.10.3.4(2) Physically and logically integrated with the communications infrastructure, technology, systems, and equipment used in the Existing Hospital.

7.10.3.5 Servers and computing hardware associated with systems, applications or databases supplied and installed by Project Co will be physically located in the MER unless otherwise approved by the Authority through the Review Procedure.

7.10.3.6 Project Co will undertake the Design and Construction of separate physical networks and systems in accordance with equipment vendor specifications and where the Authority's requirements in this Schedule dictate. This includes the provision of physically separate infrastructure for the following networks and systems:

7.10.3.6(1) IM/IT networks (wired and wireless data and voice);

7.10.3.6(2) Clinical equipment systems such as the physiological monitoring network;

7.10.3.6(3) Digital Signage;

7.10.3.6(4) Nurse call;

7.10.3.6(5) DAS;

7.10.3.6(6) Fire Alarm; and

7.10.3.6(7) FMO Network.

7.10.3.7 All communications infrastructure, networks and systems supplied and installed by Project Co will:

7.10.3.7(1) Have high availability and redundancy that meets or exceeds the industry standards for use in and support of acute care hospital applications;

7.10.3.7(2) Be easy to operate, maintain and scale;

7.10.3.7(3) Support advancement towards an integrated BH Campus that continuously contributes to operational efficiencies through standardization, provision of a consistent end-user experience, improved workflow and access to information;

7.10.3.7(4) Function in a safe manner and will not unduly impact Patient care and the operation of the Facility; and

7.10.3.7(5) 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 fibre cut.

7.10.4 Design and Construction

7.10.4.1 Project Co will at a minimum provide all design documents and Submittals as prescribed in Section 2.4 Submittal Documents.

7.10.4.2 Project Co will employ at minimum of one (1) locally based RCDD with at least ten (10) years of Design and Construction experience actively working on projects of similar complexity on Staff for the duration of the Project. Both certifications will be required to be active during the Project and Project Co will offer proof of RCDD certification by submitting a copy of each certification to the Authority.

7.10.4.3 The RCDD will be directly responsible for producing the drawings and specifications for Division 27, reviewing Shop Drawings and other Submittals and for assisting on related technical issues as required. Refer to Section 2.4 Submittal Documents for further details and requirements that Project Co is required to meet.

7.10.4.4 Project Co will provide a locally based audio-visual professional(s) who have experience in the Design and Construction of Multimedia audio/video and VC systems and Crestron graphic design and programming. The audio-visual professional(s) will be certified and accredited by the multimedia manufacturers to a level that satisfies the Authority.

7.10.4.5 Project Co will provide a qualified quality assurance inspector to verify that the Construction of communications infrastructure, networks and systems is completed in accordance with this Agreement and the Reviewed Drawings and Specifications. The quality assurance inspector must have at least ten (10) years of construction experience specific to installing and Cx communications infrastructure, networks and systems similar in complexity to those required on this Project. Project Co will provide evidence of this experience at the Authority's request.

7.10.4.6 Records of all inspections and any associated quality reports and or deficiency lists will be signed and dated by the quality assurance inspector and provided to the Authority for review. Project Co will notify the Authority of any inspection(s) and the Authority may elect to participate in these inspection(s) in addition to those inspections of the work it will carry out independently.

7.10.4.7 Project Co will establish as part of the Construction Period Joint Committee, refer to Section 2.6 of Schedule 2, an IM/IT coordination subcommittee with the Authority. The IM/IT coordination committee will meet regularly (minimum once per month) through the duration of the Project to deal with a wide range of topics and issues concerning the Design and Construction of the communications infrastructure, networks and systems in the Facility;

7.10.4.7(1) The first meeting of the IM/IT coordination committee will occur within 30 days of the Effective Date;

7.10.4.7(2) Project Co will appoint and make available to the Authority an IM/IT coordination lead to chair the IM/IT coordination committee. The appointment of the IM/IT coordination lead will occur prior to the first meeting of the IM/IT coordination committee;

7.10.4.7(3) The IM/IT coordination lead will coordinate meeting dates, establish agendas, record minutes and maintain an action register throughout the all phases of the Project; and

7.10.4.7(4) The IM/IT coordination lead will have at least ten (10) years of experience being actively engaged in managing the Design and Construction of communications infrastructure, networks and systems similar in complexity to those required on this Project.

7.10.4.8 The following IM/IT coordination committee meeting principles will be adhered to:

7.10.4.8(1) Agendas with clearly stated objectives will be issued by Project Co no later than five (5) Business Days in advance of the meeting;

7.10.4.8(2) Time allotted to the meeting aligns with the agenda put forward; and

7.10.4.8(3) Project Co will take “live minutes” so that all parties can agree on the content of the minutes during the meeting. Project Co will circulate the minutes immediately after the meeting to all parties and within three (3) Business Days Project Co must circulate formal minutes for review. If the Authority notifies Project Co of any errors in the minutes, Project Co will correct such errors within three (3) Business Days of the Authority’s notice and formally resubmit the minutes.

7.10.4.8(4) Provide all other necessary and qualified project management, technical expertise and labour required to complete the Design and Construction of the communications infrastructure, networks and systems defined in this Agreement;

7.10.4.8(5) Supply and install all materials, equipment, services and other items required to complete the Design and Construction of the communications infrastructure, networks and systems in accordance with the requirements in this Agreement; and

7.10.4.8(6) Ensure that every aspect of the Construction of the communications infrastructure, networks and systems identified in this Agreement (including those tasks performed by IM/IT directly or indirectly through its contractors and suppliers) are identified and factored into the Project Schedule in a logical, efficient, collaborative and seamless manner.

7.10.4.8(6)(a) From the Effective Date and throughout the duration of the Project, the Design and Construction Schedule will at a minimum reflect the following tasks and milestones:

7.10.4.8.6.(a).1 Completion of the Service Entrance Facilities into the Facility. Refer to Section 7.10.8.3 for details on requirements;

7.10.4.8.6.(a).2 Completion dates per floor for the backbone Communications Pathway System in the Facility. Refer to Section 7.10.7.4 for details on requirements;

7.10.4.8.6.(a).3 Completion date for rooftop Communications Pathway System in the Facility. Refer to Section 7.10.7.5 for details on requirements;

7.10.4.8.6.(a).4 Rough-in dates for the backbone cabling subsystem in the Facility. Refer to Section 7.10.9.3 for details on requirements;

7.10.4.8.6.(a).5 Finishing dates for the backbone cabling subsystem where “finishing” is defined as the termination, testing, labelling and documentation of all components associated with the intra-building copper and fibre optic backbone cabling subsystem in the Facility. Refer to Section 7.10.9.3 for details on requirements;

7.10.4.8.6.(a).6 Rough-in dates per floor for the horizontal cabling subsystem in the Facility. For details on requirements, refer to Sections 7.10.9.2 as well as Section 7.10.19 for horizontal cables associated with DAS;

7.10.4.8.6.(a).7 Finishing dates per floor for the horizontal cabling subsystem as well as for horizontal cables associated with DAS in the Facility where “finishing” is defined as the termination, testing, labelling and documentation of all components associated with these cabling infrastructures. For details on requirements, refer to Sections 7.10.9.2 and 7.10.19 and 7.10.21;

7.10.4.8.6.(a).8 Wireless system installation dates per floor. This date is typically a predecessor to the installation of

ceiling tiles in the Facility. Refer to Section 7.10.11 for details on requirements;

7.10.4.8.6.(a).9 Communications Room equipment ready dates in the Facility. Refer to Section 7.10.8.7 for details on requirements;

7.10.4.8.6.(a).10 Dates per floor when Project Co will make areas of the Facility available to IM/IT to deploy its equipment in accordance with the requirements specified in Appendix 3F [Equipment List – IM/IT].

7.10.4.8(6)(b) In addition to the minimum tasks and milestones noted above, IM/IT will direct Project Co to add additional tasks and milestones to the Design and Construction Schedule for any work (regardless of who performs it) that it deems directly relevant to the completion of its work in the Facility or on the Site; and

7.10.4.8(6)(c) Project Co will:

7.10.4.8.6.(c).1 Include all the tasks noted in the above clauses on a two week lookahead schedule that provides a detailed day-to-day plan of upcoming work identified on the Design and Construction Schedule; and

7.10.4.8.6.(c).2 Provide a report with each two week lookahead schedule that identifies any risks or unresolved issues that threaten the Design and Construction Schedule.

7.10.5 Procurement Process

7.10.5.1 If a system procured by Project Co for use in the Facility represents a net new addition to the overall Authority's systems inventory, Project Co will ensure that any contract it enters into for that system includes provisions permitting assignment of the contract to the Authority on favourable terms and conditions as included in the contract between Project Co and the system vendor;

7.10.5.2 Project Co will ensure that all of its contracts for supply and installation of systems and equipment have:

7.10.5.2(1) A defined service level commitment that supports the Authority service level expectations; and

7.10.5.2(2) A privacy and security schedule that aligns with the British Columbia Freedom of Information and Protection of Privacy Act / Personal Information Protection and Electronic Documents Act legislation as applicable.

7.10.5.3 Applications, software modules and any related software supplied, installed, operated or used by Project Co must not interfere with the operation or performance of, or reduce the security or privacy of, any Authority applications or equipment.

7.10.6 Demolition of Communication Infrastructure, Networks and Systems.

7.10.6.1 Project Co will provide all labour, materials, tools, transportation, storage costs, equipment, insurance, temporary protection, Permits, inspections, taxes and all necessary and related items required to provide complete demolition of communications infrastructure, networks and systems in those buildings, tunnels and structures identified in Section 4.4.

7.10.6.2 The Existing Hospital will be in operation while the renovation scope is carried out. Furthermore, renovation work will be carried out in direct adjacency to operational Existing Hospital departments. Project Co will schedule and execute the renovation scope in accordance with this Agreement. This includes:

7.10.6.3 Conduct a thorough investigation of the existing electrical, IM/IT and mechanical building services in the renovation area including tracing of existing services in order to:

7.10.6.3(1) Augment the information provided by the available existing drawings which may or may not be reliable;

7.10.6.3(2) Identify services which are running through the renovation area but provide service to adjacent departments;

7.10.6.3(3) Plan for and execute required re-routing of existing services to clear the renovation area;

7.10.6.3(4) Plan for and minimize shutdowns of services to other areas of the Existing Hospital. and

7.10.6.3(5) Protect all building services that are required to operate the Existing Hospital and prepare a robust backup and emergency plan in case of unintended service interruptions as part of the work Interference Minimization Plan.

7.10.6.4 Schedule work outside of regular work hours and on weekends in coordination with the Authority and around critical clinical operations;

7.10.6.5 Be prepared to stop work immediately if it is required for clinical reasons and Patient safety;

7.10.6.6 Minimize noise, dust and vibration in accordance with this Agreement;

7.10.6.7 Communications infrastructure, networks, systems and equipment will not be demolished or removed until the demolishment or removal has been coordinated with the Authority and approval is given in writing.

7.10.6.8 Project Co will coordinate interfaces to existing communications infrastructure, networks, systems that are being demolished or removed in order to minimize disruption to the infrastructure, networks and systems in the Existing Hospital. Any outages will be scheduled in advance as approved by the Authority in accordance with a Work Plan.

7.10.6.9 Project Co will:

7.10.6.9(1) Survey existing condition of all communications conduits, cable trays, underground ducts and structures and cables from origin to destination to determine extent of demolition required;

7.10.6.9(2) Label all conduits, cable trays and cables with origin, destination and what networks and systems they serve;

7.10.6.9(3) Provide drawings detailing the removal of all communications conduits, cable trays, underground ducts and structures and cables;

7.10.6.9(4) Consult with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure] to determine whether networks and systems can be disabled or whether a new parallel network or system needs to be installed;

7.10.6.9(5) Employ one of the Authority's prequalified communications contractors to completely remove each cable that runs between the buildings, tunnels and structures to be demolished and the Existing Hospital. Complete removal of a cable is to be between its point of origin and its final destination such that no portion is left abandoned;

7.10.6.9(6) Coordinate with the telecommunications carriers and cover all costs associated with the complete removal of cables running from telephone poles or manholes located outside the property line to buildings, tunnels and structures on the Burnaby Hospital Campus; and

7.10.6.9(7) Remove all abandoned communications conduits, cable trays, underground ducts and structures within the boundaries of the Site.

7.10.7 Telecommunications Services

7.10.7.1 The Authority will coordinate with telecommunications carriers pay all fees to provide data, voice and cellular services to the Facility.

7.10.7.2 If Project Co requires telecommunications services over and above what is being provided by the Authority either in terms of additional circuits or capacity, different service offerings or alternate connections and/or demarcation points to support its own temporary works and/or the solutions it is providing in the Facility, then Project Co will be responsible for all associated costs and coordination with the telecommunications carriers.

7.10.7.3 Telecommunications carriers will bring their cabling into the Facility through the Campus Perimeter Pathway System (CPPS). The CPPS is an underground network of structures consisting of ducts and manholes that runs around the perimeter of the BH Campus and ties into the Facility and each building of the Existing Hospital. The purpose of the CPPS is to support an inter-building fibre ring as well as copper cabling infrastructure for the distribution of services to the BH Campus. The CPPS also connects the telecommunications carriers' underground systems to facilitate the provision of telecommunications services to the BH Campus. Project Co is to refer to drawings of the CPPS for further detail.

7.10.7.4 Telecommunications carriers will demarcate their cabling and install their equipment in the EF Room of the Facility.

7.10.8 Telecommunications Grounding and Bonding Infrastructure

7.10.8.1 The telecommunications grounding and bonding infrastructure contains grounding bus bars, grounding conductors, bonding conductors, and connecting devices, including 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.

7.10.8.2 Project Co will undertake the Design and Construction of a complete telecommunication grounding and bonding infrastructure in the Facility that meets the requirements detailed in the PHSA Communications Infrastructure Standards and Specifications.

7.10.9 Communications Pathway System

7.10.9.1 General Requirements

7.10.9.1(1) Project Co will undertake the Design and Construction of a Communications Pathway System in the Facility that includes cable tray, conduits, underground ducts, sleeves, pull and junction boxes, underground pre-cast service vaults and boxes and all other miscellaneous accessories and products required for the routing, segregation, organization, support and protection of Structured Cabling and Extra-low Voltage communications systems wiring. This includes manufactured dropouts, cable spools and pre-manufactured bends.

7.10.9.1(2) The Communications Pathway System in the Facility and on Site will:

7.10.9.1(2)(a) Support all Structured Cabling for IM/IT Equipment and networks as well as Extra-low Voltage communications systems wiring for BMS, security systems, locating services, public address, clock systems, intercoms, nurse call, clinical equipment systems, multimedia systems and DAS.

7.10.9.1(3) The Authority reserves the right to refuse the installation of any Extra-low Voltage wiring in the Communications Pathways System that falls outside of the systems listed above. In the event permission is not granted, Project Co will supply and install a separate pathway system.

7.10.9.1(4) Project Co will install all Structured Cabling and Extra-low Voltage communications systems wiring in conduit and cable tray even in fully accessible ceilings. Non-continuous support systems such as J-hooks are not permitted except for the following noted exception - patch cords and cables installed above accessible ceilings for the express purpose of connecting to access points, external antennas or other wireless equipment can be supported using non-continuous support systems to allow flexibility for positioning.

7.10.9.1(5) Where an access point is located in a different room or area than the TO it is designated to connect to and where the ceilings are consistently accessible along the entire route between the access point and the TO, Project Co will supply and install sleeves and fire-stopping (regardless of the fire rating of the wall) in any full-height wall to enable patch cords to be installed.

7.10.9.1(6) Patch cords and cables installed in inaccessible or exposed ceilings for the express purpose of connecting to access points, external antennas or other wireless equipment will be installed in conduit unless otherwise approved by the Authority through the Review Procedure.

7.10.9.1(7) Project Co will coordinate the Design and Construction of the Communications Pathway Systems detailed herein with:

7.10.9.1(7)(a) The Facility's architectural and structural elements as well as all other systems including mechanical (including plumbing), electrical, PTS; and

7.10.9.1(7)(b) Site services and Utilities, landscaping, earthworks and all other exterior alterations and improvements.

7.10.9.1(8) Project Co will meet the requirements stated herein and in the PHSA Communications Infrastructure Standards and Specifications when undertaking the Design and Construction of the Communications Pathway System.

7.10.9.1(9) Project Co will undertake the Design and Construction of the Communications Pathway System to:

7.10.9.1(9)(a) Provide ease of access. All components of the Communications Pathway System will not be obstructed and be accessible by a maximum 2500-mm tall ladder in all instances;

7.10.9.1(9)(b) Minimize occupant disruption when the Communications Pathway System is accessed; and

7.10.9.1(9)(c) Provide capacity for expansion and change.

7.10.9.1(10) Project Co will ensure the Communications Pathway System is:

7.10.9.1(10)(a) Isolated from sources of EMI as well as high magnetic fields, radiation and high temperatures;

7.10.9.1(10)(b) Installed at parallel or right angles to building lines in order to keep cable run length at an absolute minimum;

7.10.9.1(10)(c) Installed without burrs, sharp edges or projections;

7.10.9.1(10)(d) Installed with sweeping bends in accordance with TIA standards;

7.10.9.1(10)(e) Inaccessible to Patients and the general public;

7.10.9.1(10)(f) Not routed through Electrical or Mechanical Rooms except for the express purpose of servicing these rooms; and

7.10.9.1(10)(g) Not in conflict with other building elements including architectural, structural, mechanical and electrical components.

7.10.9.1(11) Project Co will:

7.10.9.1(11)(a) Fire stop Communications Pathway System and cable penetrations of any kind resulting from the installation of Structured Cabling and Extra-low Voltage communications systems wiring using approved fire stop systems as listed under the PHSA Communications Infrastructure Standards and Specifications. This applies to all types of full-height walls for the purpose of either

restoring the fire rating of the wall or for infection control and acoustic reasons;

7.10.9.1(11)(b) Bond and ground all conduits, cable trays, racks and other infrastructure as set out in Section 7.10.8;

7.10.9.1(11)(c) Identify the Communications Pathway System using unique colour bands. Colouring scheme will comply with the Authority's standard:

7.10.9.1(11)(d) Major colour to be 100 mm wide and minor colour to be 50 mm wide;

7.10.9.1(11)(e) Identify raceways with coloured bands 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; and

7.10.9.1(11)(f) Colour-code all junction/pull boxes using spray paint on the cover.

7.10.9.1(12) Provide lamacoid labels identifying the origin and destination of each connecting conduit on the inside covers of all pull boxes used for outside plant and intra-building backbone cables;

7.10.9.1(13) Ensure that the Communications Pathways System is constructed to compensate for building movement when crossing expansion joints in the Facility and between the Facility and the Existing Hospital.

7.10.9.2 Communications Cable Tray

7.10.9.2(1) Project Co will undertake the Design and Construction of the communications cable trays and associated components in the Facility for Structured Cabling and Extra-low Voltage communications systems wiring.

7.10.9.2(2) The types of communications cable tray are as follows:

7.10.9.2(2)(a) Basket cable tray is to be supplied and installed:

7.10.9.2.2.(a).1 In all the Facility's hallways and corridors unless otherwise approved by the Authority through the Review Procedure;

7.10.9.2.2.(a).2 In the MER and TRs where it will be installed around the perimeter walls and extended over equipment racks and server cabinets; and

7.10.9.2.2.(a).3 For use as vertical risers to provide cable strain relief.

7.10.9.2(2)(b) Chatsworth ladder tray is to be supplied and installed in the EF Room where it will be installed around the perimeter walls and extended over equipment racks;

7.10.9.2(2)(c) Totally enclosed cable tray will be used on parking levels or other spaces exposed to the public; and

7.10.9.2(3) The size for all types of communications cable tray will be:

7.10.9.2(3)(a) Minimum depth will be 100 mm;

7.10.9.2(3)(b) Minimum width will be 610 mm; and

7.10.9.2(3)(c) The fill ratio for communications cable tray is to be 50 percent maximum at Substantial Completion of the Project. The remaining 50 percent is reserved for future growth capacity.

7.10.9.2(4) When a communications cable tray interfaces with a group of 103 mm sleeves or conduits, its width and or height will be adjusted above the minimum dimensions where necessary to encompass all sleeves and conduits in the group.

7.10.9.2(5) Project Co will maintain the following clearances when designing and installing communications cable tray in the Facility:

7.10.9.2(5)(a) A minimum of 1220 mm from any motor;

7.10.9.2(5)(b) A minimum of 50 mm from light fixtures (150 mm if the lighting fixture is fluorescent);

7.10.9.2(5)(c) A minimum of 150 mm from any source of EMI;

7.10.9.2(5)(d) A minimum of 305 mm of continuous clearance on at least one side of a communications cable tray along its entire length wherever it is installed in the Facility to enable installation and maintenance of Structured Cabling and Extra-low Voltage communications systems wiring;

7.10.9.2(5)(e) Provide a minimum of 150 mm above, 150 mm in front, and 75 mm below of clearance from piping, conduits, ductwork, etc.;

7.10.9.2(5)(f) The bottom of the communications cable tray will be between 200 mm and 305 mm above an accessible finished ceiling; and

7.10.9.2(5)(g) Communications cable tray will be mounted at 2700 mm AFF in all Communications Rooms.

7.10.9.2(6) Project Co will supply and install manufactured cable dropouts where cables exit and enter all horizontal communications cable trays in the Facility;

7.10.9.2(6)(a) Tray manufacturer's cable dropout fittings that clip over the side of the communications cable tray without the need to cut into the cable tray will be provided;

7.10.9.2(6)(b) Provide a cable tray dropout every 1200mm along all walls and at the rear section of every vertical manager in all Communications Rooms; and

7.10.9.2(6)(c) Project Co will undertake the Design and Construction of the communications cable tray in a manner that enables the cable dropouts to be placed to empty cables directly and fully into vertical cable management channels, GigaBIX cable management modules and other sections of communications cable tray.

7.10.9.2(7) Where required by the Authority to segregate cables for different networks or systems, Project Co will supply and install dividers inside the communications cable tray. Where dividers are used, fill calculations will apply to each divided section of the communications cable tray.

7.10.9.2(8) Where the Facility connects with the Existing Hospital, Project Co will join the communications cable tray system in the Facility to communications cable trays in the Existing Hospital either directly by re-working communications cable tray ends in the Existing Hospital to suit the tie-ins or indirectly through the provision of conduits or sleeves in those situations where the communications cable tray in the Facility is required to connect to a communications cable tray on an interstitial floor in the Existing Hospital. This requirement is applicable to all floors where the Facility connects with the Existing Hospital and includes interstitial levels, connecting links, bridges and service tunnels.

7.10.9.3 Communications Conduit and Sleeves

7.10.9.3(1) Sleeves

7.10.9.3(1)(a) Where communications cable trays are required to pass through any full-height walls or floors regardless of their location and fire rating, Project Co will supply and install 103 mm Hilti speed sleeves in the Facility.

7.10.9.3(1)(b) Quantity of 103 mm Hilti speed sleeves supplied and installed will accommodate the capacity of the communications cable tray.

7.10.9.3(1)(c) The communications cable tray will end 600 mm from any group of horizontal 103 mm Hilti speed sleeves passing through a wall.

7.10.9.3(1)(d) Unobstructed clearance will be provided around a group of 103 mm Hilti speed sleeves passing through a wall for serviceability. This includes the provision of 450 mm of unobstructed clearance from the side of any group of 103 mm Hilti speed sleeves.

7.10.9.3(1)(e) Project Co will use the Hilti ganging wall plate when installing two (2) or more Hilti speed sleeves.

7.10.9.3(1)(f) For backbone riser sleeves, Project Co will use a combination of Hilti CP 680 cast-in-place fire stop devices c/w CP-653-4" speed sleeves inserted into them. Refer to Section 7.10.7.4 for the quantity of Hilti speed sleeves to be supplied and installed in the Facility's backbone risers.

7.10.9.3(2) Conduits

7.10.9.3(2)(a) Project Co will undertake the Design and Construction of all conduits and associated components in the Facility for Structured Cabling and Extra-low Voltage communications systems wiring.

7.10.9.3(2)(b) Conduits will be EMT or rigid steel or PVC where permissible.

7.10.9.3(2)(c) Regardless of size, each conduit will have a pull string inserted and tied off at each end.

7.10.9.3(2)(d) Project Co will not encase EMT in concrete unless such installation is permitted by code and approved by the Authority through the Review Procedure as being necessary to achieve a concealed installation in finished spaces such as exposed Architectural Concrete stairwells. Refer to Division 26, Section 7.9 Electrical for additional requirements relating to the encasement of conduits in concrete.

7.10.9.3(2)(e) Project Co will individually connect each TO in the Facility to the nearest communications cable tray with a minimum 25 mm conduit:

7.10.9.3.2.(e).1 In the case of basket tray, conduits will terminate in a bonding type bushing.150 mm above the tray's sidewall;

7.10.9.3.2.(e).2 In the case of totally enclosed cable tray, conduits will be terminated in the tray's sidewall; and

7.10.9.3.2.(e).3 In the case of Chatsworth ladder tray, conduits will be attached to the edge of the tray with a bracket designed for this purpose.

7.10.9.3(2)(f) All conduit will be sized to not exceed a 28 percent fill ratio with no more than two 90º bends. Where there are no bends, the fill ratio can be increased to 40 percent.

7.10.9.3(2)(g) Sections between pull points will not exceed 30 m. In conduit runs that total more than 30 m, insert pull boxes so that no segment between pull points exceeds the 30m limit.

7.10.9.3(2)(h) Pull boxes will be placed in straight sections of conduit and will not be used in lieu of a bend.

7.10.9.3(2)(i) All conduits with an internal diameter of 50 mm or less will have sweeping bends with inside radius being no less than six (6) times the internal diameter of the conduit. For conduit 50 mm 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.

7.10.9.4 Backbone Communications Pathway System

7.10.9.4(1) Project co will undertake the Design and Construction of a backbone Communications Pathway System in the Facility that provides two physically diverse routes between:

7.10.9.4(1)(a) The Phase 1A MER and each individual TR in Phase 1A;

7.10.9.4(1)(b) The Phase 1B MER and each individual TR in Phase 1B; and

7.10.9.4(1)(c) The MER and the EF Room in Phase 1A.

7.10.9.4(2) The primary and diverse routes will be separated by a minimum of twenty (20) metres along the entire route between:

7.10.9.4(2)(a) The MER and each individual TR in Phase 1A;

7.10.9.4(2)(b) The MER and each individual TR in Phase 1B and

7.10.9.4(2)(c) The MER and the EF Room in Phase 1A.

7.10.9.4(3) The Design of the primary and diverse routes will:

7.10.9.4(3)(a) Ensure that a loss of single TR will not impact connections between the MER and any other TR in the Facility;

7.10.9.4(3)(b) Minimise the risk to service continuity to any Communications Rooms resulting from fire, flood, adverse weather, seismic events, Construction activities and vandalism; and

7.10.9.4(3)(c) Routed away from Patient rooms or other rooms or areas deemed by the Authority to be clinically sensitive.

7.10.9.4(4) Project Co will supply and install a minimum of 4 x 103 mm Hilti speed sleeves (or combination thereof) in the primary backbone riser and will add one additional 103 mm Hilti speed sleeve or conduit for every additional Communications Room serviced from a riser stack. When 103mm conduits are used in lieu of 103 mm Hilti speed sleeves, double the count of 103mm conduits to achieve the same fill capacity of 103 mm Hilti speed sleeves. Refer to PHSA Communications Infrastructure Standards and Specifications for further requirements.

7.10.9.4(5) Project Co will supply and install a minimum of four 103 mm Hilti speed sleeves and/or conduits (or combination thereof) in the diverse backbone riser. When 103mm conduits are used in lieu of 103 mm Hilti speed sleeves, double the count of 103mm conduits to achieve the same fill capacity of 103 mm Hilti speed sleeves. The diverse backbone riser will be strictly used for intra-building fiber backbone.

7.10.9.4(6) To support the extension of outside plant cables between the EF Room and MER, Project Co will also undertake the Design and Construction of four (4) 103 mm EMT conduits between these two rooms.

7.10.9.5 Rooftop Communications Pathway System

7.10.9.5(1) Project Co will undertake the Design and Construction of a rooftop Communications Pathway System that will provide contiguous and continuous support of cabling installed from the EF and MER in Phase 1A to antennas and wireless equipment placed on the roof of Phase 1A.

7.10.9.5(2) The composition of the rooftop Communications Pathway System in terms of routing, type and quantities of pathways to be supplied and installed by Project Co will meet the Authority's and telecommunications carriers' requirements for the various types of:

7.10.9.5(2)(a) Wireless systems planned for the roof of the Facility; and

7.10.9.5(2)(b) Fire ratings associated with the cables to be installed between the Phase 1A MER and antennas and wireless equipment placed on the roof of the Facility.

7.10.9.5(3) The Design of the rooftop Communications Pathway System will be such that the pathways will be installed below the roof deck and rise up to the roof level through multiple roof penetration housings positioned in close proximity to where rooftop antennas and wireless equipment are to be located.

7.10.9.5(4) Rooftop penetration housings will:

7.10.9.5(4)(a) Accommodate the number of conduits and cables required at each location;

7.10.9.5(4)(b) Be lockable;

7.10.9.5(4)(c) Be installed with a curb;

7.10.9.5(4)(d) Meet all requirements for resistance to wind, water penetration and snow loads applicable to the local climatic conditions;

7.10.9.5(4)(e) Made of suitable materials for an outside environment such as aluminum with a UV protected powder coated finish, stainless steel fasteners and gasketed lid;

7.10.9.5(4)(f) Meet building envelope and energy requirements stated in this Agreement;

7.10.9.5(4)(g) Be large enough to accommodate cable bend radiuses and provide the space and access for installation and maintenance of cables; and

7.10.9.5(4)(h) Come with watertight exit seals for conduits and cables and all other accessories required for a turnkey solution.

7.10.9.5(5) To meet the requirement to provide contiguous and continuous support of cabling, the Authority will permit Project Co to extend the rooftop Communications Pathway System for short distances on the roof from penetration housings to antenna and wireless equipment locations;

7.10.9.5(5)(a) Wherever possible, these short extensions will be kept off the roof deck and attached to structures such as the parapet wall; and

7.10.9.5(5)(b) Where attachment to structure is not possible, these short extensions of the rooftop Communications Pathway System will be supported off the roof deck and elevated at a height determined in consultation with the Authority through the Review Procedure using a non-penetrative support system that is UV and wind resistant, rust proof and can support the snow load applicable to the local climatic conditions. Where this solution is employed, Project Co will also be required to supply and install non-penetrative free-standing step over systems to ensure safe and free movement over the rooftop Communications Pathway System as determined in consultation with the Authority through the Review Procedure.

7.10.9.5(6) For all pathways that are exposed to the outside environment, Project Co will use suitable materials such as aluminum or hot galvanized steel and include expansion joints at regular intervals to ensure the rooftop Communications Pathway System responds appropriately to the wide range of temperatures that exist on rooftops.

7.10.9.6 Surface Raceways, Furniture and Custom Millwork

7.10.9.6(1) Communications Pathway Systems in the Facility will be concealed; however, surface raceways may be installed in unique circumstances as approved by the Authority through the Review Procedure.

7.10.9.6(2) All types of furniture, including Systems Furniture and Millwork supplied and installed by Project Co will be equipped with:

7.10.9.6(2)(a) Wiring channels sized according to TIA standards with a maximum 40 percent fill ratio after all the cabling is installed;

7.10.9.6(2)(b) Metallic barriers to isolate electrical wiring from Structured Cabling or other types of Extra-low Voltage communications systems wiring where joint wiring channels are provided;

7.10.9.6(2)(c) TIA compliant furniture cut-outs;

7.10.9.6(2)(d) Vertical and horizontal wire management to safely secure, manage and hide power and Structured Cabling including work area patch cords; and

7.10.9.6(2)(e) A means to attach a cable lock or similar solution to secure equipment and devices where required by the Authority.

7.10.9.7 Underground Communications Pathway Systems

7.10.9.7(1) Project Co will undertake the Design and Construction of a dedicated underground Communications Pathway System to connect the Facility to:

7.10.9.7(1)(a) All Wi-Fi access points and other connected network equipment and devices required on Site; and

7.10.9.7(1)(b) Each new street light poles placed on the Site within the property boundaries of the BH Campus.

7.10.9.7(2) The underground Communications Pathway System will be designed to support the initial and anticipated telecommunications needs. In determining the total number and size of ducts required, Project Co will consider:

7.10.9.7(2)(a) Growth;

7.10.9.7(2)(b) Difficulty of adding pathways in the future; and

7.10.9.7(2)(c) Type and size of cable to be installed.

7.10.9.7(3) All underground ducts will be:

7.10.9.7(3)(a) PVC DB2, orange in colour;

7.10.9.7(3)(b) Connected to the nearest communications cable tray inside the Facility;

7.10.9.7(3)(c) Sized to not exceed a 28 percent fill ratio with no more than two 90º. Where there are no bends, the fill ratio can be increased to 40 percent;

7.10.9.7(3)(d) Properly drained in accordance with building and electrical codes;

7.10.9.7(3)(e) Checked by pulling a mandrel, sized for each duct from both directions to remove obstructions;

7.10.9.7(3)(f) Cleaned by passing a wire brush mandrel and/or rubber duct swab (or acceptable alternative as approved by the

Authority through the Review Procedure) of appropriate size back and forth until all foreign materials and water are removed;

7.10.9.7(3)(g) Separated from electric power ducts by a minimum of 300 mm; and

7.10.9.7(3)(h) Installed with a minimum of one (1) metre of cover from the top of the duct bank to grade.

7.10.9.7(4) Project Co will place a mule tape in all underground ducts. The mule tape will be Greenlee 4435 or acceptable alternative as approved by the Authority through the Review Procedure.

7.10.9.7(5) Supply and install a 152 mm wide warning marker tape in the trench on the centerline of each duct approximately 300 mm below final grade.

7.10.9.7(6) Project Co will supply and install a precast service box when any section of duct has more than 180º of bends.

7.10.9.7(6)(a) Pre-cast service box will support a wheel loading of MS 200;

7.10.9.7(6)(b) Ducts will enter and exit service boxes in a straight-line method;

7.10.9.7(6)(c) Service box lid will have the word “Communications” in permanent raised or stamped letters;

7.10.9.8 Campus Perimeter Pathway Systems

7.10.9.8(1) Refer to Appendix 3R [Campus Perimeter Pathway System Technical Specifications].

7.10.10 Communications Rooms

7.10.10.1 The types of Communications Rooms that will be required in the Facility include:

7.10.10.1(1) EF Room in Phase 1A and EF Room in Nursing Tower;

7.10.10.1(2) MER in Phase 1A; and MER in Phase 1B; and

7.10.10.1(3) TR rooms in Phase 1A and Phase 1B.

7.10.10.2 If a requirement in this Agreement uses the term “Communications Room” that requirement will apply to all the room types listed above.

7.10.10.3 Entrance Facility Room (EF)

7.10.10.3(1) The telecommunications carriers, e.g. Telephone Company, etc., will demarcate and deliver their services in the EF Room.

7.10.10.3(2) The point of demarcation is analogous to a "border" between equipment and facilities owned by the telecommunications carriers and similar infrastructure which is owned by the Authority.

7.10.10.3(3) Project Co will meet the requirements stated herein and in the PHSA Communications Infrastructure Standards and Specifications when undertaking the Design and Construction of the Entrance Facility Room.

7.10.10.3(4) The EF Room will house:

7.10.10.3(4)(a) Terminations of copper and optical fibre cables, coming from outside the building, owned by the telecommunications carriers; and

7.10.10.3(4)(b) Terminations of Authority provided optical fiber backbone cables from the EF room to the CPPS to service the BH buildings on campus. Includes Wall mount fiber splice cabinets to transition from the OSP fiber cabling to indoor fibre optic pigtail assemblies; and

7.10.10.3(4)(c) Electronic equipment owned by the telecommunications carriers that is required to provide their services to the BH Campus.

7.10.10.3(5) The EF Room will be:

7.10.10.3(5)(a) Located on Level 0 or the basement level of the Facility;

7.10.10.3(5)(b) Separated from the MER by a minimum of 20 m;

7.10.10.3(5)(c) Located in a different architectural fire-compartment than the MER; and

7.10.10.3(5)(d) A minimum size of 5775 mm by 6581 mm capable of housing up to nine (9) telco equipment racks (711 mm wide x 914 mm deep), and two (2) equipment racks allocated to the Authority’s equipment plus space for vertical cable managers between each equipment rack and at the end of the line-up; and

7.10.10.3(5)(e) A minimum wall space requirement for the Authority provided CPPS fiber ring wall mount termination hardware is 1.2 m x 2.4 m.

7.10.10.3(6) Project co will connect the EF and the MER Rooms to the CPPS. Refer to Section 7.10.9 for further details.

7.10.10.3(7) Project Co will connect the EF Room and the MER through the backbone Communications Pathway System. Refer to Section 7.10.9 for further details.

7.10.10.4 Main Equipment Room (MER)

7.10.10.4(1) The primary functions of the MER are to:

7.10.10.4(1)(a) House core telecommunications equipment, connecting hardware, cables, pathways, splice closures, grounding and bonding facilities and appropriate protection apparatus;

7.10.10.4(1)(b) House terminations of Authority provided optical fiber backbone cables from the MER rooms to the CPPS to service the BH buildings on campus. Includes wall mount fiber splice cabinets to transition from the OSP fiber cabling to indoor fibre optic pigtail assemblies;

7.10.10.4(1)(c) A minimum wall space requirement for the Authority provided CPPS fiber ring wall mount termination hardware is 1.2 m x 2.4 m; and

7.10.10.4(1)(d) Function as a TR housing horizontal terminations for a portion of the Facility floorplate where it resides. Refer to Section 7.10.10.5 for the function and requirements associated with a TR.

7.10.10.4(2) Contain the Main Cross-connect or Intermediate Cross-connects used in the backbone cabling hierarchy.

7.10.10.4(3) Provide for the routing of the equipment cabling, and or cords, from the Main cross-connect or Intermediate cross-connect to the telecommunications equipment.

7.10.10.4(4) Project Co will meet the requirements stated herein and in the PHSA Communications Infrastructure Standards and Specifications when undertaking the Design, Construction and fit out of the MER.

7.10.10.4(5) The MER will be:

7.10.10.4(5)(a) Located on Level 0 or basement level of Phase 1A;

7.10.10.4(5)(b) A minimum size of 6100 mm wide x 6850 mm in length in Phase 1A;

7.10.10.4(5)(c) Located on level 1 in Phase 1B;

7.10.10.4(5)(d) A minimum size of 3656 mm wide x 4877 mm in length in Phase 1B;

7.10.10.4(5)(e) Equipped with eight equipment racks and four server cabinets in Phase 1A expansion Facility; and

7.10.10.4(5)(f) Equipped with four equipment racks in Phase 1B.

7.10.10.4(6) A growth factor of 100 percent will be provided when determining the location for the MER in Phase 1A. Project Co will achieve this in its Design by placing the MER adjacent to non-critical space that can be claimed in the future if so required, e.g. storage room.

7.10.10.4(7) Project Co will connect the MER to the CPPS. Refer to CPPS Appendix 3R [Campus Perimeter Pathway System Technical Specifications] for further details.

7.10.10.4(8) Project Co will connect the MER to the EF Room, each TR in the Facility through the backbone Communications Pathway System. Refer to Section 7.10 for further details.

7.10.10.5 Telecommunications Rooms (TRs)

7.10.10.5(1) The TR is the critical point between the work area and the MER.

7.10.10.5(2) The TR's connection to the work area is achieved through the horizontal pathways and cabling subsystem.

7.10.10.5(3) The functions of a TR are to:

7.10.10.5(3)(a) House the terminations of horizontal and backbone cables to connecting hardware; and

7.10.10.5(3)(b) Provide a controlled environment to house telecommunications equipment, connecting hardware and splice closures.

7.10.10.5(4) The systems that are permissible by the Authority to be housed within a TR include IM/IT networks, BMS switches (whose purpose is to provide ethernet connectivity), security systems, locating systems, public address, clock systems, intercoms, nurse call, clinical equipment systems, multimedia systems, and DAS. Fire Alarm, BMS and Lighting Control panels that are 50V and under are permitted in any type of Communication room.

7.10.10.5(5) The Authority reserves the right to refuse the installation of any equipment and its associated infrastructure in a Communications Room that falls outside of the systems listed above. In the event permission is not provided, Project Co will be obligated to provide suitable alternative locations in the Facility to house equipment and its associated infrastructure for systems outside the defined list.

7.10.10.5(6) Project Co will meet the requirements stated herein and in the PHSA Communications Infrastructure Standards and Specifications when undertaking the Design and Construction and fit out of the TRs.

7.10.10.5(6)(a) The minimum size of a TR is 3656 mm wide x 4877 mm in length and it will house four Authority equipment racks;

7.10.10.5(6)(b) TRs will be located on the same floor as the work area they serve. except where the floor is a Penthouse or where the entire floor contains only an Electrical Energy Centre or below grade Parking levels. Where the Authority approves the above-noted exception, the telecommunication needs of the floor must be supported by the floor below or above;

7.10.10.5(6)(c) A growth factor of 50 percent will be included when determining the TR room size.

7.10.10.5.6.(c).1 Room sizing and the calculation of spare capacity for growth will consider floor and rack space as well as useable wall mounting area;

7.10.10.5.6.(c).2 Useable wall mounting area does not include wall space above 2700 mm AFF or wall space that, if used, would compromise operational clearances; and

7.10.10.5.6.(c).3 The calculation of available spare capacity for growth will be based on an accurate depiction of the quantity and dimensions of all components identified in the layouts of each TR provided in the Design of the Facility. To validate dimensions, Project Co will provide Shop Drawings of each component to be installed in a TR at the Authority's request.

7.10.10.5(7) Project Co, where necessary, will enlarge the size of the TRs above the minimum dimension specified to provide additional equipment rack and wall space to meet the requirements of all systems housed within a given TR while still maintaining a 50 percent growth factor.

7.10.10.5(8) The number of TRs required in the Facility is determined by:

7.10.10.5(8)(a) The 80m (262') maximum Permanent Link length of cable required to reach the extremities of a building's interior space for designed and future TOs;

7.10.10.5(8)(b) The density of Data Drops in specific work areas and spaces; and

7.10.10.5(9) Project Co will connect each TR in the Facility to the MER. Refer to Section 7.10 for further details.

7.10.10.5(10) Project Co will ensure all horizontal and backbone communication cabling for a given floor or area terminates at a TR.

7.10.10.5(11) Subject to compliance with the maximum Permanent Link, the maximum quantity of Data Drops per TR is 1,200 unless otherwise approved by the Authority through the Review Procedure.

7.10.10.6 Design Requirements

7.10.10.6(1) All requirements stated in this Section apply to all the types of Communications Rooms unless otherwise noted.

7.10.10.6(2) Architectural and Structural

7.10.10.6(2)(a) Project Co will design Communications Rooms with expansion and maintenance as the foremost thought, taking into consideration building size, the variety of systems that operate within health care facilities, the floor area of the working space, the Permanent Link length of cables and Data Drop density.

7.10.10.6(2)(b) Project Co will not place Communications Rooms in locations that at minimum allow for expansion in one directions without being constrained by building components such as stairwells, exterior walls, sheer structural walls, columns, elevator shafts or other fixed building walls.

7.10.10.6(2)(c) Triangle, L, curved or any other odd shaped rooms and spaces are not acceptable for use as a Communications Room.

7.10.10.6(2)(d) Project Co will locate Communications Rooms:

7.10.10.6.2.(d).1 Away from all services and conditions that are visible or hidden within the fabric of the Facility that will endanger or adversely affect telecommunications equipment and cabling;

7.10.10.6.2.(d).2 Away from where any water service or displays are provided in the Facility. Locating Communications Rooms beneath or adjacent to toilets, showers, the Frozen Section Pathology Laboratory, kitchens, laundries, janitorial rooms, Environmental Service Closets, sinks, open courtyards, planters and water fountains is not permitted;

7.10.10.6.2.(d).3 To minimize the Permanent Link length for all cable runs;

7.10.10.6.2.(d).4 To provide easy access for equipment installation and replacement; and

7.10.10.6.2.(d).5 To avoid interference with architectural and structural elements as well as other systems and services including mechanical, electrical, and PTS.

7.10.10.6(2)(e) Project Co will vertically stack Communications Rooms on all floors throughout the Facility. If an additional TR is required on any floor, spatially separate the rooms on the plan and position these in different architectural fire-compartments.

7.10.10.6(2)(f) Project Co will not place Communications Rooms in any areas in the Facility that would be considered by the Authority to be a confined space of any kind or space with recognizable hazards requiring specific worker safety precautions and protocols.

7.10.10.6(2)(g) Communications Rooms will always be directly accessible from a common corridor or hallway that connects to an elevator. The access path which includes all entrances, corridors, doorways openings and elevators from BH Loading Dock to any Communications Room will be:

7.10.10.6.2.(g).1 Well lit;

7.10.10.6.2.(g).2 Unobstructed;

7.10.10.6.2.(g).3 Capable of supporting the smooth operation of mechanical handling aid such as a pallet jack, hand truck and cart;

7.10.10.6.2.(g).4 Capable of safely moving equipment as large 1200 mm deep, 2400 mm high, plus the typical height of a mechanical handling aid, and 914 mm wide; and

7.10.10.6.2.(g).5 Capable of supporting a weight of 1361 kg (3000 lbs.).

7.10.10.6(2)(h) Communications Rooms require a minimum one-hour fire rating.

7.10.10.6(2)(i) Communications Rooms will not have exterior windows.

7.10.10.6(2)(j) Communications Rooms walls will be to underside of slab. All walls will be lined with rigidly installed 19 mm, Type A High Temperature (HT) Fire Retardant Treated Plywood meeting AWPA standards P50, U1 UCFA, or UL class A with FR-S Rating or CAN/ULC S102 & S102.2 with two coats of light-coloured paint applied to all sides. Sanding between coats is mandatory. The plywood panels will extend from floor level to a height of 2.4 m. Expose certified stamped mark.

7.10.10.6(2)(k) The minimum clear height in a Communications Room will be 2700 mm without obstructions. The height between the finished floor and the lowest point of the ceiling will be no less than 3048 mm to accommodate taller frames and overhead pathways and other infrastructure required to service the room.

7.10.10.6(2)(l) There will be no suspended ceiling installed in a Communications Room.

7.10.10.6(2)(m) Static dissipative floor coverings in Communications Rooms will be rubber composite, i.e. light in colour to enhance the brightness of the room. Vinyl tiles or sheeting are not acceptable. The floor will be grounded to the telecommunications grounding busbar in accordance with manufacturer’s instructions.

7.10.10.6(2)(n) 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 professional structural engineer, registered in British Columbia, will be consulted during the design to specify the floor loading limit. The minimum floor load capacity will be 6.0 kPa (125 lbs/square foot) in all Communications Rooms.

7.10.10.6(2)(o) Seismic specifications for telecommunications and IT infrastructure and related facilities will accommodate applicable seismic requirements in accordance with the Governmental Authority.

7.10.10.6(2)(p) The door openings for Communications Rooms will be a minimum size of 1066 mm wide and 2440 mm high and will swing 180º 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 Communications 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 equipped with door sweeps. Where a Communications Room is directly accessible from the Facility's exterior or from parkade levels, the door will be equipped with security hinges and a full-length astragal installed.

7.10.10.6(3) Mechanical

7.10.10.6(3)(a) Mechanical equipment, ducting, water/sewer/steam/drain pipes, fuel lines, gas lines, medical gas lines, steam lines, sprinkler risers and radiant heating or any other mechanical component will not reside in or transit through Communications Rooms. This includes adjoining walls and the floor and ceiling slab.

7.10.10.6(3)(b) Mechanical systems, equipment and associated ducting for supply and return air that are used to cool and control the environment within Communications Rooms will not be housed within the Communications Rooms unless otherwise approved by the Authority through the Review Procedure as this will inhibit the placement of overhead cable tray and lighting and constrain the optimal layout of the space.

7.10.10.6(3)(c) Project Co will supply and install dedicated scalable, reliable and N+1 redundant cooling capacity in a consistent manner in all the Communications Rooms to permit all equipment racks to be fully populated.

7.10.10.6.3.(c).1 A minimum of 6000 BTUs of cooling capacity will be provided per equipment rack and server cabinet in all Communications Rooms in the Facility. This includes the provision of 6000 BTUs of cooling capacity for future equipment racks and server

cabinets that can be accommodated within the Communications Rooms;

7.10.10.6.3.(c).2 HVAC systems serving Communications Rooms will maintain a temperature between 18 and 24 degrees Celsius (DB temperature) with a relative humidity between 25 percent and 60 percent. Anything outside these ranges will generate an alarm that will be visible on the Facility's BMS;

7.10.10.6.3.(c).3 Design the HVAC system to maintain these requirements 24/7, 365 days a year;

7.10.10.6.3.(c).4 Supply and install separate, in room controls for the HVAC systems serving all Communications Rooms in order to enable the correct amount of cooling capacity and humidity control to be delivered to each Communications Room;

7.10.10.6.3.(c).5 Each Communications Room will be provided with supply and return air through dedicated ducts that serve only the room in order to ensure that the environment inside each Communications Room is not influenced by external factors;

7.10.10.6.3.(c).6 The air pressure inside a Communications 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; and

7.10.10.6.3.(c).7 Refer to Division 23, Section 7.5 Heating, Ventilating and Air Conditioning for further details.

7.10.10.6(3)(d) Communications Rooms will have proper sealing of doors or any other gaps to maintain positive air pressure in the interior of the room and to provide additional prevention against the ingress of dust and debris which may impact

equipment performance and lifespan as well as result in cable failures and degradation of service. Project Co will supply and install filters (minimum acceptable rating MERV 8) on any mechanical system supplying air into Communications Rooms.

7.10.10.6(3)(e) Project Co will supply and install heat and smoke detection and a double interlock pre-action sprinkler system in all Communications Rooms;

7.10.10.6.3.(e).1 Sprinkler heads will be mechanically protected in all cases;

7.10.10.6.3.(e).2 In order to avoid the placement of sprinkler heads above equipment racks or server cabinets, additional sprinkler heads will be supplied and installed to provide the required coverage in the room;

7.10.10.6.3.(e).3 If there are no alternatives other than to place a sprinkler head above an equipment rack or a server cabinet, then it is the responsibility of Project Co to identify all instances of this situation for the Authority’s review and approval through the Review Procedure. Upon receipt of the Authority’s approval, Project Co will supply and install drip trays under the sprinkler head(s) that are appropriately drained and supplied with a complete leak detection system that can be monitored through the BMS system by the Authority;

7.10.10.6.3.(e).4 If an inspector's test connection is required, it will be located outside the Communications Room. This includes all additional drains, valves, piping, maintenance space and accessories required; and

7.10.10.6.3.(e).5 Refer to Division 21, Section 7.3 Fire Suppression for further details regarding fire suppression requirements.

7.10.10.6(3)(f) Where a Communications Room is located below grade, Project Co will provide protection against the risk of flooding in the same fashion as prescribed for electrical rooms.

7.10.10.6(4) Electrical

7.10.10.6(4)(a) Electrical feeders, branch circuits and equipment including transformers, non-IM/IT distribution panels, distribution centres and large motors that generate EMI will not be allowed to reside in or transit through Communications Rooms. This includes adjoining walls and floor and ceiling slabs.

7.10.10.6(4)(b) In the MER and TRs, Project Co will supply and install two (2) L21-30R twist lock receptacles per equipment rack and server cabinet; one from the central IM/IT UPS distribution panel in the room and one from the vital distribution panel in the room.

7.10.10.6(4)(c) The kW load per equipment rack, including the server cabinet, in the MER will have an average peak demand of 4kW per equipment rack/server cabinet, but Project Co will allow for 50 percent of the equipment racks to scale to 8kW of peak demand. The Design and Construction of all aspects of the electrical distribution to the equipment racks and the server cabinet in the MER will accommodate 8kW per equipment rack and server cabinet. Refer to Division 26, Section 7.9 Electrical for further details.

7.10.10.6(4)(d) TRs that exclusively service areas such as parking, MDRD, Logistics, dedicated mechanical levels, will be categorized as low demand. In these low demand TRs, the average peak demand will be 2.5kW per equipment rack. This includes all future equipment racks that can be accommodated within the TR.

7.10.10.6(4)(e) TRs that service inpatient Components inclusive of non-Clinical Spaces included on the same level or floor as these areas will be categorized as medium demand. In these medium demand TRs, the average peak demand will be 4kW per equipment rack, but Project Co will allow for 25 percent of the equipment racks to scale to 8kW of peak demand. This includes all future equipment racks that can be accommodated within the TR.

7.10.10.6(4)(f) TRs that service Outpatient, Diagnostic Cardiology, Maternal/Child, Inpatient Patient Psychiatry, Perioperative and the Medical Inpatient Units, inclusive of non-Patient care included on the same level or floor as these Components, will be categorized as high demand. In these high demand TRs, the average peak demand will be 4kW per equipment rack, but Project Co will allow for 50 percent of the equipment racks to scale to 8kW of peak demand. This includes all future equipment racks that can be accommodated within the TR.

7.10.10.6(4)(g) The decision as to whether a TR is categorized as low, medium or high demand will be based on the Design of the Facility and the placement of the functional areas identified in Appendix 3A [Clinical Specifications and Functional Space Requirements]. Final decision on the categorization of the TR as low, medium or high demand will reside with the Authority based on the Design of the Facility.

7.10.10.6(4)(h) The Design and Construction of all aspects of the electrical distribution to the planned and future equipment racks in TRs regardless of their demand categorization will accommodate 8kW per equipment rack. Refer to Division 26 for further details.

7.10.10.6(4)(i) In the EF Room, Project Co will allow for the provision of two (2) L21-30R twist lock receptacles per equipment rack space fed from a vital distribution panel in the room. Exact receptacle configuration will be confirmed by the Authority during Design.

7.10.10.6(4)(j) In Phase 1A, Project Co will allow for the provision of two (2) L21-30R twist lock receptacles for each equipment rack allocated for site wide wireless systems where one receptacle is fed from the central IM/IT UPS distribution panel in the room and the other receptacle is fed from the vital distribution panel in the room. Exact receptacle configuration will be provided by the Authority during Design.

7.10.10.6(4)(k) For the remaining equipment rack spaces allocated for the telecommunications carriers in the ER Room, Project Co will allow for the provision of two (2) L21-30R twist lock receptacles per equipment rack space from the vital distribution panel in the room. Exact receptacle configuration will be provided by the Authority during Design.

7.10.10.6(4)(l) The EF Room and AHER will be considered as low demand. The average peak demand will be 2.5kW per equipment rack space based on a full complement of equipment racks that the rooms are intended to support. The Design and Construction of all aspects of the electrical distribution to the equipment racks will accommodate 8kW per equipment rack. Refer to Division 26, Section 7.9 Electrical for further details.

7.10.10.6(4)(m) Project Co will supply and install convenience electrical outlets with 15/20A T-slot receptacles along the perimeter wall of all Communications Rooms at a maximum spacing of one outlet every 3m.

7.10.10.6.4.(m).1 Each convenience electrical outlet will be recessed into the wall cavity; and

7.10.10.6.4.(m).2 Connect 50 percent of outlets 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, Section 7.9 Electrical for further details.

7.10.10.6(4)(n) The lighting in Communications Rooms will be coordinated with the equipment layout, particularly overhead cable trays, equipment racks and server cabinets, to ensure the light emanating from the lighting fixtures is not obstructed.

7.10.10.6(4)(o) The lighting supplied and installed by Project Co in each Communications Room will meet the following requirements, refer to Division 26, Section 7.9 Electrical for further details:

7.10.10.6.4.(o).1 Lighting fixtures will be typically mounted at 2.8 m AFF unless otherwise approved by the Authority through the Review Procedure;

7.10.10.6.4.(o).2 Lighting fixtures and associated power cables will have a minimum separation of 50 mm from communications cabling;

7.10.10.6.4.(o).3 The minimum light levels will be 500 lux in the horizontal plane and 200 lux

in the vertical plane @ 1 m AFF. Project Co will demonstrate that its lighting calculations account for light loss due to a full cable tray.

7.10.10.6.4.(o).4 Interior room lighting will be supplied from both the vital and conditional power branches with a minimum of 50 percent of the lights supplied from the vital branch;

7.10.10.6.4.(o).5 Lighting will not be powered from the same panel as the telecommunications and IT equipment in the space; and

7.10.10.6.4.(o).6 Supply and install local light switching and an occupancy sensor(s) to control the lights.

7.10.10.6(4)(p) Electrical panels installed in the MER must be equipped with a minimum of 25% spare breaker space.

7.10.10.6(5) Security

7.10.10.6(5)(a) Project Co will supply and install a card access system for all Communications Rooms doors. Only the main entry door will be equipped with a network access control pin code proximity reader. Supplementary doors will be for exit only. Manual punch code locks are not permitted.

7.10.10.6(5)(b) Project Co will supply and install IP video surveillance system camera(s) inside all Communications Rooms. IP video surveillance system camera(s) will be used to:

7.10.10.6.5.(b).1 Identify people at the points of entry and egress into the room; and

7.10.10.6.5.(b).2 Track activity within the room. The quantity of cameras will be sufficient to ensure that the interior of the room is completely within the field of view of the IP video surveillance system camera(s) system such that there are no blind spots including in front and behind equipment racks and server cabinets.

7.10.10.6(5)(c) IP video surveillance camera footage to be recorded on the Facility's security systems and stored for a minimum of thirty (30) days.

7.10.10.6(5)(d) Project Co will supply and install an intrusion alarm when the Communications Room 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.

7.10.10.7 Communications Rooms – Equipment Ready Status

7.10.10.7(1) Prior to installing any active equipment and components in a Communications Room, Project Co will:

7.10.10.7(1)(a) Complete a cleaning of the Communications Room at the sub-micron level, that meets or exceeds the Federal Standard 209E, Class 100,000 (same as 14644-1 Class 8 standard) or better, removing all dust and debris from all surfaces including floors, walls, ceilings, electrical and mechanical equipment, cables trays and equipment racks and all components installed within them.

7.10.10.7.1.(a).1 Once active equipment and components are installed in a Communications Rooms, Project Co will repeat the post-construction cleaning process and associated air quality testing as many times as necessary to maintain a clean environment until Substantial Completion of the Facility is achieved; and

7.10.10.7.1.(a).2 The cleaning will be done professionally by a company that is specialized in cleaning critical environments. Project Co will use the Authority's vendor to clean the Communications Rooms in the Facility and conduct the air quality testing and reporting.

7.10.10.7(1)(b) Conduct air quality testing and provide the Authority with a report and analysis of particle counts before and after the cleaning of a Communications Room. If the quantity

of particles of 0.5 and 0.3 microns per square foot exceeds acceptable levels as permissible by the Fed. Standard Class 100,000 (same as: ISO 14644-1 class 8) guidelines, then Project Co will re-clean the room and take whatever other measures that are necessary to achieve the required air quality in the Communications Room.

7.10.10.7(1)(c) Project Co will supply and install clean room sticky mats, booties, curtains and plastic strip doors and air scrubbers as long as required to maintain the required air quality and keep the Communications Rooms clean until Substantial Completion of the Facility is achieved.

7.10.10.8 Equipment Racks

7.10.10.8(1) Project Co will supply and install equipment racks required in all the Facility's Communications Rooms. Equipment racks will:

7.10.10.8(1)(a) Be free standing four (4) post equipment rack, black in colour and gang-able with the following dimensions: 610 mm wide by 914 mm deep by 2134 mm high;

7.10.10.8(1)(b) Come with RU markings (RU1 at top & RU44 at bottom) that are stamped or silk screened onto the front and rear vertical mounting rails or posts (labels will not be acceptable);

7.10.10.8(1)(c) Be independently tested and certified to meet or exceed established Seismic Zone 4 NEBS Telcordia GR-63-CORE standards and specifications;

7.10.10.8(1)(d) Provide 483 mm (19") rack mount capability for rack mountable components; and

7.10.10.8(1)(e) Provide 1956 mm of vertical mounting space. (44 rack units).

7.10.10.8(2) Refer to the PHSA Communications Infrastructure Standards and Specifications for product details, approved manufacturers and model numbers that will be used on this Project.

7.10.10.8(3) The minimum number of equipment racks to be supplied and installed by Project Co will be:

7.10.10.8(3)(a) EF – Two (2) equipment racks;

7.10.10.8(3)(b) MER in Phase 1A – Eight (8) equipment racks, four (4) server cabinets;

7.10.10.8(3)(c) MER in Phase 1B – Four (4) equipment racks; and

7.10.10.8(3)(d) TR – Four (4) equipment racks per room.

7.10.10.8(4) Additional equipment racks (including vertical and horizontal cable management and ePDUs) over and above the minimum quantities noted above will be supplied and installed by Project Co to:

7.10.10.8(4)(a) Provide more space to accommodate all the rack mountable equipment associated with any network or system required in the Facility that is permitted to be located in a Communications Room; and/or

7.10.10.8(4)(b) Achieve the growth factor in a TR.

7.10.10.8(5) When additional equipment racks are required over and above the minimum quantities noted above, Project Co will:

7.10.10.8(5)(a) Enlarge the Communications Room to accommodate all the additional equipment racks (including vertical cable management) and meet all required clearances;

7.10.10.8(5)(b) Supply and install additional power and cooling capacity for each additional equipment rack in accordance with the requirements in this Agreement; and

7.10.10.8(5)(c) Adjust any other related infrastructure required to accommodate additional equipment racks and or an enlarged Communications Room.

7.10.10.8(6) Project Co will ensure:

7.10.10.8(6)(a) The maximum number of Data Drops per equipment rack will be 240 at the time when the Facility becomes operational;

7.10.10.8(6)(b) The location of the equipment racks will provide physical and environmental protection for IM/IT network and Extra-low Voltage communications systems equipment. This protection address threats including temperature, humidity, vibration, exposure to ultraviolet radiation, ingress of dust, fluids or other contaminants, physical damage (accidental or malicious), security, EMI and the presence of other hazards and impediments;

7.10.10.8(6)(c) The location of the equipment racks will allow for adequate access to safely allow repair, expansion, installation and maintenance of the Structured Cabling infrastructure, Extra-Low Voltage communications system

wiring and IM/IT network and Extra-low Voltage communications systems equipment;

7.10.10.8(6)(d) Access clearances of one (1) metre in the front and behind the rear of the equipment racks is to be provided. Where several rows of racks are located side by side, the row spacing will be a minimum of one (1) metre. A minimum clearance of 50 mm will be maintained between one side of an equipment rack's vertical manager and the wall. All clearances are to be measured from the face of any equipment mounted to the wall (as opposed to the wall itself) and from the front or side of the vertical cable managers;

7.10.10.8(6)(e) All installations of equipment racks will be reviewed by a professional structural engineer registered in British Columbia for certification as being seismically restrained in accordance with the requirements for a post-disaster building; and

7.10.10.8(6)(f) Equipment racks will be grounded in accordance with Section 7.10.8.

7.10.10.8(7) Project Co will supply and install vertical and horizontal cable management. Vertical and horizontal cable management requirements are as follows:

7.10.10.8(7)(a) All vertical cable managers will be 2134 mm in height;

7.10.10.8(7)(b) Where two or more equipment racks are mounted side by side, the equipment racks will have a double sided 254 mm to 305 mm wide vertical cable managers installed in between them and ganged with metal bolts and washers. This size of vertical cable manager will also be installed where one of the adjacent equipment racks is designated as future or planned and is not physically being installed under the scope of this Project;

7.10.10.8(7)(c) Supply and install double sided 152 mm wide vertical cable managers at either end of the line-up;

7.10.10.8(7)(d) All vertical cable managers are to be equipped with three (3) slack management spool kits; and

7.10.10.8(7)(e) Supply and install two (2) rack mounted horizontal wire managers for the top and bottom of each equipment rack. Each horizontal wire manager will be two (2) rack units in height and will come with fingers, rear access and cover plate.

7.10.10.8(8) For each equipment rack, Project Co will supply and install two (2) redundant ePDUs connected to L21-30R circuits, one fed from the centralized IM/IT UPS power and one from the vital power. The ePDU specified for the Communications Rooms is an Eaton EMI331-10. The requirements for each ePDU is as follows:

7.10.10.8(8)(a) Input: NEMA L21-30P, three (3) metre cord (w/molded male cord ends);

7.10.10.8(8)(b) Output: (24) C13, (3) C19 and (6) NEMA 5-20R;

7.10.10.8(8)(c) LCD metered with Ethernet Connection and Environmental Probe; locate the Environmental Probe at the front of rack #2 approximately 1524 mm AFF. Confirm mounting solution with IM/IT. Provide 2 per TR and 3 per MER; and

7.10.10.8(8)(d) Supply and install all required mounting hardware necessary to attach each ePDU and environmental probe to the vertical post of an equipment rack.

7.10.10.9 Server Cabinets

7.10.10.9(1) Project Co will supply and install four (4) server cabinets in the MER. The requirements for this server cabinet are as follows:

7.10.10.9(1)(a) Server cabinets will be 915 mm wide x 1066 mm deep c/w integrated wire managers front and rear;

7.10.10.9(1)(b) Side panels and front and rear doors will be provided, but must be removable should the Authority wish to have the server cabinet opened up for accessibility;

7.10.10.9(1)(c) Come with RU markings (RU1 at top & RU44 at bottom) that are stamped or silk screened onto the front and rear vertical mounting rails or posts (labels will not be acceptable);

7.10.10.9(1)(d) The server cabinet will be independently tested and certified to meet or exceed established Seismic Zone 4 NEBS Telcordia GR-63-CORE standards and specifications;

7.10.10.9(1)(e) Come with 4 sets of mounting rails, 2 sets are adjustable;

7.10.10.9(1)(f) Come loaded with 10-32 cage nuts; and

7.10.10.9(1)(g) Refer to the PHSA Communications Infrastructure Standards and Specifications for product details,

approved manufacturers and model numbers to be used on this Project.

7.10.10.9(2) Project Co will ensure:

7.10.10.9(2)(a) The location of the server cabinet will provide physical and environmental protection for IM/IT network and Extra-low Voltage communications systems equipment. This protection address threats including temperature, humidity, vibration, exposure to ultraviolet radiation, ingress of dust, fluids or other contaminants, physical damage (accidental or malicious), security, EMI and the presence of other hazards and impediments;

7.10.10.9(2)(b) The location of the server cabinet will allow for adequate access to safely allow repair, expansion, installation and maintenance of the Structured Cabling infrastructure, Extra-Low Voltage communications system wiring and IM/IT network and Extra-low Voltage communications systems equipment;

7.10.10.9(2)(c) Access clearance of one (1) metre in the front and behind the rear of the server cabinet is to be provided. A minimum clearance of 50 mm will be maintained between one side of the server cabinet and the wall. All clearances are to be measured from the face of any equipment mounted to the wall (as opposed to the wall itself) and from the front or side of the vertical cable managers;

7.10.10.9(2)(d) The installation of the server cabinet will be reviewed by a professional structural engineer registered in British Columbia for certification as being seismically restrained in accordance with the requirements for a post-disaster building; and

7.10.10.9(2)(e) The server cabinet will be grounded in accordance with Section 7.10.8.

7.10.10.9(3) For the server cabinet, Project Co will supply and install two (2) redundant ePDUs connected to L21-30R circuits, one fed from the centralized IM/IT UPS power and one from the vital power. The ePDU specified for the Communications Rooms is an Eaton EMI331-10. The requirements for each ePDU is as follows:

7.10.10.9(3)(a) Input: NEMA L21-30P, three (3) metre cord (w/molded male cord ends);

7.10.10.9(3)(b) Output: (24) C13, (3) C19 and (6) NEMA 5-20R;

7.10.10.9(3)(c) LCD metered with Ethernet Connection and Environmental Probe; locate the Environmental Probe at the front of cabinet approximately 1524 mm AFF. Confirm mounting solution with IM/IT. Provide 1 per 2 cabinets; and

7.10.10.9(3)(d) Supply and install all required mounting hardware necessary to attach each ePDU inside the server cabinet.

## 7.10.11 Structured Cabling

### 7.10.11.1 General Requirements

7.10.11.1(1) Structured Cabling is defined as building or campus telecommunications cabling infrastructure that consists of a number of standardized smaller elements (hence structured) called subsystems.

7.10.11.1(2) The importance of the Structured Cabling is similar to that of other critical building infrastructure in a hospital where interruptions to service can have a serious impact. Because of this, and the additional fact that the Design Life of a Structured Cabling infrastructure will last several decades, it is essential that the Design and Construction of the Structured Cabling system in the Facility is done with due care and attention ensuring capacity when and where required as well as protection against obsolescence and physical risks.

7.10.11.1(3) Project Co will meet local building codes, applicable rules and regulations of the Governmental Authority, industry standards and best practices, codes and methods and the PHSA Communications Infrastructure Standards and Specifications when undertaking the Design and Construction of the Structured Cabling infrastructure in the Facility.

7.10.11.1(4) The Design and Construction of the Structured Cabling infrastructure in the Facility will deliver predictable performance, support the connectivity of the networks, systems and equipment as well as have the flexibility to accommodate moves, adds and changes, support a wide variety of applications, provide redundancy and diversity to critical networks and systems and meet future technology demands.

7.10.11.1(5) To meet 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 the PHSA Communications Infrastructure Standards and Specifications for further details on the manufacturers and products approved for use on this Project.

7.10.11.1(6) The installation of the Structured Cabling infrastructure in the Facility will be performed by one of the Authority's prequalified cable contractors.

7.10.11.1(7) All components of the Structured Cabling infrastructure installed on the interior and exterior of the Facility and on the Site in general will be protected from water, moisture, ultra violet exposure, dust, corrosive agents and all other hazards that could impact the operation, performance, connectivity and or life span Structured Cabling infrastructure.

7.10.11.1(8) Structured Cabling will be installed in the Facility's Communications Pathway System. Refer to Section 7.10.9 for further requirements.

7.10.11.1(9) A minimum slack allowance of 300 mm will be supplied and installed by Project Co for all Structured Cabling crossing an expansion joint location in the Facility.

7.10.11.1(10) All manufacturer's warranties as it relates to the Structured Cabling infrastructure will be transferable to the Authority at the completion of the Project. Refer to the PHSA Communications Infrastructure Standards and Specifications for warranty requirements.

7.10.11.2 Horizontal Cabling Subsystem

7.10.11.2(1) Project Co will undertake the Design and Construction of a complete horizontal Category 6A subsystem for the Facility. This includes the supply, installation, termination, testing and labelling of all components of the subsystem.

7.10.11.2(2) The horizontal cabling subsystem extends from the work area's TOs to a designated TR or MER.

7.10.11.2(3) The configuration of the horizontal cabling subsystem will be a star structure with separate dedicated Category 6A Data Drops run in a continuous fashion with no splices from the TR or MER to the work area TOs on the same floor.

7.10.11.2(4) The horizontal cabling subsystem supplied and installed by Project Co will include horizontal Category 6A cables, TOs, jacks, mechanical terminations, patch panels and patch cords.

7.10.11.2(5) The maximum Permanent Link length of any Category 6A Data Drop in the horizontal cabling subsystem will not exceed 80m (262') within the entire physical work area (hereupon identified as serving zone) served by TR or MER. If the Permanent Link length of 80m is exceeded within the interior of the Facility, Project Co will need to undertake the Design and Construction of additional TRs unless otherwise approved by the Authority through the Review Procedure.

7.10.11.2(6) Project Co will supply and install surge protectors in Communications Rooms for each horizontal Category 6A Data Drop entering the Facility from the exterior. Refer to the PHSA Communications Infrastructure Standards and Specifications for further details.

7.10.11.2(7) If the Permanent Link length of 80m is exceeded to any TO located on the exterior of the Facility or within the boundary of the Site, Project Co will supply and install a powered fibre system equivalent to CommScope's Powered Fibre Cable System or GatorLink by Fiber Connections Inc., as approved by the Authority through the Review Procedure. The system will include all the necessary components required for a complete system, such as:

7.10.11.2(7)(a) Hybrid fibre / copper cable (either single mode or multimode will be used depending on the distance between the TO and the TR or MER);

7.10.11.2(7)(b) PoE extender;

7.10.11.2(7)(c) Media converters;

7.10.11.2(7)(d) Safety & overload protection;

7.10.11.2(7)(e) Power supply;

7.10.11.2(7)(f) Power transmission management; and

7.10.11.2(7)(g) Cable/fibre management.

7.10.11.2(8) Serving zones will be established for the MER and each TR in the Facility and identified on all floor plans. Horizontal Category 6A Data Drops will not cross the serving zone boundary lines to be terminated in another TR.

7.10.11.2(9) The ANSI/TIA-1179-A Health Care Facility Telecommunications Cabling Standard will be used to establish the minimum quantity of Category 6A Data Drops that will be installed in the Facility by Project Co.

7.10.11.2(10) Project Co will, as directed by the Authority acting reasonably, assign each room, area and space in the Facility a work area density ("High", "Medium" or "Low") in accordance with the ANSI/TIA-1179-A Health Care Facility Telecommunications Cabling Standard Table 1:

7.10.11.2(10)(a) Low Density Work Area - 2 to 6 Data Drops in each area;

7.10.11.2(10)(b) Medium Density Work Area - 7 to 14 Data Drops in each area; and

7.10.11.2(10)(c) High Density Work Area - > 14 Data Drops in each area.

7.10.11.2(11) If the ANSI/TIA-1179-A Health Care Facility Telecommunications Cabling Standard does not clearly identify a work area density for a specific type of room or area in the Facility, then Project Co will, as directed by the Authority acting reasonably, assign a work area density to that specific room or area.

7.10.11.2(12) Project Co will, as directed by the Authority acting reasonably, determine the specific number of Data Drops to be supplied and installed in each room or area of the Facility. This determination will fall within the range of the work area density assigned for a given room and or area in the Facility.

7.10.11.2(13) Project Co will supply and install additional Data Drops in excess of the minimum quantity to:

7.10.11.2(13)(a) Support all of the networks, systems and equipment to be installed or used in the Facility;

7.10.11.2(13)(b) Comply with any other provisions of this Agreement that require Data Drops; and

7.10.11.2(13)(c) Ensure there is one unused Data Drop for each TO installed in the Facility with the exception of those TOs associated with wall mounted telephones, intercom door stations, Multimedia Room control panels, IP video surveillance camera(s) and access points.

7.10.11.3 Backbone Cabling Subsystem

7.10.11.3(1) Copper Backbone

7.10.11.3(1)(a) Project Co will undertake the Design and Construction of a complete multi-conductor twisted pair Category 3 copper backbone in the Facility. This includes the supply, installation, termination, testing and labelling of all components.

7.10.11.3(1)(b) The multi-conductor twisted pair Category 3 copper backbone supplied and installed by Project Co will include such components as unshielded twisted pair cables (including tie cables), Gigabix termination equipment, cross-connect wire, patch panels and patch cords.

7.10.11.3(1)(c) This multi-conductor twisted pair Category 3 copper backbone will connect the MER to each TR in the Facility:

7.10.11.3.1.(c).1 The configuration of the copper backbone will be a hierarchical star

typology where separate dedicated multi-conductor twisted pair Category 3 cables will be installed from the MER to each TR; and

7.10.11.3.1.(c).2 The pair count of each multi-conductor twisted pair Category 3 riser installed between the MER and each TR will be a minimum of twenty-five (25) pairs.

7.10.11.3(1)(d) This multi-conductor twisted pair Category 3 copper backbone will also include:

7.10.11.3.1.(d).1 The supply and installation of a 100 pair cable installed between the Phase 1A MER and the Phase 1A EF Room.

7.10.11.4 Intra-Building Fibre Backbone

7.10.11.4(1) Project Co will undertake the Design and Construction of an intra-building fibre backbone in the Facility. This includes the supply, installation, termination, testing and labelling of all components.

7.10.11.4(2) The intra-building fibre backbone supplied and installed by Project Co will include such components as single mode and multimode fibre optic cables, high density patch panels, cassettes, connectors, patch cords and fibre management components.

7.10.11.4(3) The type of fibre to be supplied and installed in the Facility is:

7.10.11.4(3)(a) Single mode – OS2 distribution fibre, tight buffer, all dielectric; and

7.10.11.4(3)(b) Multimode – OM5 distribution fibre, tight buffer, all dielectric.

7.10.11.4(4) The configuration of the intra-building fibre backbone will be a hierarchical star typology where separate dedicated primary and secondary multimode and single mode fibre optic cables will be installed between the MER and each TR.

7.10.11.4(4)(a) Primary and secondary multimode and single mode fibre optic cables will be installed utilizing the physically route diverse backbone Communications Pathway System between the MER and each TR;

7.10.11.4(4)(b) Minimum strand count for each primary and secondary multimode and single mode fibre optic cable running between the MER and each TR will be twenty-four (24); and

7.10.11.4(4)(c) Refer to Section 7.10.19 for additional requirements for the DAS system.

7.10.11.4(5) As part of the intra-building fibre backbone, Project Co will also supply and install:

7.10.11.4(5)(a) A minimum of one (1) twenty-four (24) strand single mode and one (1) twenty-four strand OM5 multimode fibre optic cables installed in the physically diverse backbone Communications Pathway System between the Phase 1A MER and the Phase 1A EF Room.

7.10.11.4(6) All fibre optic cable will be protected along its entire length either by employing interlocking armoured cable or inner duct.

7.10.11.4(6)(a) All fibre optic cable jackets including inner and outer jackets as well as inner duct are to be colour coded so the type of fibre can easily be identified. The accepted colour code standards are yellow for single mode and lime green for OM5 multimode; and

7.10.11.4(6)(b) Armoured fibre optic cable will be grounded in accordance with Section 7.10.8.

7.10.11.4(7) All connectors, boots, cassettes, patch cords and cable assemblies employed are to be colour coded so the type of fibre can easily be identified. The accepted colour code standards are blue (connectors) and yellow (for cable) for single mode and lime green for OM5 multimode.

7.10.11.4(8) Project Co will supply and install:

7.10.11.4(8)(a) Eight (8) metres of slack on both ends of each fibre optic cable installed;

7.10.11.4(8)(b) Wire management in each Communications Room to manage fibre optic cable slack; and

7.10.11.4(8)(c) Angle bracket or cantruss structure to support the wire management rings in each Communications Room.

7.10.11.4(9) All intra-building backbone fibre optic cables will be terminated using LC connectors unless otherwise noted.

7.10.11.5 Telecommunications Outlets

7.10.11.5(1) In this Agreement, the terms "telecom outlet, “workstation outlet”, “data outlet”, “Voice-Data Outlet”, “wireless outlet”, "wireless communication outlet" and "communications outlet" are used interchangeably.

7.10.11.5(2) Regardless of their name, all such outlets will be considered TOs.

7.10.11.5(3) All TOs in the Facility will:

7.10.11.5(3)(a) Include a minimum of two Data Drops;

7.10.11.5(3)(b) Be accessible. TOs will not be obstructed and will be reachable using a maximum 2500 mm tall ladder unless otherwise approved by the Authority through the Review Procedure;

7.10.11.5(3)(c) Be located consistently in rooms that are exactly the same in terms of size and layout of all furniture, Millwork and equipment unless specifically stated otherwise by the Authority;

7.10.11.5(3)(d) Be connected to the nearest cable tray or Communications Room (MER or TR) with conduit in accordance with Section 7.10.9. In the event the TO is located within a junction box, it is the junction box that will be connected to the nearest cable tray or Communications Room (MER or TR) with conduit;

7.10.11.5(3)(e) Maintain the proper bend radius of cable media installed; and

7.10.11.5(3)(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 ports unless otherwise specified by the Authority.

7.10.11.5(4) Project Co will:

7.10.11.5(4)(a) Provide jack number information on the Authority's cable information Excel spreadsheet. Refer to the PHSA Communications Infrastructure Standards and Specifications and as-built drawings;

7.10.11.5(4)(b) Design each room and area in the Facility such that TOs are distributed throughout the room as required to support clinical and operational functionality and convenient use of equipment;

7.10.11.5(4)(c) Co-locate, at each TO location, an electrical outlet(s) with an appropriate quantity and type of receptacles;

7.10.11.5(4)(d) Protect TOs and associated cables, jacks, faceplates and labels from water, detergents, extreme temperature conditions, moisture, ultra violet exposure, dust, corrosive agents and all other hazards that could impact the

operation, performance, connectivity and or lifespan of the TO and its component parts including the Category 6A cabling. Project Co will achieve this protection through:

7.10.11.5.4.(d).1 Using materials that are suitable for the environment where the TO resides; and

7.10.11.5.4.(d).2 By supplying and installing NEMA enclosures that are appropriately rated to protect the TO.

7.10.11.5(5) Supply and install Telecommunication Outlets in the ceilings of the Facility for all equipment including access points, antennas, beacons, transmitters, receivers, AV and multimedia equipment and all types of cameras. Specific installation method of the TOs located in the ceilings of the Facility will vary depending on the type of ceiling and location.

7.10.11.5(5)(a) Inaccessible ceilings - The TO box will be:

7.10.11.5.5.(a).1 Mounted above the finished ceiling for the termination of the Category 6A Data Drops;

7.10.11.5.5.(a).2 A minimum size of 100 mm x 100 mm x 54 mm with a 100 mm x 100 mm shoe box steel cover for a decora strap;

7.10.11.5.5.(a).3 Fastened directly to the ceiling's structural support member with a caddy clip and or screws no more than 305 mm above the access hatch opening;

7.10.11.5.5.(a).4 Accessible through the provision of an access panel with a minimum dimension of 610 mm x 610 mm. Access panels will be of high abuse security grade, Ligature Resistant, tamper-proof, and Vandal Resistant where required by the Authority; and

7.10.11.5.5.(a).5 Labelled in accordance with requirements in the PHSA Communications Infrastructure Standards and Specifications. This includes the access panel.

7.10.11.5(5)(b) Accessible ceilings - The TO box will be:

7.10.11.5.5.(b).1 Mounted above the finished ceiling for the termination of the Category 6A Data Drops;

7.10.11.5.5.(b).2 A minimum size of 100 mm x 100 mm x 54 mm with a 100 mm x 100 mm shoe box steel cover for a decora strap;

7.10.11.5.5.(b).3 Fastened by Project Co directly to the ceiling's structural support member with a caddy clip and or screws no more than 305 mm above the finished ceiling; and

7.10.11.5.5.(b).4 Labelled in accordance with requirements in the PHSA Communications Infrastructure Standards and Specifications. This includes the ceiling grid or panel.

7.10.11.5(5)(c) Exposed or unfinished ceilings – Junction boxes will be:

7.10.11.5.5.(c).1 Mounted to the ceiling;

7.10.11.5.5.(c).2 A minimum size of 150 mm x 150 mm x 100 mm with a solid cover plate;

7.10.11.5.5.(c).3 Contain a Telecommunication Outlet that will consist of a two (2) port surface jack assembly located; and

7.10.11.5.5.(c).4 Labelled in accordance with requirements in the PHSA Communications Infrastructure Standards and Specifications.

7.10.11.5(5)(d) Supply and install Telecommunication Outlets in the ceiling plates of the Packaging and Assembly Area in the MDRD; and

7.10.11.5(5)(e) Supply and install floor boxes with TOs and power to meet all requirements specified in this Agreement including floor mounted self-registration kiosks and electronic Wayfinding, AV and multimedia systems.

7.10.11.6 Patch Cords and Cross Connect Wire

7.10.11.6(1) Project Co will supply and, where noted, install Category 6A, multimode and single mode fibre patch cords as well as any copper cross connect wire jumpers of the correct length for all equipment in sufficient quantity to make each device, network and system in the Facility fully operational.

7.10.11.6(2) Project Co will supply additional spare Category 6A patch cords in excess of the quantity required above. The formula used to determine the quantity will be 2 x (6.5 percent x the total number of switch ports in the Facility at Substantial Completion). The variety of lengths of the spare patch cords will be provided to Project Co by the Authority.

7.10.11.6(3) All Category 6A patch cords used in Communications Rooms will be 28 AWG stranded with an outer diameter less than or equal to 4.72 mm.

7.10.11.6(4) Project Co will supply four Category 6A patch cords for each TO associated with the Category 6A cabling grid (two for the access point and two for connection to the switch in the MER or TR).

7.10.11.6(5) Project Co will supply additional spare multimode and single mode patch cords in excess of the quantity required above. The amount will be equal to twelve spare multimode and twelve spare single mode patch cords for each fibre patch panel installed in the Facility. The variety of lengths of the spare patch cords will be provided to Project Co by the Authority.

7.10.11.6(6) In addition to the patch cords required for IM/IT networks, Project Co will supply and install any additional patch cords necessary to support all of the other networks and systems to be installed or used in the Facility as required in this Agreement.

7.10.11.6(7) Meet all other stated requirements in the PHSA Communications Infrastructure Standards and Specifications.

7.10.12 IM/IT Data Network

7.10.12.1 The Authority will:

7.10.12.1(1) Design the IM/IT data network;

7.10.12.1(2) Provide, configure, activate and test the network equipment, required to connect systems and equipment in the Facility to the IM/IT data network;

7.10.12.1(3) Coordinate with telecommunications carriers to deliver the services necessary for the IM/IT data network to function in the Facility; and

7.10.12.1(4) Undertake the design and construction of the fibre inter-building cabling infrastructure in the CPPS necessary to physically connect the Facility's IM/IT data network to the IM/IT data network in the Existing Hospital.

7.10.12.2 Project Co will:

7.10.12.2(1) Undertake the Design and Construction of all other communications infrastructure in the Facility required to support the implementation of the Authority's IM/IT data network in accordance with the requirements stated in this Agreement;

7.10.12.2(2) Mount all Authority supplied network equipment in Communications Rooms in the Facility in accordance with instructions and documentation provided by the Authority. This includes the provision and installation of all mounting hardware as well as the connection of network equipment to the ePDUs installed in equipment racks and server cabinets;

7.10.12.2(3) Supply and install the materials and labour to physically connect all Authority supplied network equipment to the Facility's intra-building fibre backbone infrastructure in accordance with instructions and documentation provided by the Authority; and

7.10.12.2(4) Supply and install all patch cords required to connect Authority supplied network equipment to all systems and equipment requiring connectivity to the Facility's IM/IT data network in accordance with instructions and documentation provided by the Authority.

7.10.12.3 Network equipment and any other form of active component regardless of who is providing it will only be installed in the Facility's Communications Rooms when the room is considered Equipment Ready by the Authority. A Communications Room will be considered Equipment Ready by the Authority once the following conditions are met:

7.10.12.3(1) The Facility is enclosed and weather tight and its internal temperature and humidity conditions are approximately the same as final conditions expected;

7.10.12.3(2) The Communications Room construction and finishes are complete and the handover requirements as defined in Section 7.10.10 are met;

7.10.12.3(3) The Category 6A horizontal cabling subsystem associated with the serving zone of a MER or a TR is tested in accordance with the PHSA Communications Infrastructure Standards and Specifications. All test results are to be provided to the Authority for review;

7.10.12.3(4) The intra-building copper and fibre backbone cabling subsystem between the MER and a Communications Room is tested in accordance with the PHSA Communications Infrastructure Standards and Specifications. All test results are to be provided to the Authority for review;

7.10.12.3(5) The cabling information for each Structured Cabling subsystem associated with the Communications Room are provided to the Authority in the format prescribed in the PHSA Communications Infrastructure Standards and Specifications;

7.10.12.3(6) Telecommunications grounding and bonding infrastructure is completely installed and tested; and

7.10.12.3(7) All other electrical, mechanical and security infrastructure and systems associated with Communications Rooms are fully constructed and commissioned as required in this Agreement. If necessary, Project Co has the option to present temporary measures to the Authority that, if approved by the Authority through the Review Procedure, can exist for an interim period until the electrical, mechanical and security systems associated with the Communications Rooms are fully commissioned.

7.10.12.4 Upon receipt of network equipment, Project Co will be financially responsible for any damage or disappearance of Authority provided equipment due to improper handling and storage, negligence, fire, theft and environmental conditions during Construction. This includes any financial costs associated with impacts to the Project Schedule or to the Authority's deployment schedule resulting from the loss of network equipment.

7.10.13 IM/IT Wi-Fi Network

7.10.13.1 General Requirements

7.10.13.1(1) The IM/IT Wi-Fi network is a mission critical infrastructure and as such will be designed and installed to:

7.10.13.1(1)(a) Provide superior coverage, capacity and reliability, with a cabling infrastructure capable of supporting wireless services;

7.10.13.1(1)(b) Blend aesthetically with the environment while not impacting wireless performance;

7.10.13.1(1)(c) Protect wireless access points and antennas from theft, vandalism, tampering, accidental damage and unauthorized moves and disconnects;

7.10.13.1(1)(d) Protect access points from adverse environmental conditions; and

7.10.13.1(1)(e) Permit convenient and authorized access to access points and cabling to simplify moves, adds and changes brought about by technological advancements, new wireless applications, alterations in the physical environment, and increased utilization over time.

7.10.13.1(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 wireless reliability and performance to its end users, the Authority does not permit other wireless networks to operate in the Facility that cause interference and disruption to its IM/IT Wi-Fi network. If Project Co installs a wireless system that interferes with the IM/IT Wi-Fi network in the Facility, Project Co will have to turn it 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.

7.10.13.1(3) The Authority will:

7.10.13.1(3)(a) Design IM/IT Wi-Fi network. The design of the IM/IT Wi-Fi network is largely dependent on the design of the Facility. As such, the Design of the IM/IT Wi-Fi network will be iterative and commence once Project Co can confirm that the shell and core of Facility is largely finalized. The final iteration of the Design of the IM/IT Wi-Fi network will be complete after the IFC submission is issued by Project Co;

7.10.13.1(3)(b) Procure, configure and commission all wireless network equipment required to make the IM/IT Wi-Fi network fully operational including access points, antennas, controllers and other appliances;

7.10.13.1(3)(c) Provide centralized authentication and security appliances or latest equivalent to support the wireless network within the Facility;

7.10.13.1(3)(d) Procure and supply all standard vendor mounting brackets, lightning arrestors and accessories required to install wireless hardware;

7.10.13.1(3)(e) Conduct 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; and

7.10.13.1(3)(f) Label and supply Project Co with wireless access points, antennas, mounting brackets, lightning arrestors and other standardized hardware in accordance with the Project Schedule.

7.10.13.1(4) Project Co will:

7.10.13.1(4)(a) Furnish the Authority with all Design documentation in the format requested by the Authority to complete a software based predictive Design of the IM/IT Wi-Fit network. This includes floor plans, reflected ceiling plans, elevation and section drawings, furniture and equipment layouts and information on building materials and finishes;

7.10.13.1(4)(b) Meet all requirements stated in the Fraser Health Design Stages Submittals Expectations as it relates to:

7.10.13.1.4.(b).1 Identifying specific elements of the Wi-Fi Design on the construction drawings;

7.10.13.1.4.(b).2 Coordinating specific elements of the Wi-Fi Design on the construction drawings; and

7.10.13.1.4.(b).3 Updating the construction drawings to reflect changes to the Wi-Fi Design throughout the duration of the Project.

7.10.13.1(4)(c) Obtain, if required, a code variance from the AHJ to ensure access points can be placed in stairwells to provide Wi-Fi coverage to the stairwell. Coverage in stairwells is essential for critical communications in the Facility and it standard practice for Authority to place access points in stairwell landings in all of its buildings

7.10.13.1(4)(d) Minimize the risk of interference and ensure the proper operation of the Wi-Fi system by:

7.10.13.1.4.(d).1 Keeping all metal 1200 mm away from access points and placing no metal underneath access points. This includes, but is not limited to, pipes and ducting (insulated or otherwise) and EMT conduits of all sizes. This requirement also applies to any new

Design and Construction undertaken by Project Co in the Energy Center that might impact existing access points. If this requirement is not achieved during Construction, the Project Co will be responsible to re-locate the metal infrastructure at no cost to the Authority; and

7.10.13.1.4.(d).2 Adequately spacing all Project Co RF emitting devices and antennas 1200 mm from access points to ensure sufficient isolation. If this requirement is not achieved during Construction, the Project Co will be responsible to re-locate its RF emitting device and antennas at no cost to the Authority

7.10.13.1(4)(e) Undertake the Design and Construction of a Category 6A cabling grid for the IM/IT Wi-Fi network as required by Section 7.10.11.2;

7.10.13.1(4)(f) Install Authority provided access points, antennas and associated accessories and hardware as required by Section 7.10.11.3;

7.10.13.1(4)(g) Supply and install enclosures and other components as noted in Section 7.10.11.3;

7.10.13.1(4)(h) Provide adequate space and power outlets for wireless device charging stations inside each functional area of the Facility, taking into account that charging stations with multiple devices may cause signal concentrations that impact wireless performance and capacity. Sufficient spread of charging stations will be maintained for both charging and storage areas so as not to impact operational performance of the Wi-Fi network. Refer to Division 26, Section 7.9 Electrical for additional requirements; and

7.10.13.1(4)(i) Provide the Authority and its representatives with all access to the Site as required to complete the Design and Construction of the IM/IT Wi-Fi network.

7.10.13.2 Category 6A Cabling Grid

7.10.13.2(1) Project Co will undertake the Design and Construction of cabling grid consisting of Category 6A Data Drops terminated in TOs throughout the Facility's ceiling spaces to connect Wi-Fi access points.

7.10.13.2(2) This Category 6A cabling grid will be considered as part of the horizontal cabling subsystem and, as such, its Design and Construction will conform to all requirements stated in Section 7.10.11.2.

7.10.13.2(3) The Category 6A cabling grid is defined as a collection of uniform cells where each cell is a square.

7.10.13.2(3)(a) The size of each square is 10 m x 10 m. The Authority permits Project Co to adjust the size of grid squares to 15 m x 15 m on the parking levels of the Facility only;

7.10.13.2(3)(b) TOs with two Category 6A Data Drops are to be supplied and installed by Project Co in the ceiling spaces of the Facility at the centre of each square cell; and

7.10.13.2(3)(c) Where only a portion of a square cell resides within the interior of the Facility (such as at the Facility's perimeter), a TO with two Category 6A Data Drops will still be supplied and installed by Project Co in the interior of the Facility for that partial cell.

7.10.13.2(4) To ensure ubiquitous seamless Wi-Fi coverage for both the 2.4 GHz and 5.0 GHz frequency ranges, the Category 6A cabling grid supplied and installed by Project Co will cover all rooms, areas and spaces within the Facility This includes Utility rooms, (mechanical, electrical, elevator machine, Communications Rooms), interstitial floors, stairwells, parking levels, service links, bridges and tunnels.

7.10.13.2(5) At the Communications Room (MER or TR), the Category 6A Data Drops which comprise the cabling grid in a given serving zone will be terminated evenly across all patch panels to enable patching to different network switches.

7.10.13.2(6) Additional TOs over and above what is provided by the Category 6A cabling grid will be supplied and installed by Project Co in:

7.10.13.2(6)(a) Large Multimedia Rooms in accordance with ANSI/TIA-4966 - Telecommunications Infrastructure Standard for Educational Facilities.

7.10.13.2.6.(a).1 Project Co is to install one additional TO equipped with two Category 6A Data Drops for every twenty-five (25) seats in a Multimedia Room; and

7.10.13.2.6.(a).2 The location of these additional TOs in Multimedia Rooms will be determined

in consultation with the Authority through the Review Procedure.

7.10.13.2(6)(b) All elevator landings, (lobbies), and if permissible by code, in elevator shafts and cabs.

7.10.13.2(6)(c) On the exterior of Phase 1A or Phase 1B provide exterior Wi-Fi coverage up to 15m off the exterior of the building and to ensure seamless integration with IM/IT Wi-Fi networks in adjacent areas of the Existing Hospital.

7.10.13.2.6.(c).1 Exterior Wi-Fi coverage areas include patios, courtyards, roofs, pedestrian pathways, and parkade of the Phase 1A and Phase 1B buildings; and

7.10.13.2.6.(c).2 The location and quantity of TOs to be placed the exterior of the Facility and on the Site will be determined through the Authority's Design of the IM/IT Wi-Fi network.

7.10.13.2(7) To enable Wi-Fi access points and other network connected devices (such as IP video surveillance camera(s)) to be installed on street light poles, Project Co will ensure all new street light poles installed on the Site within the property boundary of the BH Campus are:

7.10.13.2(7)(a) Connected to the nearest communications cable tray in the Facility through a dedicated underground Communications Pathway System. Refer to Section 7.10.9 for requirements; and

7.10.13.2(7)(b) Provided with:

7.10.13.2.7.(b).1 Sufficient vital power necessary for media converters, an exterior Wi-Fi access point and IP video surveillance camera(s) camera concurrently;

7.10.13.2.7.(b).2 Weatherproof grommets inserted into the pole as required for cabling to the exterior Wi-Fi access point and IP video surveillance camera(s);

7.10.13.2.7.(b).3 A means inside the length of the pole to isolate street light conductors from cabling to the exterior Wi-Fi access point and IP video surveillance camera(s);

7.10.13.2.7.(b).4 Handholds with a removable raintight cover with theft-proof bolt;

7.10.13.2.7.(b).5 Ground bolt and bond accessible from a handhole; and

7.10.13.2.7.(b).6 A lockable 200 mm x 400 mm x 200 mm box for communications equipment made of a suitable material to install into the base of the pole. This box is to be connected to the underground Communications Pathway System and to the electrical box co-located in the base of the pole.

7.10.13.3 Wi-Fi Network Equipment, Components and Enclosures

7.10.13.3(1) Project Co will install all wireless network equipment (access points, antennas and associated accessories and hardware) as prescribed in the Authority's Design of the IM/IT Wi-Fi Network.

7.10.13.3(2) Wireless network equipment provided to Project Co for the interior of the Facility will not be installed until:

7.10.13.3(2)(a) The Facility is enclosed, weather tight, temperature and humidity conditions are approximately the same as final conditions expected; and

7.10.13.3(2)(b) Category 6A cabling grid is installed and tested.

7.10.13.3(3) Project Co will not be permitted to install wireless network equipment until the Authority has inspected the interior conditions of the Facility and provided written approval to proceed with the installation.

7.10.13.3(4) Prior to receipt of wireless network equipment for installation, Project Co will provide the Authority with as-built documentation of the Category 6A cabling grid identifying the cable IDs associated with each TO.

7.10.13.3(5) Upon receipt of wireless network equipment, Project Co will be financially responsible for any damage or disappearance of Authority provided equipment and associated materials due to improper handling and storage, negligence, fire, theft and environmental conditions during Construction. This includes any financial costs associated with impacts to the Project Schedule or to the Authority's deployment schedule resulting from the loss of wireless network equipment.

7.10.13.3(6) Project Co will:

7.10.13.3(6)(a) Seismically restrain all access points and wireless components;

7.10.13.3(6)(b) Install and label two patch cords between each access point and its designated TO as specified in the Authority's Design of the IM/IT Wi-Fi network;

7.10.13.3(6)(c) Supply and install lightning arrestors and associated grounding on all outdoor access points;

7.10.13.3(6)(d) Supply, install and label indoor/outdoor NEMA rated access point enclosures to protect wireless network equipment from the environment, theft or vandalism in the parking levels and other areas inside and outside the Facility and on the Site as specified by the Authority.

7.10.13.3.6.(d).1 Enclosures will be UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, and work with all variations of Authority provided wireless network equipment;

7.10.13.3.6.(d).2 Project Co, if requested, will provide samples of the enclosure to Authority for RF testing purposes and to check for interoperability with wireless network wireless network equipment; and

7.10.13.3.6.(d).3 Enclosures provided will come with locking hardware.

7.10.13.3(6)(e) Supply, install and label ceiling (hard cap and tile) enclosures to house wireless network equipment in areas of the Facility where the Authority identifies a high risk to Patient and Staff safety. These enclosures will hide wireless equipment from view and prevent unauthorized access to the access point and the connecting cabling.

7.10.13.3.6.(e).1 Enclosures will be high abuse security grade, Ligature Resistant, tamper-proof, and Vandal Resistant;

7.10.13.3.6.(e).2 Enclosures will work with all variations of Authority provided wireless network equipment, allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour;

7.10.13.3.6.(e).3 Project Co, if requested, will provide samples of the enclosure to Authority for RF testing purposes and to check for interoperability with wireless network equipment; and

7.10.13.3.6.(e).4 Enclosures provided will come with locking hardware.

7.10.13.3(6)(f) Supply, install and label electrical boxes of suitable dimensions that are approved by the Authority through the Review Procedure for mounting wireless network equipment in areas inside the Facility that have exposed ceilings (where an enclosure is not required by the Authority);

7.10.13.3(6)(g) Supply and install in all inaccessible and exposed ceilings, the conduits necessary to connect:

7.10.13.3.6.(g).1 Enclosures and electrical boxes either supporting or containing wireless network equipment to access hatches or boxes containing a TO (designated by the Authority to be used to connect wireless equipment); and

7.10.13.3.6.(g).2 Enclosures and boxes either supporting or containing wireless network equipment to enclosures and boxes containing or supporting external antennas.

7.10.13.3(6)(h) Supply and install coloured vanity skins or covers for wireless network equipment where required by the Authority for aesthetic reasons;

7.10.13.3(6)(i) Supply and install specialized or customized mounts and brackets to install and or suspend wireless network equipment;

7.10.13.3(6)(j) Take full responsibility (including cost) for all alterations in the Design and Construction of the Facility required to install any aspect of the wireless infrastructure;

7.10.13.3(6)(k) Move and or install new wireless network equipment as prescribed by the Authority after completion of pre and post occupancy wireless surveys. This includes:

7.10.13.3.6.(k).1 Supply and installation of all patch cords;

7.10.13.3.6.(k).2 Supply and installation of all conduits, sleeves, firestopping, boxes and enclosures; and

7.10.13.3.6.(k).3 In the event of a move, replacement of ceiling tiles and repair of walls and ceilings where necessary.

7.10.14 IM/IT Voice Network

7.10.14.1 The voice network and infrastructure in the Facility will be equipped to provide VoIP, analog, fax and public access services through the Authority's own PBX located offsite at a remote data centre servicing Fraser Health acute sites.

7.10.14.2 The Authority will:

7.10.14.2(1) Coordinate with telecommunications carriers to deliver the services and capacity required to connect the Facility to the PSTN directly through the Authority's PBX;

7.10.14.2(2) Undertake the Design and Construction of the fibre and copper inter-building cabling infrastructure in the CPPS necessary to physically connect the Authority's PBX at a remote data centre, through the Facility's backbone cabling subsystem; and

7.10.14.2(3) Provide dial tone, voice mail and related features to systems and equipment in the Facility.

7.10.14.3 Project Co will:

7.10.14.3(1) Undertake the Design and Construction of all other communications infrastructure in the Facility required to support the implementation of the Authority's IM/IT voice network in accordance with the requirements stated in this Agreement;

7.10.14.3(2) Provide the materials and labour required to cross-connect and patch all VoIP, analog, fax and public access lines in the Facility in accordance with instructions and documentation provided by the Authority; and

7.10.14.3(3) Install and supply TOs for wall mounted courtesy phones and taxi phones in the Facility as directed by the Authority.

7.10.15 IM/IT Equipment

7.10.15.1 The requirements and responsibilities relating to IM/IT Equipment are as described in Appendix 3F [Equipment List – IM/IT].

7.10.16 Project Co Supplied Servers

7.10.16.1 Project Co supplied servers will align with the Authority's:

7.10.16.1(1) Policies and operational procedures with regards to security and operations. This includes aligning to the Authority operating systems and hardware patching processes; and

7.10.16.1(2) Standards for procuring equipment including hardware models, operating systems, software licenses, maintenance and contract agreements.

7.10.16.2 Project Co supplied servers will be the latest technology and will include:

7.10.16.2(1) Dual power supplies and dual NIC cards; and

7.10.16.2(2) The installation and management of:

7.10.16.2(2)(a) Antivirus software that aligns with the Authority's antivirus policies; and

7.10.16.2(2)(b) Enterprise data backup and retention software that aligns with the Authority's backup and retention policies and procedures.

7.10.16.3 The hardware and software configuration of all servers provided by Project Co will be reviewed and approved by the Authority through the Review Procedure.

7.10.16.4 Where technically possible, Project Co will offer the opportunity to virtualize any of the servers it is providing under this Agreement and, where approved by the Authority through the Review Procedure, cover all costs associated with implementation of such virtualization in accordance with Authority standards, requirements, policies and procedures.

7.10.16.5 Project Co supplied servers will be installed in the Phase 1A MER unless a compelling reason technical or otherwise emerges through the course of Design and Construction of the Facility that requires the server to be located elsewhere.

7.10.17 Multimedia Infrastructure, Systems and Requirements

7.10.17.1 Multimedia Rooms and Multimedia Spaces

7.10.17.1(1) Overview. Multimedia AV systems and equipment will be located in Multimedia Rooms and in ancillary Multimedia Spaces throughout the Facility. The more stringent acoustic and finishes requirements for Multimedia Room Design and Construction described herein are necessary in order to enable accurate capture and playback of audio and video signals free from distortion, while preventing acoustic or visual interference in and from adjacent rooms or spaces.

7.10.17.1(2) Multimedia Room functionality and types. In general, there are six (6) types of Multimedia Rooms used for multimedia capture and/or playback in the Facility. Multimedia Room sizes vary. Some Multimedia Rooms may have more than one function:

7.10.17.1(2)(a) Type 1 – A room with a permanently installed AV system including one Ultra HD digital display monitor with dual channel (stereo) sound bar. Used for presenting material from a laptop or other portable device for collaborative meetings and small group AV presentations. Some Type 1 rooms are used for education purposes for Patients. Also used for Teleconference meetings using a speakerphone or Skype (or similar) communications software. Presenters will be able to easily connect and display audio and video content from a laptop or mobile device. Type 1 rooms are to be pre-wired with additional power and data connections so that they can easily be converted to Type 2 rooms in the future.

7.10.17.1(2)(b) Type 2 – Rooms used for meetings, Teleconferencing, Skype sessions, AV presentations and also for internal and external VC utilizing two permanently installed Ultra HD digital display monitors, associated Codecs, VC camera(s), microphones, systems control and amplified wall or ceiling speakers. Seating and tables will be used in different configurations for AV and VC meetings. In the event of an emergency one of the Type 2 rooms becomes the EOC utilizing additional multiple Multimedia and communications systems simultaneously.

7.10.17.1(2)(c) Type 3 – Multimedia Rooms incorporating UBC Faculty of Medicine standards for such rooms, and that will used by UBC.

7.10.17.1(2)(d) Type 4 – The Lecture Room. A flexible meeting room with a capacity of 100 people and complex multimedia requirements. The room will be used by Staff and the Public for meetings, presentations and videoconferences. Additional requirements for the lecture room are detailed in Appendix 3T.

7.10.17.1(2)(e) Type 5 – Clinical rooms that are used for virtual health. Virtual health includes point-to-point real time VC connecting a clinician/physician in the hospital with a remote Patient, and for sharing clinical data for real time consultation with a remote associate. Also used for connecting local Patients with a remote clinician/ physician. Virtual health utilizes computer-based VC

software, a video camera, two Ultra HD digital display monitors, microphone and soundbar.

7.10.17.1(2)(f) Type 6 – Clinical rooms equipped with UHD PTZ cameras and microphones that are used by the Authority as a source room for internally televising procedures for the purposes of training and education via a clinical education camera system. There are also multiple clinical education viewing rooms where those live source streams are viewed by Staff, and where pre-recorded video can be viewed by Patients. There are 4 (Four) Operating rooms that have clinical education cameras (supplied by the Authority) that are part of the clinical education camera system but those rooms are NOT considered Multimedia Rooms for construction purpose and they instead are to be designed and constructed to the clinical standards for such rooms.

7.10.17.1(2)(g) The Multimedia Rooms quantities and locations are identified in Appendix 3P [Multimedia Room Matrix].

7.10.17.2 Types of Multimedia Spaces. In addition to the Multimedia Rooms described above in general there are also two (2) types of spaces with multimedia playback equipment as described below. Although not as stringent as the requirements for Multimedia Rooms their Design and Construction will enable accurate playback of audio and video signals free from distortion while preventing acoustic or visual interference with adjacent rooms or spaces.

7.10.17.2(1) Public spaces and Staff spaces containing digital signage screens, as described further in 7.10.15.21.

7.10.17.2(2) Spaces utilizing amplified audio and music playback systems such as exercise rooms, dining areas, lounges, and other locales with digital signage monitors that have speakers.

7.10.17.3 Multimedia Scope

7.10.17.3(1) The Authority is responsible for:

7.10.17.3(1)(a) Identifying the typical number of seats and table layouts required for multimedia purposes in Multimedia Rooms. This will determine sightlines to Ultra HD digital display monitors and/or cameras, monitor sizes, and connectivity requirements to electrical and data connections in floor boxes. The number of seats in Multimedia 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

relocated, and additional chairs are brought in the actual occupancy figures and heat loads will be greater;

7.10.17.3(1)(b) Identifying those type 5 rooms that require multimedia, communications or construction infrastructure in order to provide functionality for virtual health purposes;

7.10.17.3(1)(c) Identifying those type 6 room that will be used as clinical education source rooms and viewing rooms;

7.10.17.3(1)(d) Identifying the Multimedia Room that is to have an interactive whiteboard that is connected to the videoconference system;

7.10.17.3(1)(e) Identifying ancillary Multimedia Spaces that require multimedia communication or construction infrastructure;

7.10.17.3(1)(f) Describing the Authority's standard requirements for construction and finishes for Multimedia Rooms and Multimedia Spaces. These standards will describe requirements for lighting, AV controls, Building Systems controls, wall finishes, window treatments, electrical and data distribution, security, and acoustics;

7.10.17.3(1)(g) Describing the types of equipment and connectivity required for the various types of Multimedia Rooms and Multimedia Spaces;

7.10.17.3(1)(h) Approving mounting materials and methods and other functional and aesthetic considerations for the installation of Ultra HD digital display monitors, cameras, microphones, speakers, sound bars, control devices and other related multimedia equipment;

7.10.17.3(1)(i) Providing tables and seating for all Multimedia Rooms and Multimedia Spaces except for the Type 4 Room;

7.10.17.3(1)(j) Providing and installing desk phones, wall phones, speaker phones, or conference phones deployed in Multimedia Rooms as listed in Appendix 3F [Equipment List - IM/IT];

7.10.17.3(1)(k) Providing and installing a computer, keyboard and mouse in those Multimedia Rooms that require such a computer for Staff use as listed in Appendix 3F [Equipment List - IM/IT];

7.10.17.3(1)(l) Providing any multimedia hardware or components to Project Co for subsequent installation and inter-connection in type 3 rooms used by UBC;

7.10.17.3(1)(m) Providing virtual health equipment and desktop or laptop multimedia communications hardware to Project Co for subsequent installation and inter-connection in type 5 rooms used for virtual health;

7.10.17.3(1)(n) Procurement, installation and configuration of computer software for virtual health purposes;

7.10.17.3(1)(o) Procurement and installation of Type 6 room cameras in Planned ORs whose audio and video streams are used in the clinical education camera system that Project Co is responsible for, and the licenses for such streaming.

7.10.17.3(1)(p) Upon successful completion of the installation by Project Co the Authority will configure VC Codecs in Multimedia Rooms; and

7.10.17.3(1)(q) The Authority will observe Project Co 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 external VC facilities and endpoints.

7.10.17.3(2) Project Co is responsible for:

7.10.17.3(2)(a) Designing and constructing Multimedia Rooms incorporating the requirements, dimensions, layouts, materials and finishes that the Authority has described herein;

7.10.17.3(2)(b) Designing and constructing Multimedia Spaces incorporating the requirements that the Authority has described herein;

7.10.17.3(2)(c) Designing, constructing and installing any Millwork, required to house or support multimedia equipment in Multimedia Rooms;

7.10.17.3(2)(d) Providing stackable seating and tables with folding or collapsible legs that can be locked into position of a type suitable for housing AV and power cables as part of an integrated solution in the Type 4 Multimedia Room. The seats and tables will be easy to transport and store efficiently when the Type 4 room is converted for various events;

7.10.17.3(2)(e) Providing the modular stage and stage components required in the type 4 room;

7.10.17.3(2)(f) Providing all multimedia equipment including display monitors, speakers, microphones, signal amplification and processing equipment, controls, and related cabinets or racks and the wiring and hardware components necessary in order to provide complete AV and VC systems for type1, type 2, and type 4 Multimedia Rooms and Multimedia Spaces, and the installation, integration, configuration and testing of that equipment;

7.10.17.3(2)(g) The installation and inter connection and configuration and testing of multimedia and virtual health equipment that is procured by the Authority and supplied to Project Co for installation in type 5 rooms;

7.10.17.3(2)(h) The installation and inter connection of digital signage components including display screens, brackets and media players as described in Appendix 3F [Equipment List – IM/IT] that are procured by the Authority and supplied to Project Co for installation;

7.10.17.3(2)(i) The provision, installation, integration, configuration and testing of equipment and infrastructure including Ultra HD digital display monitors, speakers, coders, decoders, controls, cameras that are not located in operating rooms, and all related equipment necessary in order to deliver a fully functional clinical education camera system;

7.10.17.3(2)(j) Providing in room Crestron touch screen control panels and associated controllers and interface units for BMS and AV control in each and every Type 2, 4 and 6 Multimedia Room and the integration of the Crestron panels with multimedia systems and BMS systems and devices as described herein;

7.10.17.3(2)(k) Designing the Crestron graphics and programming the Crestron control panels and ensuring their customized display graphics match the Authority's standards and meet the operational requirements for such controls;

7.10.17.3(2)(l) Providing remote interface controls software (such as x panel, or equivalent) and the associated programming and integration of this networked software with the BMS and other control systems for all Multimedia Rooms;

7.10.17.3(2)(m) Ensuring that the equipment Provided and installed matches, meets or exceeds the Authority's latest types

and standards for multimedia equipment at the time of the Shop Drawing approval;

7.10.17.3(2)(n) The supply and installation of all wiring, connection cables, patch cables, multi-cable extension snakes, connectors, terminals, mounting brackets, fasteners, labels, hardware and accessories required for installing, interconnecting and operating the AV equipment in Multimedia Rooms and Multimedia Spaces;

7.10.17.3(2)(o) Providing digital signage display screens, brackets and media players and installation and interconnection in those rooms or spaces that are to have digital signage that is functional at Substantial Completion;

7.10.17.3(2)(p) Providing adequate space and TOs and power outlets for all multimedia components;

7.10.17.3(2)(q) Provide a TO at each Ultra HD digital display monitor location at each camera location and at each Codec location;

7.10.17.3(2)(r) Provide one duplex receptacle at each Ultra HD digital display monitor location and at each Codec location;

7.10.17.3(2)(s) Providing floor boxes in Multimedia Rooms of a type acceptable to the Authority in those rooms requiring floor boxes;

7.10.17.3(2)(t) Providing AV wall boxes of a type acceptable to the Authority in those rooms requiring wall boxes;

7.10.17.3(2)(u) The complete installation, interconnection, testing and Commissioning by qualified AV contractors of all hardware, components and materials and controls that form the multimedia systems. This will include proper adjustment and fine tuning of audio levels and signal processing settings and other adjustments necessary to optimize the intelligibility of audio capture and playback and optimize the quality of video capture and display;

7.10.17.3(2)(v) Providing the Authority and its representatives with access to the Multimedia Rooms and Multimedia Spaces 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;

7.10.17.3(2)(w) Providing control systems interfaces to and integration with the Fire Alarm system and BMS for lighting, HVAC and audio overrides in all Multimedia Rooms and Multimedia Spaces in emergency situations;

7.10.17.3(2)(x) Provide the Authority with as-built documentation of Multimedia Rooms and related multimedia equipment:

7.10.17.3.2.(x).1 A set of final, reviewed Shop Drawings;

7.10.17.3.2.(x).2 Manufacturer's warranty documents;

7.10.17.3.2.(x).3 Binders containing operation and maintenance manuals for the AV and VC and controls equipment and systems that Project Co provides or installs. The format will be as described in Section 2.4.13; and

7.10.17.3.2.(x).4 A list of any spare parts or accessories or supplemental multimedia equipment components left over from the installation and that are to be turned over to the Authority at the completion of the work.

7.10.17.3(2)(y) Providing service training to the Authority's technical Staff including wiring routes and interconnections, means of access to junction boxes, mounts and related multimedia infrastructure and the removal and replacement procedures for all components;

7.10.17.3(2)(z) Delivering a working copy of the code changes related to customized GUI template programming for the Crestron control panels;

7.10.17.3(2)(aa) Providing licenses and keys for all VC Codecs and other multimedia components supplied by Project Co;

7.10.17.3(2)(bb) Providing any and all codes, passwords and configuration settings for equipment that Project Co installs; and

7.10.17.3(2)(cc) Providing, installing and connecting an interactive whiteboard in one Multimedia Room that will seamlessly integrate with the VC equipment.

7.10.17.3(3) Prior to ordering equipment Project Co will provide the following:

7.10.17.3(3)(a) A sample of all proposed multimedia equipment mounts should the Authority so request;

7.10.17.3(3)(b) Access to an interactive, software based, wireframe mock-up of each Crestron GUI screen demonstrating layouts and navigation; and

7.10.17.3(3)(c) A sample of proposed Multimedia Room floor boxes and connection plates, should the Authority so request.

7.10.17.4 Multimedia Room Design Deliverables

7.10.17.4(1) Enhanced Room Data Sheets. Multimedia Room architectural drawings and Enhanced Room Data Sheets will be produced for each individual Multimedia Room, not just each room type, in the Facility and included in the submission for each phase of the Design as well as the as-built record for the Project, as described in 2.4.13 IM/IT Design and Construction Drawings.

7.10.17.4(2) AV Drawings. In addition to the Enhanced Room Data Sheets, produce detailed plan drawings and reflected ceiling drawings for each Multimedia Room as part of the Division 27 “T” series as described in Section 2.4.13.

7.10.17.4(3) Single line diagrams and schematic diagrams as described in Section 2.4.13.

7.10.17.4(4) Produce interactive software draft versions of each Crestron screen page so that navigation flow, layout, graphic components and other GUI components can be reviewed throughout the design phase and prior to programming as described in Section 2.4.13.

7.10.17.4(5) Produce and submit a photometric map of the lighting design for each individual Multimedia Room as described in the Project design submittals requirements outlined in Section 2.4.12.1 of this Schedule.

7.10.17.5 Design Guidelines for Multimedia Rooms

7.10.17.5(1) Project Co will coordinate with the Authority to ensure Multimedia Rooms are designed to support the technology, performance and services required.

7.10.17.5(2) Multimedia Rooms will not be situated in areas in the Facility at risk from water entry due to plumbing or drainage failures or adjacent to sources of high humidity. Water supply lines and drain lines are not to traverse Multimedia Room ceilings except for sprinkler lines specifically necessary to provide protection within the room.

7.10.17.5(3) The design of Multimedia Rooms will facilitate operational flexibility 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.

7.10.17.5(4) The tops of lids and covers of floor boxes will be level, must be flush with the finished floor with no lip, and not impede the flow of people or materials through the room nor the level placement of tables or chairs.

7.10.17.5(5) The design of Multimedia Rooms including the quantity and location of floor boxes will allow furniture to be relocated to facilitate various operational configurations.

7.10.17.5(6) Walls will be suitably reinforced in locations where Ultra HD digital display monitors, cameras, microphones, sound bars and speakers will be mounted, and ceilings will be suitably reinforced in those locations from which such items will be hung or suspended.

7.10.17.5(7) Room and BMS controls for any co-located Multimedia Rooms that contain an operable partition will meet all requirements, in particular acoustics and noise abatement, for each room when the partition is closed. When the rooms are combined the BMS and multimedia controls will operate both rooms as one, with the larger room's Crestron controller acting as master for both rooms.

7.10.17.5(8) Room specific temperature zoning will be Provided for each of the type 2 rooms and each of the 2 sections of the EOC. HVAC control for Multimedia Rooms with Crestron panels will be by the in-room Crestron panel.

7.10.17.5(9) Multimedia Room acoustic and noise abatement requirements are described in 7.10.15.6.

7.10.17.5(10) Multimedia Room door requirements are described in 7.10.15.7.

7.10.17.5(11) Multimedia Room lighting requirements are described in 7.10.15.8.

7.10.17.5(12) Multimedia Room finishes requirements are described in 7.10.15.9.

7.10.17.5(13) In addition to the clock display on Crestron panels all Type 2 rooms require a wall mounted clock that will not have reflective properties detrimental to the camera (such as glare from lighting, poor readability) nor LED elements that cause video banding issues or flicker in the video stream. The Type 4 room requires 2 such clocks viewable from the front and the rear of the room.

7.10.17.5(14) Non-reflective whiteboards in type 2 rooms will be located in a position that can be seen by the videoconference camera. Whiteboards with glossy finishes are not to be used in any Multimedia room.

7.10.17.6 Acoustics and noise abatement in Multimedia Rooms

7.10.17.6(1) Rated acoustic walls for Multimedia Rooms will be constructed with two layers of GWB to minimize unwanted acoustic transfer. Interior double stud "party" walls with two layers of GWB on the interior side of the wall will have 25 mm air gap between the two stud rows with all intervening cavities filled with fibreglass or similar insulation.

7.10.17.6(2) Provide wall and floor assemblies with minimum STC ratings of 55 for walls and 50 for floor/ceilings or better.

7.10.17.6(3) Reverberation time is not to exceed 0.5 seconds in the mid and high frequencies. Project Co will provide a report demonstrating that the Multimedia Rooms meet this requirement when unoccupied.

7.10.17.6(4) Design partition walls and ceiling construction to provide the same degree of sound control through each component of the assembly. When a partition is used for sound isolation extend the sound control construction from slab to slab.

7.10.17.6(5) Direct contact between the wall lining board and floor finish will be avoided, to reduce vibration transfer. Wall plasterboard will be stopped 5 mm above the floor and the resulting gap filled with acoustic sealant.

7.10.17.6(6) 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 will be separated by at least one stud space.

7.10.17.6(7) Joints in successive layers of drywall will be staggered. Any gaps will be sealed with acoustic sealant.

7.10.17.6(8) Carpet floors are required in Multimedia Rooms used by Staff for acoustic reasons. Rubber floors are required in Multimedia Rooms used by Patients or the public for reasons of infection control. In such rooms a rubberized floor finish that helps to reduce impact noise within the space (footsteps, chair scraping, etc.) is preferred. Ceiling and wall acoustic treatment must be increased to maintain the 0.5 second reverberation time in Multimedia Rooms, compensate for the reflective floor finish and to maintain the maximum allowable 0.5 second reverberation time in Multimedia Rooms.

7.10.17.6(9) Ceilings in Multimedia Rooms will not be constructed of hard, acoustically reflective material. Acoustic ceiling tiles are required.

7.10.17.6(10) As the EOC will have a high occupancy level, and a very high level of noise producing activity when in use as an EOC, polyurethane pyramid type anechoic foam panels in a colour that is acceptable to the Authority will be installed across the entire ceiling except for openings required for lighting fixtures, ventilation grilles or louvers and for life safety components. Panels will be a minimum of 3 inches thick.

7.10.17.6(11) Acoustic wall panels will be installed on at least two adjacent walls in Multimedia Rooms having twelve (12) or more seats to eliminate echo, reverberation and flutter. Install acoustic wall panels starting 1m AFF and continue to ceiling. In Multimedia Rooms requiring infection control, washable acoustic wall panels with properties suitable to the Authority will be used.

7.10.17.6(12) HVAC diffusers will be selected for low noise properties and will not vibrate or rattle. Dampers will not be placed within 3 metres of diffusers. Ducts in Multimedia Rooms will be lined with duct liner.

7.10.17.6(13) Mechanical, electrical and other equipment that makes or emits noise will not be installed in Multimedia Room ceilings.

7.10.17.6(14) Design and construct the Facility so that noise from the mechanical systems does not exceed the noise levels of NC 25-30, dBA 30-35, within Multimedia Rooms.

7.10.17.6(15) Noise control 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.

7.10.17.6(16) The interior noise levels of Multimedia Rooms (LA90 15 minute) due to exterior sources will not exceed noise levels of NC 25-30, 30-35 dBA.

7.10.17.6(17) 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.

7.10.17.6(18) Where possible do not locate Multimedia Rooms adjacent to elevators, mechanical rooms and other spaces that cause physical vibrations. Utilize vibration isolation methods and flexible, non-rigid, connectors on all mechanical, electrical and other equipment adjacent to Multimedia Rooms to control airborne and structure borne noise and vibration. Cameras in Multimedia Rooms must not

be mounted on such adjacent walls, and furthermore are to use vibration isolating mounts.

7.10.17.6(19) Any co-located Multimedia Rooms that contain operable partition will meet the specific acoustic requirements for each room when the partition is closed. When the rooms are combined the more stringent requirement (if they are different) applies to the entire room.

7.10.17.6(20) Post-construction acoustic performance verification tests will be performed as detailed in Section 5.5.26 and Appendix 3C [Acoustic and Noise Control Measures].

7.10.17.7 Multimedia Room Doors

7.10.17.7(1) All Multimedia Rooms will utilize a card access system via a swipe or proximity card system that provides an audit trail of entry activities.

7.10.17.7(2) Door secure status will be monitored with door position switches connected to the Facility's security system.

7.10.17.7(3) Any glazing on Multimedia Room interior doors will be minimal in size and requires privacy covering. Any glazing on Multimedia Room exterior doors requires blackout covering.

7.10.17.7(4) Multimedia Room doors will have a STC rating of STC45 or better when tested as a complete unit (door slab, glass, perimeter seals, and frame).

7.10.17.7(5) All doors will be fitted with effective acoustic seals on top and sides and concealed automatic door bottom drop seals.

7.10.17.8 Multimedia Room Lighting

7.10.17.8(1) Lighting will provide an evenly lit space with minimal glare and shadowing. LED lamp technology will be used to reduce maintenance and energy costs.

7.10.17.8(2) Colour temperature in Multimedia Rooms will be 3500K suitable for video production.

7.10.17.8(3) Achievable light levels in Multimedia Rooms will be 80-foot candles measured 1 metre above the floor with a minimum of 50-foot candles of horizontal illuminance and 30-foot candles of vertical illuminance

7.10.17.8(4) Dimming controls will be Provided for each Multimedia Room. All lighting circuits, fixtures and luminaires will be dimmable. Dimming will be lineal and smooth, not stepped, from 100 percent down to 1 percent.

7.10.17.8(5) Lighting controls in all Type 2, Type 4, and Type 6 Multimedia Rooms will be via a Crestron screen, programmed with multiple lighting scenes, and connected to an occupancy sensor.

7.10.17.8(6) Lighting fixtures closest to digital display monitors in Multimedia Rooms and monitors or screens in Multimedia Spaces will be on a separate control so that they can operate independently of other lighting circuits in the room. All lighting fixtures will be located to provide even coverage to desktop and faces while eliminating light spill washout on Ultra HD digital display monitors and camera lens glare.

7.10.17.8(7) Multimedia Rooms with twelve (12) or more seats require dimmable wall washers.

7.10.17.8(8) A separate key light will be Provided for a prime presenter location in Multimedia Rooms with 25 or more seats.

7.10.17.8(9) Lighting controls will be integrated with the equipment controls and Crestron control panels in the rooms so that the lighting can vary to suit different activities including pre-sets for meetings, televised interviews, AV presentations, video conferencing and non-AV related activities.

7.10.17.8(10) Lighting controls in Multimedia Rooms will be interfaced to the BMS to enable monitoring and overrides necessitated by fire alarms or forced evacuations.

7.10.17.8(11) Project Co will submit a photometric map for each individual Multimedia Room during each Design stage identified in Section 2.4.13.

7.10.17.8(12) Lighting design in Multimedia Rooms will also comply with requirements in Division 26.

7.10.17.9 Multimedia Room Walls and Finishes

7.10.17.9(1) Acceptable wall colours for Multimedia Rooms are pale gray or blue with an eggshell finish, or acceptable alternative colours suitable for use in video production, as approved by the Authority through the Review Procedure. Semi-gloss finishes are permitted on door and window frames only.

7.10.17.9(2) Acceptable finish colours for the tops of desks, tables, Millwork and other work surfaces Provided by Project Co in rooms with cameras used for VC, virtual health, or clinical education purposes are white, off white, or pale gray to allow light to bounce off the surface and reflect upward. This helps to illuminate the faces of the presenters, eliminate dark shadows under the chin/nose, and maintain contrast

ratios when white paper is moved. Wood surfaces will be light maple or acceptable alternative as approved by the Authority through the Review Procedure and will not have a gloss finish.

7.10.17.9(3) Solid colours will be used, not stripes or patterns, to avoid adding unnecessary bandwidth to video capturing and transmission.

7.10.17.10 Multimedia Room Window Treatments

7.10.17.10(1) All exterior windows in Multimedia Rooms require blackout roller blinds that are non-reflective acoustically and visually.

7.10.17.10(2) Blackout blinds in Multimedia Rooms with 12 or more seats will be motorized.

7.10.17.10(3) Controls for motorized blinds in Multimedia Rooms will be via the in room Crestron control panel.

7.10.17.10(4) All interior window glazing in Multimedia Rooms requires privacy blinds or acceptable alternative coverings that are non-reflective acoustically and visually, as approved by the Authority through the Review Procedure.

7.10.17.11 AV Type 1 Multimedia Rooms Functional Requirements

7.10.17.11(1) Presenters will be able to easily present audio, video and data content from a PC, a laptop or mobile device and other sources onto a wall mounted Ultra HD digital display monitor.

7.10.17.11(2) All local participants will be able to clearly see and when applicable hear the presentation content.

7.10.17.11(3) Type 1 Multimedia Rooms with twelve or more seats require ceiling speakers for stereo play back of audio from the video shown on the Ultra HD digital display monitor. Type 1 rooms with fewer than 12 seats will use a wall mounted sound bar for audio playback.

7.10.17.11(4) Monitor input source connections will be easily available through extensions that terminate at an AV wall box or floor box as appropriate.

7.10.17.11(5) Crestron wall mounted control panel and related equipment for controlling audio levels, mic muting, monitor power on/off, room lighting scenes and levels, room temperature, and Skype for business conferences and calls.

7.10.17.12 VC type 2 Multimedia Rooms Functional Requirements

7.10.17.12(1) Presenters will be able to easily connect and present audio, video and data content from a PC, a laptop or mobile device, document

camera, and other fixed or portable auxiliary sources onto one or both of the wall mounted Ultra HD digital display monitors independently.

7.10.17.12(2) Input source connections for auxiliary equipment will be easily available through extensions at either an AV wall box, or floor box, or desk mounted cable cubby as appropriate.

7.10.17.12(3) In VC mode, all participants (local and distant) will clearly see, hear, and speak to each other.

7.10.17.12(4) All participants will be able to clearly see (and hear, when applicable) other participants' presentation material without obstructed sightlines.

7.10.17.12(5) All VC rooms will have wall mounted or ceiling mounted speakers (as appropriate) for stereo audio playback.

7.10.17.12(6) Two side-by-side Ultra HD flat panel displays mounted at the front of the room for simultaneous display of images.

7.10.17.12(7) One Ultra HD PTZ videoconference camera mounted at the front of the room, between the displays. Final camera mounting location will be approved by the Authority’s technical representatives through the Review Procedure.

7.10.17.12(8) Multiple microphones (depending on room size) mounted in the ceiling to enable two channel audio capture and transmission. Desktop microphones are not acceptable.

7.10.17.12(9) Crestron wall mounted control panel and related equipment for controlling audio levels, mic muting, monitor power on/off, room lighting scenes and levels, room temperature, camera presets and Skype for business conferences and calls.

7.10.17.12(10) A rectangular aspect ratio of side walls to front/back walls of 1:1.2 (one to one point two).

7.10.17.13 Type 3 Room Requirements

7.10.17.13(1) In addition to the requirements stated herein, Project Co will design and construct Type 3 Multimedia Rooms in accordance with the requirements of Appendix 3S [UBC-FoM-Clinical Education Facility Requirements]. If there is a conflict between a provision of those documents and a provision of this Schedule (with respect to type 3 Multimedia Rooms only) the UBC FoM provision will govern.

7.10.17.14 Type 4 Room Requirements

7.10.17.14(1) The Type 4 room requirements are further detailed in Appendix 3T [Lecture Room Requirements]. The Type 4 design will include and provide the following:

7.10.17.14(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.

7.10.17.14(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.

7.10.17.14(1)(c) Ability for 100 participants to simultaneously connect to 120v and USB 5V @1.5A power connectors housed in 25 or more distributed floor boxes. Project Co 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.

7.10.17.14(1)(d) A raised modular 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 code compliant rise or other removable, transportable means of providing wheelchair access.

7.10.17.14(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.

7.10.17.14(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.

7.10.17.14(1)(g) In Videoconferencing mode, all participants (local and distant) are to clearly see, hear, and speak to each other.

7.10.17.14(1)(h) All participants must be able to see (and hear, when applicable) other participants' presentation material.

7.10.17.14(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.

7.10.17.14(1)(j) A permanently installed AV presentation system.

7.10.17.14.1.(j).1 The AV system will have the ability to screen live television feeds, DVD and Blu-ray content, stereo audio playback, digital video in all common forms including Mpeg-4, Mpeg-2, H2.64, H2.65. AVI, MKV, MOV as well as streaming feeds and other content from the internet

7.10.17.14(1)(k) A permanently installed dual codec Videoconferencing system.

7.10.17.14.1.(k).1 Two side-by-side fixed projection screens as detailed in Appendix 3T [Lecture Room Requirements].

7.10.17.14.1.(k).2 There will be simultaneous display of electronic images including local and remote video, document camera, computer based digital slides, and computer presentations

7.10.17.14.1.(k).3 Four motorized 4K UHD cameras with zoom lenses suitable for videoconference use in a large videoconference room.

(k).3.1 Audience cameras are to automatically triangulate and pan/tilt/zoom to active audience microphones.

(k).3.2 Target framing is for 2 people (upper body) at each microphone.

(k).3.3 A primary and a secondary camera mapped to each mic location is required so that image switching does not occur during camera movements.

(k).3.4 Camera/mic triangulation mapping is required for 3 seating variations.

7.10.17.14.1.(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 4K video and two 4k graphics channels via dual videoconferencing codecs. The VC system can be controlled from all of the touch screens - on the lectern, the front wall, and at the projection control racks.

7.10.17.14.1.(k).5 A 2 person lectern will be the primary systems control point housing a Blu-ray player, computer interfaces, the systems control touch screen, a document camera, microphone, monitor and other related technology and communications components and connection points. In addition to those connections used for equipment typically in use at the lectern additional convenience connections for auxiliary multimedia equipment are also to be provided for use presenters technicians and operators.

(k).5.1.1 Auxiliary Data and video input connections are to include HDMI x2, USB, USB-C

(k).5.1.2 Auxiliary Audio inputs are to include 1x RCA stereo pair (female). XLR x2 1/8 submini x1

(k).5.1.3 Provide 1x TO at the lectern as an auxiliary

(k).5.1.4 One auxiliary 120V duplex outlet easily accessible.

(k).5.2 A lockable equipment rack with power distribution, cooling fan, ventilation, and secure storage for cables, microphones and other small AV accessories is to be incorporated into the lectern. All 4 wheels or casters will be lockable;

7.10.17.14.1.(k).6 The presenter(s) position requires two preview/confidence UHD digital

display monitors mounted on wheeled monitor frames. The purpose of these monitors is to provide the presenters with the ability to move freely about on the stage while still seeing the selected video source and the VC participants in local and remote locations

7.10.17.14(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.

7.10.17.14(1)(m) The lecture room will have one wired lectern microphone, two wireless head-worn presenter microphones, and six wireless hand-held microphones with 4 table stands for panel discussions and 2 full height mic stands for audience stand-up Q+A use. A Push to talk table microphone will be required for all audience tables, with 1 mic for each 2 seats. The form and quantity of these microphones will be dependent upon the type of tables and seating provided by Project Co that is approved by the Authority through the Review Procedure. Ceiling mics will not be used.

7.10.17.14(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.

7.10.17.14(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.

7.10.17.14(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. Audience microphones are to be non-latching. Microphones are to converge with active camera tracking.

Project Co is to investigate all microphone technologies in order to determine which microphone system will deliver the best legibility and operational functionality for 100 video conference participants in the Type 4 room.

7.10.17.14(1)(q) All audio and video equipment that the Project Co supplies or provides will conform to IEE 802.1 Time Sensitive Networking standards.

7.10.17.14(1)(r) The controls system will integrate the function of all controllable devices in the room including screen motors, HVAC and lighting with the AV systems. All of the required controllable devices will be connected to central processors, allowing networked control from high resolution touch panels housed on the wall, in the lectern, and in the projection control room.

7.10.17.14(1)(s) 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.

7.10.17.14(1)(t) The Type 4 Multimedia Room is to have it's entire area covered by an induction loop assistive listening system to provide hearing augmentation for participants and visitors wearing hearing aids.

7.10.17.14.1.(t).1 The induction loop amplifiers must be able to monitor induction loops for faults and report back to the control system for fault flagging.

7.10.17.14(2) AV / Videoconferencing projection and control racks area

7.10.17.14(2)(a) The control racks are to be located at the back of the Type 4 room with clear sightlines to the front wall and the on stage lectern.

7.10.17.14(2)(b) This area will house all AV and Videoconferencing processing and control equipment, cabinet racks and other related multimedia equipment, which may include AV and VC control racks for other Multimedia Rooms. cabinets are to have 1 metre clearance front and back. Rear doors of cabinet pairs are to be hinged in a gull wing layout to provide unobstructed access to two racks at once.

7.10.17.14(2)(c) The controls area will have space for two operator positions to allow an operator to monitor and support the multimedia sessions, adjust room and AV controls with the Crestron touch screen, as well as an operator to control the video capture and streaming equipment and other technical duties.

7.10.17.14(2)(d) Additional convenience connections for auxiliary multimedia equipment are to be provided for use by technicians and operators.

7.10.17.14.2.(d).1 Auxiliary Data and video input connections are to include HDMI x2, USB, USB-C, RCA composite video

7.10.17.14.2.(d).2 Auxiliary Audio inputs are to include 2x RCA stereo pairs (female). XLR x2, 1/8 submini x2

7.10.17.14(2)(e) The ability to capture and stream live events inbound and outbound;

7.10.17.14(2)(f) As the projectors and control racks will contain active equipment and related videoconferencing control equipment for other Multimedia Rooms, Project Co will ensure that the power supply and cooling capacities of the Lecture Room are appropriately sized for the heat load of the equipment and the operators as well as presenters and the audience.

7.10.17.15 Virtual health type 5 Multimedia Rooms Technical Requirements

7.10.17.15(1) Designated wall or floor boxes. Power (x2) and Data Drops (x3) for Virtual Health equipment will be available from an additional wall box or floor box to be Provided in all type 5 rooms. This is in addition to those power and TOs that are already required in the room. Confirm the location of each designated wall or floor box with the Authority.

7.10.17.15(2) The design guidelines for Multimedia Rooms listed in 7.10.15.5 apply to all virtual health rooms.

7.10.17.16 Clinical education type 6 Multimedia Rooms Functional Requirements

7.10.17.16(1) Project Co will design, supply, install and interconnect an audio and video over IP streaming solution that will deploy Ultra HD cameras and microphones in source rooms to capture and stream images and sound to Ultra HD digital display monitors in viewing rooms.

7.10.17.16(1)(a) The solution will incorporate AV streams from the Authority supplied Planned OR cameras;

7.10.17.16(1)(b) The viewer will be able to select any of these live streams for viewing in the type 6 viewing rooms where Staff and Patients can view internally streamed procedures and sessions for education purposes; and

7.10.17.16(1)(c) The Clinical education camera system will not connect with the site security camera system described in Division 28.

7.10.17.16(1)(d) One TO and one duplex outlet for each camera location;

7.10.17.16(1)(e) With the exception of the cameras in the operating rooms the provision, installation and connection of the camera on a wall or ceiling location in the two Resuscitation/Trauma bays suitable to the Authority;

7.10.17.16(1)(f) In each source room provide a wall mounted in-room control to turn the clinical education system camera and microphone on/off; and

7.10.17.16(1)(g) In each source room provide an in -room visual indication utilizing a tally light or similar means to clearly indicate when the clinical education system camera and microphone in the room are active and in use.

7.10.17.16(2) In each type 6 viewing room, Project Co will provide:

7.10.17.16(2)(a) A 40-inch flat panel commercial grade Ultra HD Digital display monitor;

7.10.17.16(2)(b) 2 network drops and one duplex outlet at each Ultra HD digital display monitor location;

7.10.17.16(2)(c) One TO and one duplex outlet specifically for the Authority supplied PC used for streaming the clinical education audio and video to the Ultra HD Digital display monitor. Location to be determined in consultation with the Authority through the Review Procedure;

7.10.17.16(2)(d) A VESA wall mount (with tilting functionality) for the monitor;

7.10.17.16(2)(e) An amplified stereo speaker sound bar such as a Crestron SAROS SB-200 or acceptable alternative as approved by the Authority through the Review Procedure, so that observers can clearly hear the streamed audio; and

7.10.17.16(2)(f) Source selection and volume control that will enable the viewer to select between any of the streaming clinical cameras will be programmed into a Crestron wall mounted touch panel in each viewing room.

7.10.17.16(2)(g) In the event that a source room has turned off the clinical education camera system a graphic is to be displayed on the viewing room Crestron screen indicating that “The Selected Source Room Is In Privacy Mode” or a similar message suitable to the Authority.

7.10.17.16(3) Several type 2 Multimedia Rooms will also function as type 6 clinical education camera system viewing rooms. The Crestron touch panels will be programmed so that Staff can easily and intuitively switch between VC mode and clinical educational camera viewing mode on the monitor.

7.10.17.16(4) Coordinate the mounting elevation and placement of controls, Ultra HD digital display monitors and speakers with the room layout and with the Authority.

7.10.17.16(5) The Crestron wall mounted control touch panel will be used for controlling audio levels and selectable source controls for switching between audio and video streams from every required clinical education camera system source.

7.10.17.17 EOC Multimedia Room type 2 Functional and Technical Requirements

7.10.17.17(1) The EOC is a type 2 videoconference room that will be used daily for meetings and videoconferences. It will also be able to quickly be converted to an EOC in the event of a disaster.

7.10.17.17(2) A permanently installed AV presentation system will be Provided by Project Co. The AV presentation system will have the following functionality:

7.10.17.17(2)(a) The ability to screen multiple live broadcast television feeds, broadcast radio feeds, audio playback, digital video in all common forms as well as streaming feeds and other content from the Internet on 1 large wall mounted Ultra HD Display monitor with wall mounted speakers; and

7.10.17.17(2)(b) 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.

7.10.17.17(3) A permanently installed dual Codec VC system will also be provided, which allows simultaneous transmission and reception of up to two video and two high-resolution graphics channels.

7.10.17.17(3)(a) 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 videoconference locations;

7.10.17.17(3)(b) 2 x UHD PTZ cameras for VC;

7.10.17.17(3)(c) The video conference leader's desk will be the primary control point. A Systems Furniture piece, housing an audio/video player, computer interfaces, a systems control Crestron touch screen, a document camera and other related technology and communications components, controls and connection points. A lockable equipment rack with power distribution, cooling fan, ventilation, and secure storage for cables, microphones and other small AV accessories is to be incorporated into the desk. All 4 wheels or casters will be lockable;

7.10.17.17(3)(d) Additional convenience connections for auxiliary multimedia equipment will be Provided in the floorbox at the conference leaders position with data and video input connections that include 3x HDMI, 2x USB- A 3.0, 1x USB-C, and a TO;

7.10.17.17(3)(e) Auxiliary audio input connections will include one RCA stereo pair (female) and one 1/8" sub-mini stereo (female);

7.10.17.17(3)(f) The EOC will have ceiling mounted multi-element conference microphones; and

7.10.17.17(3)(g) The centrepiece of the audio systems will be a centralized 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 videoconference and video recording/streaming feeds.

7.10.17.17(4) The Crestron controls system will integrate the function of all controllable devices in the EOC including AV, HVAC and lighting. All

of the required controllable devices will be connected to central processors, allowing networked control from high resolution touch panels, one housed on the wall and a tablet at the conference leaders table.

7.10.17.17(5) Project Co will ensure that the power supply and cooling capacities of the EOC is appropriately sized for 22-23 occupants with all equipment active.

7.10.17.17(6) All power receptacles in the EOC including those in floor boxes will be on vital power. Due to the additional portable equipment that would be brought into the room when in use as an EOC all 120V wall mounted convenience outlets will be quad receptacles, with no point along any wall being more than 6 feet from a receptacle.

7.10.17.17(7) Noise mitigation requirements for the EOC are described in 7.10.15.6.(10).

7.10.17.17(8) In addition to the AV systems described herein there will also be an Authority supplied television in the EOC. This television will be pole mounted by Project Co to the ceiling slab with a tilt and swivel mount Provided by Project Co who is to run all wires and cables inside the pole so that they are out of view.

7.10.17.18 Multimedia and AV Equipment Installation

7.10.17.18(1) All materials and equipment used Project Co will be CSA or Underwriters Laboratories (UL) compliant and installed in accordance with manufacturer's specifications and recommendations.

7.10.17.18(2) Installation of Ultra HD digital display monitors, cameras, microphones, control devices, electronics and other dust sensitive equipment may only take place when the Multimedia Rooms and Multimedia Spaces are secure, clean and dust free.

7.10.17.18(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 Project Co.

7.10.17.18(4) Videoconference Codecs, amplifiers, signal processors and other AV components will be installed behind the Ultra HD digital display monitors. For those AV components that cannot all fit behind the Ultra HD digital display monitors in the EOC a lockable AV equipment cabinet with equipment rack will be incorporated into the videoconference leader’s desk Provided by Project Co.

7.10.17.18(5) All wall and ceiling mounted components will be seismically supported by Project Co in accordance with equipment manufacture's guidelines.

7.10.17.18(6) All cables will be hidden and run in conduit in walls, ceilings and floors. Surface mounted raceways are not permitted.

7.10.17.18(7) All multimedia cabling will be properly dressed and labeled at each end in a manner and to a standard developed in consultation with the Authority through the Review Procedure.

7.10.17.18(8) Cables will be terminated with appropriate connectors in high quality plates that are suitable for the décor and finishes of the room.

7.10.17.18(9) Project Co will be required to provide all necessary tamper proof, vandal proof and Ligature Resistant measures to protect multimedia devices mounted to a wall or ceiling in those areas of the Facility specified by the Authority. This includes such preventative measures as lockable enclosures or Millwork.

7.10.17.18(10) Provide AV component mounts of suitable dimensions for each Outlet to support a cable box or other AV component. The mount must be capable of being attached to the wall or to the wall mount used to support the HD digital display monitor.

7.10.17.19 Distributed Power and Data Boxes for System Users

7.10.17.19(1) Floor Box power and data. Provide in-slab floor boxes with flush steel tops, proportionally spaced for ease of access beneath the meeting room tables in type 1, type 2, type 3 and type 4 rooms. 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, 1X powered USB-A and 1X USB-C charging outlets and a Telecommunication Outlet. Provide one such floor box for every 4 end-user seats except for the type 2 EOC which will have one such floor box for every 3 end-user seats.

7.10.17.19(2) Auxiliary equipment connections in type 1 and type 6 rooms. From each Ultra HD digital display monitor Provide wired connections to a wall mounted source connection plate, such as Extron Cable Cubby or equivalent that can be readily accessed by end users in order to connect auxiliary equipment to the Ultra HD digital display monitors for audio and video playback.

7.10.17.19(2)(a) Data and video input connection types in type 1 rooms will include HDMI (x2);

7.10.17.19(2)(b) Audio Input connections will include one 1/8” sub-mini stereo (female) and Bluetooth;

7.10.17.19(2)(c) The corresponding output plate will be wall mounted behind the Ultra HD digital display monitor;

7.10.17.19(2)(d) In-wall AV wiring between the input and output plates will be in conduit; and

7.10.17.19(2)(e) Data and video input connection types in type 6 rooms will include HDMI (x3), USB-A 3.0 (x1), USB-C (x1).

7.10.17.19(3) Auxiliary equipment connections in type 2 and 4 rooms. From each videoconference controller Provide wired connections to a wall, table or floor box mounted termination plate, such as Extron Cable Cubby or equivalent that can be readily accessed by end users in order to connect auxiliary equipment to the Ultra HD digital display monitors for AV playback and as additional inputs to a videoconference session.

7.10.17.19(3)(a) Data and video input connection types will include HDMI 2.1 (x2), USB-A 3.0 (x1); on a 4k auto switching plate; and

7.10.17.19(3)(b) Audio input connections will include one 1/8” sub-mini stereo (female).

7.10.17.19(4) Auxiliary equipment connections in type 5 rooms. Mobile virtual health equipment that the Authority may deploy will be able to easily connect to the Ultra HD digital display monitors in type 5 Multimedia Rooms from a 4k auto switching "source connection" wall mounted plate, wired to an output plate behind the Ultra HD digital display monitor, thence to the connectors on the rear of the Ultra HD digital display monitor.

7.10.17.19(4)(a) Input connection types will include HDMI 2.1 (x2), USB-A 3.0 (x1), USB-C (x1); on a 4k auto switching plate;

7.10.17.19(4)(b) Project Co will confirm with the Authority each wall location of the source connection plates;

7.10.17.19(4)(c) The corresponding output plate will be wall mounted behind the Ultra HD digital display monitor; and

7.10.17.19(4)(d) In-wall AV wiring between the input and output plates will be in conduit, not free run.

7.10.17.20 Multimedia Room Equipment Performance Requirements

7.10.17.20(1) All audio and video equipment that Project Co supplies or provides will conform to IEE 802.1 Time Sensitive Networking standards.

7.10.17.20(2) Ultra HD Digital Display Monitors

7.10.17.20(2)(a) All Ultra HD digital display monitors will be commercial grade with a minimum resolution of 4K, securely attached to the front wall with tiltable VESA mounts. Monitors will have narrow, non-reflective bezels. Monitors will be USB-A 3.0 and USB-C compliant. Monitors will be HDMI 2.1 compliant. Suitable monitor size is determined by the ratio of the monitor height (MH) to the distance of the most distant viewer (MDV) not exceeding a factor of 6.7 All screens will have the ability for networked control, including remote power on/off and Wireless (Wi-Fi or Bluetooth) connectivity. Provide a TO at each screen location;

7.10.17.20(2)(b) Type 1 Multimedia Rooms require one Ultra HD digital display monitor for AV presentations, wall mounted. Screen size (measured diagonally) will be determined by MH/MDV ratio. Audio playback will be from a wall mounted stereo soundbar;

7.10.17.20(2)(c) Type 2 Multimedia Rooms require 2 Ultra HD digital display monitors for VC. Screen size (measured diagonally) will be determined by MH/MDV ratio. Stereo speakers will be external, and wall or ceiling mounted as most suitable. Input connections will include 1/8" stereo sub-min (x1), (HDMI x2). Bluetooth Audio Input. Provide two (2) network drops at each monitor location and 1 network drop at each Codec location. Swing out mounts that are suitable to the Authority are required to enable the Authority's technicians easy access to the rear of the monitors;

7.10.17.20(2)(d) The type 2 EOC requires 2 Ultra HD digital display monitors for VC as well as 1 Ultra HD display monitor that can be used to display AV and data content and broadcast television feeds. Screen size (measured diagonally) will be determined by SH/MDV ratio. Stereo speakers will be wall or ceiling mounted as most suitable. Input connections will include RCA audio (x1), 1/8" stereo sub-min (x1), HDMI x3, USB-A 3.0 (x2), USB-C (x1). Provide a Telecommunication Outlet at each Ultra HD digital display monitor location and at each Codec location. Provide a Outlet at each HD digital display monitor location.

7.10.17.20(3) Controls for Multimedia Rooms

7.10.17.20(3)(a) Controls for hardware in Multimedia Rooms (other than for Televisions, if present) will 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;

7.10.17.20(3)(b) Building systems controls and multimedia controls will be via a Crestron wall mounted panel in all Type 2, Type 4, and Type 6 Multimedia Rooms;

7.10.17.20(3)(c) Room temperature controls are to be limited to a change of 3 degrees Celsius above to 3 degrees Celsius below the normal set point for the room;

7.10.17.20(3)(d) Lighting controls are to have multiple pre-set scenes that provide customized levels to enhance functionality for various room uses, such as meetings, video conferencing, presentations and displays on monitors etc. Adjustable dimming levels for all pre-set scenes is also required;

7.10.17.20(3)(e) Stand alone in-room controls and switches for lighting, HVAC, other Building Systems and AV systems will not be deployed in Type 2, Type 4, and Type 6 Multimedia Rooms. Occupancy/ vacancy sensors are permissible, temperature sensors not thermostats are to be used;

7.10.17.20(3)(f) When programming the control panels Project Co will ensure that its customized display graphics are intuitive for the user, and match the Authority's standards and templates for such controls as deployed in its other facilities;

7.10.17.20(3)(g) The maintenance page for each Crestron screen is to be password protected;

7.10.17.20(3)(h) Produce interactive software mock-ups of the Crestron control screen graphics that include details for each screen page, illustrating the proposed graphic layout and navigation path for the Authority's approval through the Review Procedure prior to commencing Creston programming;

7.10.17.20.3.(h).1 Graphics and symbols are to be intuitive so that a first-time user can easily navigate through the menu layers and readily identify the means to control lighting, audio levels, AV inputs, room temperature, blinds controls and other required functions;

7.10.17.20.3.(h).2 A home symbol and a “return” arrow are required on each individual page so that the user can easily navigate back one page or jump back to the home page;

7.10.17.20.3.(h).3 Room name and room number is required on each home page;

7.10.17.20.3.(h).4 A time of day clock is required in the lower right-hand corner of each page. Display the hour: minute AM/PM. The control screen clock display is to be synchronized with the master clock system at least every 15 minutes;

7.10.17.20.3.(h).5 Lighting control pages are to indicate all fixtures and their groupings for each pre-set scene to aid the user in selecting the most suitable pre-set; and

7.10.17.20.3.(h).6 Thematic and graphic consistency is required across all GUIs through the use of common typefaces and layouts. However, controls screens for each room will be tailored to reduce clutter and include only those devices that are present in the room. For example; blinds controls will not be shown on screens in rooms that do not have external windows.

7.10.17.20(3)(i) An interactive software based mock-up is to be used to test and demonstrate to the Authority the design progress of Crestron screen graphics and navigation.

7.10.17.20(4) VC Equipment

7.10.17.20(4)(a) At the time of procurement, the VC equipment and connectivity will comply with the Authorities latest standards;

7.10.17.20(4)(b) Videoconference systems will be complete, including Ultra HD digital display monitors, Ultra HD cameras, and Codecs, microphones, automatic microphone controllers, amplifiers, speakers, video controllers, switching units, processing equipment, remote controls, and network connectivity;

7.10.17.20(4)(c) UHD 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. Project Co will provide and turn over to the Authority the appropriate Codec licenses for the system;

7.10.17.20(4)(d) Audio transmission quality will be Wideband 50Hz to 7Khz or higher. Telephone voice band is not acceptable;

7.10.17.20(4)(e) Video quality will support HD 720p and 1080p and 4K Ultra HD. Encapsulation standards will include H.264, MPEG-4, H.264 SVC and H.265 (HEVC);

7.10.17.20(4)(f) Cameras require positioning for appropriate image angles, and for complete visual coverage for all VC scenarios. Specifically, designated positions in the walls are required to accommodate the cameras;

7.10.17.20(4)(g) Cameras will be positioned such that when participants are looking at the Ultra HD digital display monitors, they appear to be looking in the direction of the camera;

7.10.17.20(4)(h) Cameras require appropriate protection from theft and damage; and

7.10.17.20(4)(i) Adjoining rooms will be carefully analysed to detect and then prevent or mitigate the causes of structural-borne vibration. Ultra HD cameras have a low tolerance for vibration, and the problem is compounded when using zoom lenses. Camera mount locations that have any detectable vibration will also use isolation measures and damping materials to stabilize the image.

7.10.17.20(5) Microphones

7.10.17.20(5)(a) Ceiling mounted microphones in Multimedia Rooms will be multi-element and, in a quantity, and locations to provide full and even stereo pickup; and

7.10.17.20(5)(b) Microphones will use isolation mounts in any location where there is detectable vibration.

7.10.17.20(6) Speakers

7.10.17.20(6)(a) Speakers in ceilings will be flush mounted;

7.10.17.20(6)(b) Speaker covers and trim rings will be in a colour that complements the surrounding surface; and

7.10.17.20(6)(c) For type 1, and type 5 Multimedia Rooms a wall mounted sound bar, such as Crestron SAROS SB-200, or acceptable alternative as approved by the Authority through the Review Procedure, will be used for audio playback at each Ultra HD digital display monitor.

7.10.17.20(7) Interactive Whiteboard

7.10.17.20(7)(a) Project Co will Provide 1 duplex receptacle, 1 TO, and 1 interactive white board such as Polycom UC Board, or acceptable alternative as approved by the Authority through the Review Procedure, in one of the multimedia rooms and connect it into the VC system so that the information written on the whiteboard is easily presented onto one of the Ultra HD display monitors and integrated for remote viewing as part of the videoconference session.

7.10.17.20(8) High Definition Multimedia Interface standard

7.10.17.20(8)(a) All HDMI source equipment, cabling, transmission equipment, processing equipment, and displays supplied by Project Co will be HDMI 2.1 compliant.

7.10.17.20(9) USB standard

7.10.17.20(9)(a) All multimedia equipment supplied by Project Co will be USB-A 3.0, and USB-C compliant.

7.10.17.21 Digital Signage

7.10.17.21(1) Project Co will provide the infrastructure for current and future digital signage screen locations that the Authority will identify.

7.10.17.21(2) Project Co will design, construct and prepare walls in various locations throughout the Facility specifically in order to enable the mounting of digital signage screens 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 monitor.

7.10.17.21(3) These monitors will be used for a variety of purposes and will be installed in either a "portrait" or "landscape" orientation depending on their intended purpose. Project Co 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 signage screen location. The Authority will determine the size of the monitor screen at each location.

7.10.17.21(4) At each digital signage Screen location Provide one duplex outlet and one TO at the required elevation. Structured cabling will be properly terminated and tested from the Communications Room patch panel to the outlet. The electrical wiring will be coiled and covered with a blank faceplate in future locations where screen will not be installed after the project completion date.

7.10.17.21(5) In locations that the Authority requires a flush screen front installation the walls will be constructed with cavities and recessed power and TOs to allow the digital signage Screens and accessories to be recessed into the wall. Ventilation must be provided to keep enclosed active electronic components cool.

7.10.17.21(6) The Authority will identify initial and future digital signage screen locations. They will include:

7.10.17.21(6)(a) Meeting Rooms and Conference Rooms

7.10.17.21.6.(a).1 Provide power, a TO outside each type 1 ,type 2 and type 4room. The screen will show relevant information in a portrait orientation.

7.10.17.21(6)(b) Patient Rooms

7.10.17.21.6.(b).1 In each Patient Room, provide the wall reinforcement, a TO and power receptacle required for future installation of digital signage monitors that can be used for displaying information on a Patient room board positioned at a suitable angle that can be seen from the bed by the Patient; and

7.10.17.21.6.(b).2 Outside each Patient Room, at an elevation that provides a clear Line of Sight when walking towards the door, provide the wall reinforcement, a TO and power receptacle required for future installation of digital signage monitors that can be used as Critical Care Indicator (CCI) boards.

7.10.17.21(6)(c) Lobby spaces including elevator lobbies

7.10.17.21.6.(c).1 Provide power, a TO at each elevator lobby.

7.10.17.21(6)(d) Areas where Staff congregate

7.10.17.21.6.(d).1 At each Care Team Base Provide power, a TO and the infrastructure necessary for Patient status boards and other clinical electronic display boards. These will be on vital power circuits.

7.10.17.21(6)(e) At all Staff lounges provide power, a TO for a digital signage display screen.

7.10.17.21(7) Emergency Waiting Rooms in all zones

7.10.17.21(7)(a) Provide power and a TO for a digital signage display screen.

7.10.17.21(8) All Inpatient and Critical Care waiting rooms

7.10.17.21(8)(a) Provide rough in pathways for power and data.

7.10.17.21(9) At links to adjacent buildings

7.10.17.21(9)(a) The links and connections for people and materials to adjacent buildings that are part of the current and future Burnaby Hospital campus.

7.10.17.21(10) At entrances and links to parking facilities.

7.10.17.22 Supplemental Sound Systems

7.10.17.22(1) Functional Requirement

7.10.17.22(1)(a) Supplemental audio playback systems (amplified speakers) are required in several rooms throughout the Facility. Project Co will Provide a means of localized and focused playback audio content, with adjustable volume controls so that the sound levels are appropriate within those rooms without leaking into adjacent spaces. Full range quality audio playback that is free from distortion, hum and other noise is required. Components used will be selected for their ability to deliver clear legibility of speech and distortion free music in order to prevent the need for over amplification.

7.10.17.22(2) In each Waiting Area and Waiting Room

7.10.17.22(2)(a) Supply and install amplified, flush mounted ceiling speakers with grills and trims to match or blend in with the ceiling's colour for stereo playback;

7.10.17.22(2)(b) Provide audio wiring connected to the stereo headphone output jack on the television or Digital Signage display monitor; and

7.10.17.22(2)(c) Audio levels will be controlled via the screen's remote control.

7.10.18 Patient Physiological and Vital Signs Monitoring System

7.10.18.1 Basic Requirements

7.10.18.1(1) System Overview

7.10.18.1(1)(a) The Patient physiological monitoring system comprises the following:

7.10.18.1.1.(a).1 Fixed and mobile physiological and vital signs monitoring Equipment;

7.10.18.1.1.(a).2 Central and remote viewing/ monitoring stations;

7.10.18.1.1.(a).3 Dedicated wired network infrastructure;

(a).3.1 Physically separate from the Authority's IM/IT data network.

(a).3.2 Dedicated wireless (Telemetry) networking infrastructure and Equipment;

(a).3.2.1 Physically separate from the Authority's IM/IT Wi-Fi network.

7.10.18.1(1)(b) The system is entirely separate from and does not share infrastructure, Equipment and/or software with:

7.10.18.1.1.(b).1 IM/IT data network; and/or

7.10.18.1.1.(b).2 IM/IT Wi-Fi network.

7.10.18.1(2) Applicable Area

7.10.18.1(2)(a) Applies to the Facility.

7.10.18.1(3) System Responsibilities

7.10.18.1(3)(a) Refer to Appendix 3K [Systems Responsibility Matrix] for Authority and Project Co scope summaries.

7.10.18.1(3)(b) Authority will:

7.10.18.1.3.(b).1 Select, design and supply all system headend equipment;

7.10.18.1.3.(b).2 Install all system headend equipment;

7.10.18.1.3.(b).3 Design, supply and install all system software;

7.10.18.1.3.(b).4 Commission system headend equipment and software; and

7.10.18.1.3.(b).5 Provide design feedback to Project Co through the process described in Appendix 2C [User Consultation and Review Procedure].

7.10.18.1(3)(c) Project Co will:

7.10.18.1.3.(c).1 select, design, supply, install and commission all system infrastructure as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure];

7.10.18.1.3.(c).2 design, install, and commission all system field equipment in consultation with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure], including:

(c).2.1 supply and install mounting hardware and physical connection of all equipment;

(c).2.2 coordinate the design of the Telemetry wireless access points with the system vendor;

(c).2.3 install Authority supplied access points, antennas, brackets and associated accessories and hardware in consultation with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure];

(c).2.4 supply and install all cabling required for all systems and equipment requiring connectivity to the Facility's Physiological Monitoring network; and

(c).2.5 Commission field equipment power and network connectivity.

7.10.18.2 Performance Criteria

7.10.18.2(1) General

7.10.18.2(1)(a) Refer to Appendix 3A [Clinical Specifications and Functional Space Requirements] and 3B [Minimum Room Requirements] for specific Authority functional and Equipment location requirements.

7.10.18.2(1)(b) Project Co will:

7.10.18.2.1.(b).1 provide all physical infrastructure required to install, cable, connect, pathway, power and support the equipment supplied by the Authority;

7.10.18.2.1.(b).2 furnish the Authority and system vendor with all Design documentation in the format requested to complete a software based predictive Design of the Patient Monitoring system. This includes floor plans, reflected ceiling plans, elevation and section drawings, Furniture and equipment layouts and information on building materials and finishes;

7.10.18.2.1.(b).3 undertake the Design and Construction of a structured cabling and dedicated patch panels for the Patient Monitoring system. TRs will contain equipment including synchronisation units and network switches;

7.10.18.2.1.(b).4 provide dedicated equipment rack space within the 4 rack (minimum) space specified under section 7.10.10.8(3)(d) complete with power supplies and wire management; and

7.10.18.2.1.(b).5 coordinate with the Authority and system vendor to determine locations of access points required to support the dedicated, independent wireless infrastructure associated with the

Patient physiological monitoring system. Project Co will install infrastructure and wireless access points.

7.10.18.2(2) Fixed and Mobile Physiological Monitoring Equipment

7.10.18.2(2)(a) Project Co will provide all physical infrastructure and pathways required to install, cable, connect power and support the equipment supplied by the Authority.

7.10.18.2(2)(b) Project Co will provide UPS receptacles for equipment as directed by the Authority.

7.10.18.2(2)(c) Project Co will coordinate with the Authority and provide and install the mounting hardware for the Patient physiological monitors and vital signs monitors throughout the Facility, including in the Care Stations, Patient rooms, surgical, and procedure rooms.

7.10.18.2(3) Dedicated Wired Network Infrastructure

7.10.18.2(3)(a) TR's will contain the Patient physiological monitoring system equipment including PoE switches, synchronization units and network switches. Project Co will ensure that each TR has sufficient rack space to support all physiological monitoring network equipment associated with it, plus 50% spare capacity.

7.10.18.2(3)(b) Physiological monitoring network equipment and patch panels will reside within a single rack, and not be spread across multiple racks.

7.10.18.2(3)(c) Project Co will provide additional Data Drops on the physiological monitoring network at each Care Station and other required areas throughout the Facility:

7.10.18.2.3.(c).1 provide four Data Drops per Telemetry Central Monitor; and

7.10.18.2.3.(c).2 provide two Data Drops for other Telemetry Monitor types.

7.10.18.2(3)(d) Project Co will provide two additional Data Drops on the physiological monitoring network at each Charting Workstation in the Critical Care Complex.

7.10.18.2(3)(e) Project Co will provide Data Drops on the physiological monitoring network at each headwall/ boom or other walls in rooms specified by the Authority.

7.10.18.2(3)(f) Project Co will provide dedicated rack space and complete structured cabling connections between the RJ45 outlet jack serving both the fixed Patient locations or the wireless access point, and the port on the network switch.

7.10.18.2(4) Dedicated Wireless (Telemetry) Networking Infrastructure

7.10.18.2(4)(a) Project Co will provide detailed electronic Facility floor plans to the Telemetry vendor for its use in designing the Telemetry wireless access point layout. Project Co will ensure that the design of the system meets the vendors requirements.

7.10.18.2(4)(b) Wireless access points for the physiological monitoring system will be installed throughout all surgical, emergency, outpatient, and medical imaging departments, as well as all corridors and elevator lobbies connecting these departments. Refer to Appendix 3A [Clinical Specifications and Functional Space Requirements] for additional details regarding Equipment locations and requirements.

7.10.18.2(4)(c) Provide a TO with a single Data Drop for each Patient physiological monitoring system wireless access point.

7.10.18.2(4)(d) Coordinate locations of antenna access points, mounting hardware and telecommunications enclosures required to support the dedicated, independent wireless infrastructure associated with the Patient physiological monitoring system. This includes identifying all infrastructure on reflected ceiling plans uniquely and providing clash detection with other ceiling infrastructure including lighting, antennas, ceiling lifts and all other ceiling systems.

7.10.18.2(4)(e) Telemetry wireless access points and Authority IM/IT Network wireless access points are to be physically separated by 2m. Project Co will identify any conflicts between the two systems to the Authority.

7.10.18.2(4)(f) For the safety of Patients and Staff, Project Co will be required to supply, install and label ceiling (hard cap and tile) enclosures to accommodate 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.

7.10.18.2(4)(g) The enclosures provided will allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour.

7.10.18.2(4)(h) Prior to purchase of the enclosures, Project Co will submit Shop Drawings to the Authority for approval through the Review Procedure and, if required, provide samples to the Authority for RF testing purposes and to check for interoperability with wireless hardware.

7.10.18.2(4)(i) At a minimum, these enclosures will be required in all Mental Health Areas of the Facility.

7.10.18.2(4)(j) To protect wireless hardware from the environment, theft or vandalism, Project Co will be required to supply, install and label indoor/outdoor NEMA rated access point enclosures in certain areas within the Facility and for all outdoor WAPs.

7.10.18.2(4)(k) The enclosures will be able to protect wireless hardware from wet and dirty environments, ventilated, UV stabilized for exposure to directly sunlight, virtually transparent to wireless signals, lockable and work with all variations of Authority provided wireless hardware.

7.10.18.2(4)(l) Prior to purchase of the enclosures, Project Co will submit Shop Drawings to the Authority for approval through the Review Procedure and, if required, provide samples to the Authority for RF testing purposes and to check for interoperability with wireless hardware.

7.10.18.3 Clinical Infrastructure Requirements

7.10.18.3(1) This section is intended to provide Project Co with a preliminary summary of equipment locations for review and coordination. This preliminary list will require confirmation and validation with clinical stakeholders through the Design and Construction process as technology selections are subject to change.

7.10.18.3(2) Project Co will supply and install dedicated structured cabling and electrical infrastructure for Patient physiological monitoring system equipment within functional spaces as follows:

7.10.18.3(2)(a) Ambulatory Telemetry

7.10.18.3.2.(a).1 Outpatient Care:

(a).1.1 All areas within each Clinic.

7.10.18.3.2.(a).2 Maternal/Child department:

(a).2.1 All areas within the department.

7.10.18.3.2.(a).3 Perioperative Services:
(a).3.1 All areas within the department.

7.10.18.3.2.(a).4 Emergency Department:
(a).4.1 All areas within the department.

7.10.18.3.2.(a).5 All corridors and stairwells between the above listed areas.

7.10.18.3(2)(b) Bedside Monitor

7.10.18.3.2.(b).1 Outpatient Care Department:
(b).1.1 All testing, Exam and Assessment Rooms or Bays within Cardiac or Diagnostic Cardiology Clinics.

7.10.18.3.2.(b).2 Maternal/Child Unit:
(b).2.1 All Patient, Assessment, and procedure rooms within the department.

7.10.18.3.2.(b).3 Emergency Department:
(b).3.1 Exam and Treatment Rooms or Bays;
(b).3.2 Exam Bays; and
(b).3.3 Trauma/Resuscitation Suite.

7.10.18.3.2.(b).4 Perioperative Services:
(b).4.1 Operating Rooms;
(b).4.2 Stretcher Rooms or Bays;
(b).4.3 Recovery Bays; and
(b).4.4 Procedure Rooms.

7.10.18.3(2)(c) Alcove Station Monitor

7.10.18.3.2.(c).1 Outpatient Care Department:
(c).1.1 Diagnostic Cardiology Clinic:
(c).1.1.1 All Viewing Alcoves.

7.10.18.3(2)(d) Central Station Monitor

7.10.18.3.2.(d).1 Outpatient Care Department:
(d).1.1 Diagnostic Cardiology Clinic:
(d).1.1.1 Office.

7.10.18.3.2.(d).2 Emergency Department:
(d).2.1 All Care Stations;
(d).2.2 All Central Care Stations.

7.10.18.3.2.(d).3 Medical Inpatient unit: Maternal/Child Department:

(d).3.1 All Care Stations;

(d).3.2 NICU Care Stations.

7.10.18.3(2)(e) Additional Display Monitors.

7.10.18.3.2.(e).1 Emergency Department:

(e).1.1 Each Resuscitation bay.

7.10.18.3(2)(f) Beside Fetal Monitor

7.10.18.3.2.(f).1 Maternal/Child Unit:

(f).1.1 Each Patient Room (not in NICU);

(f).1.2 Assessment Room; and

(f).1.3 Patient Rooms Ante/Postpartum Shared or Single Rooms (note that there are two beds in the Shared Rooms and both beds will have a fetal monitor wall mounted).

7.10.18.3(2)(g) Central Station Fetal Monitor

7.10.18.3.2.(g).1 Maternal/Child Department:

(g).1.1 All Care Stations (not in NICU).

## 7.10.19 Public Address

### 7.10.19.1 Basic Requirements

7.10.19.1(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.

7.10.19.1(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 Project Co must be reliable, resilient and easy to operate and maintain with minimal mechanical contact points.

7.10.19.1(3) The PA System will be separate from and act independently of the Fire Alarm System and its emergency voice communications system, however integration between these systems will be provided.

7.10.19.1(4) Alternative communications systems other than the PA system will be used for routine communications between Staff and other Facility occupants.

7.10.19.1(5) Project Co will provide a hybrid IP-Analogue based System in the Facility to integrate the Existing Hospital PA systems at the site.

7.10.19.1(6) Project Co 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.

7.10.19.1(7) Project Co will supply and install all equipment necessary for a fully operational public-address system including:

7.10.19.1(7)(a) Two (2) DSPs (QSC Core 110f) or Authority approved equivalent within each MER;

7.10.19.1(7)(b) Dedicated and fully redundant network switches to connect the PA system in the Facility to connect to the redundant DSP in the MERs. The QSC system communicates on a standard gigabit network, via QSC approved switches.

7.10.19.1(8) Project Co 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.

7.10.19.1(9) Project Co will train the Authority's Maintenance and Operational Staff on how to maintain the PA System.

7.10.19.1(10) A training course will be given by Project Co on site during normal working hours.

7.10.19.1(11) The training will cover all of the items contained in the approved operating and maintenance manuals as well as a demonstrations of routine maintenance operations.

7.10.19.2 Performance Requirements

7.10.19.2(1) Project Co will ensure the full functionality of the PA System is available via the existing PA contact centre interface.

7.10.19.2(2) Provide sound levels as follows throughout the Facility:

7.10.19.2(2)(a) Normal paging: 60 dB minimum.

7.10.19.2(2)(b) Paging sound levels will be at least 10 dB above ambient noise levels in all locations.

7.10.19.2(3) Provide at a minimum 6 Paging zones per floor. Provide additional paging zones as directed through user consultation described in Schedule 2 [Design and Construction Protocols].

7.10.19.2(4) Project Co will provide all equipment necessary for a fully operational public address system including:

7.10.19.2(4)(a) Paging amplifiers. Project Co is to provide one additional spare paging amplifier over and above the number required to operate the Facility's PA System.

7.10.19.2(4)(b) Speakers

7.10.19.2.4.(b).1 All speakers must be multi-tap.

7.10.19.2.4.(b).2 Flush tamper proof ceiling speakers in finished areas.

7.10.19.2.4.(b).3 Enclosed ceiling speakers in unfinished areas

7.10.19.2.4.(b).4 Trumpet type speakers in mechanical and other high ambient noise locations.

7.10.19.2.4.(b).5 Power supplies and other support equipment.

7.10.19.2(5) Paging amplifiers are to be IP-based and rack mounted in centralized locations within Communications Rooms.

7.10.19.2(6) Equipment racks are to be provided and installed for the PA System.

7.10.19.2(7) 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.

7.10.19.2(8) Equipment and equipment racks will be grounded to the Telecommunication Ground Bus (TGB).

7.10.19.2(9) Equipment racks are to be provisioned with power and ePDUs.

7.10.19.2(10) All PA system wiring be run in conduit, and cable tray even in fully accessible ceiling areas.

7.10.19.2(11) Size amplifiers to handle the total load plus 25% spare capacity per channel.

7.10.19.2(12) Maximum of one second delay between accessing the system and the ability to transmit a page from either a local station or remotely.

7.10.19.2(13) Wire alternate speakers to different amplifier channels such that a fault on one channel does not render paging in an area inaudible.

7.10.19.2(14) As directed by the Authority through the process described in Schedule 2 [Design and Construction Protocols] Project Co will integrate the public address system with the following systems:

7.10.19.2(14)(a) IM/IT voice network and integration engine;

7.10.19.2(14)(b) Fire alarm; and

7.10.19.2(14)(c) Nurse call.

## 7.10.20 Nurse Call Systems

### 7.10.20.1 Basic Requirements

7.10.20.1(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 7.11.5 Fixed Panic/Duress system.

7.10.20.1(2) Provide a full feature audio and visual nurse call system with full duplex communications.

7.10.20.1(3) Nurse call system will be Rauland 5000.

7.10.20.1(4) Nurse call system will integrate and be designed to work with the existing Rauland nurse call systems currently deployed in the Existing Hospital. Nurse call system will seamless integrate into the existing nurse call system. Campus nurse call system will be fully functional with complete full functionality. Project Co to provide all software, hardware, replacement of existing devices in Nursing Tower, and Support Facilities Building, wiring and provide SIP as required. The existing nurse call system devices that are no longer compatible with the new Rauland 5000 system will be replaced with new Rauland 5000 devices, this includes but is not limited to master stations, duty stations, patient stations, emergency call buttons, dome lights, zone lights.

7.10.20.1(5) Integrate with the existing Rauland R4, and R5000 systems located in the Existing Hospital for codes, alert annunciation and 2-way voice communication. Include all wiring, licensing, configuration and

programming to accomplish this integration. Final integration to be coordinated with Authority the Design Development Phase pursuant to Appendix 2C [User Consultation and Review Procedure].

7.10.20.1(6) Project Co. to work with third party nurse call vendor to identify the existing nurse call system components, location, and quantities to confirm replacement and compatibility upgrade requirements between the new and existing system.

7.10.20.1(7) Design the system in coordination with the Authority through the process described in Schedule 2 [Design and Construction Protocols].

7.10.20.1(8) Project Co 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:

7.10.20.1(8)(a) Prior to 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;

7.10.20.1(8)(b) Design the nurse call system in consultation with the Authority's clinical Staff through the review procedure described in Appendix 2C [User Consultation and Review Procedure], including hardware and software functionality and system workflow; including reporting tools;

7.10.20.1(8)(c) Implement the nurse call system, including to install, program, test and commission the system, and coordinate all workflows with the Authority; and

7.10.20.1(8)(d) Train Authority end-user Staff and supporting Staff on the nurse call system in all areas where new or upgraded equipment is installed.

7.10.20.1(9) Staff will have the means to disable nurse call buttons on an individual basis to prevent misuse by Patients.

7.10.20.1(10) System will have the capability to integrate with wireless Staff devices, EMR, ADT and Staff scheduling systems.

7.10.20.1(11) System will include reporting/auditing features and all required software/licensing for workstations.

7.10.20.2 Quality Requirements

7.10.20.2(1) The nurse call system will utilize the latest proven technology used in facilities similar to the Facility.

7.10.20.2(2) Comply with all applicable standards, including UL1069, CSA C22.2 and CSA Z32.

7.10.20.2(3) The nurse call system will be the primary emergency communication system for patients to contact Staff in each patient care and treatment area, including all areas accessible to a patient.

7.10.20.2(4) The nurse call system will be the primary communication device for Authority Staff to alert other Staff that they need assistance in a patient or treatment area.

7.10.20.2(5) The nurse call system will be designed to promote efficient operation for Staff.

7.10.20.2(6) The nurse call system will annunciate code blue (cardiac arrest), code pink (neonatal cardiac arrest), code red (fire) and patient monitoring alarms. The nurse call system will annunciate alarms from these systems in a seamless manner on the care team base consoles and wireless handheld devices based on Authority requirements.

7.10.20.2(7) The nurse call system will integrate with an annunciator on wireless Staff communication for near instant alarm response. The nurse call system will operate seamlessly with the wireless Staff communication devices and allow two-way voice communication into all patient locations without loss of call or ability to answer calls.

7.10.20.3 Performance Criteria

7.10.20.3(1) Confirm all operational workflows, call flows and device locations through user group meetings prior to installing or programming the system.

7.10.20.3(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.

7.10.20.3(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 through the review procedure described in Appendix 2C [User Consultation and Review Procedure], with other Facility networks. Nurse call system will work in stand-alone mode if the hospital LAN is down.

7.10.20.3(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.

7.10.20.3(5) All nurse call network horizontal runs to Communications Rooms will be terminated and labelled in accordance with Section 7.10.11 Structured Cabling. Connections from the Nurse call system to the Authority network will utilize Category 6A UTP in accordance with Structured Cabling specifications.

7.10.20.3(6) All system equipment (excluding servers) will be from a single manufacturer and will be the same model number from that manufacturer.

7.10.20.3(7) Nurse call system will be supplied by power from the uninterruptible power system (UPS) with backup from the Emergency Power System.

7.10.20.3(8) Provide connection to Patient Bedroom smoke detection system to annunciate on the nurse call dome lights as per code.

7.10.20.3(9) The nurse call system will annunciate on the master console located at Care Stations on each unit. At a minimum, provide a Staff console in each clinical care area including care team bases, care hubs, nurse stations, reception, and treatment areas.

7.10.20.3(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.

7.10.20.3(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.

7.10.20.3(12) The nurse call system will provide an open system with HL7 standard interface that will accommodate integration to the Authority's Meditech system.

7.10.20.3(13) Provide an interface to the Authority's Clinical Communications & Collaboration Platform for additional monitoring and vectoring of calls.

7.10.20.3(14) Provide integration with the Authority's existing PBX SIP VoIP server and provide sufficient audio channels, as determined in consultation with the Authority through the Review Procedure, for the requirements of the Facility.

7.10.20.3(15) The nurse call system will be connected to the Authority's network, while maintaining ULC compliance, and the central nurse call server to track calls via the nurse call management software. The call management software will record all calls from all departments,

response times and allow for trending and report generation. The Authority will provide the management software.

7.10.20.3(16) Provide all required licensing to integrate the new nurse call system with the existing nurse call to create a facility wide solution.

7.10.20.3(17) Provide programming servers and Staff communication device allocation server locally on the Facility network to allow care team base computer access to monitor status of the system and with appropriate password implement program changes.

7.10.20.3(18) As directed by the Authority through the process described in Schedule 2 [Design and Construction Protocols] Project Co will integrate the nurse call system with the following systems:

7.10.20.3(18)(a) IM/IT voice network and integration engine;

7.10.20.3(18)(b) Fire alarm; and

7.10.20.3(18)(c) Nurse Call.

7.10.20.3(19) In each Clinical Space, provide the following:

7.10.20.3(19)(a) One enhanced patient station with a patient assist button for each bed location;

7.10.20.3(19)(b) Waterproof pull cord stations, one located at floor height (300 mm AFF) and one at standing height (1050 mm AFF) in the ensuite;

7.10.20.3(19)(c) Provide appropriate pull cord station with either audio, call button or pull cord only, as determined through consultation with the Authority through the review procedure described in Appendix 2C [User Consultation and Review Procedure];

7.10.20.3(19)(d) Final locations to be determined in consultation with the Authority through the Review Procedure and as noted in the Minimum Room Requirements;

7.10.20.3(19)(e) For Isolation Patient Rooms, Isolation Exam/Treatment Rooms, Isolation Pre/Post Unit Rooms, Isolation PACU Rooms, Trauma Rooms and Decontamination Rooms, provide additional staff terminals for 2-way audio communication with locations including:

7.10.20.3.19.(e).1 Observation Alcove;

7.10.20.3.19.(e).2 Care Team Base;

7.10.20.3.19.(e).3 Workstation, PCC/UC;

7.10.20.3.19.(e).4 Observation Rooms;

7.10.20.3.19.(e).5 Exterior wall where Staff will be facing the room in their standing position when using such communication device; and

7.10.20.3.19.(e).6 Locations as determined in consultation with the Authority through the Review Procedure. The Review Procedure device quantity wil be limited to 20% of the total devices required in clause 7.10.18.3(19)(e) and Appendix 3B [Minimum Room Requirments].

7.10.20.3(20) Enhanced Patient stations will be individually programmable to allow multiple call classification and priority levels. Enhanced Patient stations will be capable of connecting two alarm inputs. Provide the ability to disable any nurse call system input from any VoIP nurse console.

7.10.20.3(21) Enhanced Patient stations will be individually programmable to allow multiple call classifications and priority levels. Nurse call alarms will include functions such as normal Patient calls, priority Patient calls, bathroom calls, and shower calls.

7.10.20.3(22) Provide pillow speakers for all Patient beds. Pillow speakers will be the type with TV controls (sound and channels). Low voltage lighting (reading, ambient) and customized buttons for functions as determined in consultation with the Authority through the Review Procedure.

7.10.20.3(23) 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 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.

7.10.20.3(24) Provide a Staff assist system with buttons at locations determined in consultation with the Authority through the Review Procedure.

7.10.20.3(25) Provide Staff assist system with buttons located at all Clinical Space as determined in consultation with the Authority through the Review Procedure. When possible, incorporate button into the enhanced Patient station.

7.10.20.3(26) Provide a code blue/pink system with code blue/pink buttons at locations determined in consultation with the Authority through the Review Procedure, including at the following locations:

7.10.20.3(26)(a) Tub rooms;

7.10.20.3(26)(b) Treatment & recovery areas;

7.10.20.3(26)(c) Strategic corridor locations to be coordinated with the Authority;

7.10.20.3(26)(d) Procedure rooms;

7.10.20.3(26)(e) Exam rooms;

7.10.20.3(26)(f) Treatment rooms;

7.10.20.3(26)(g) Patient rooms; and

7.10.20.3(26)(h) Final locations to be determined in consultation with the Authority through the Review Procedure.

7.10.20.3(27) Rooms that can be subdivided into 2 rooms provide code blue system for all subdivided rooms.

7.10.20.3(28) Code blue, code pink alerts are to be annunciated at the regional switchboard at the time of the event.

7.10.20.3(29) Provide code blue (cardiac arrest) and code pink (neonatal cardiac arrest) at locations determined in consultation with the Authority through the Review Procedure, including at each care team base, reception desk and all patient rooms, patient therapy rooms, patient lounges, procedure rooms and exam rooms. Provide remote indication of specific alarm origin at a central control panel located at the main reception desk of the Facility or other location, as directed by Authority. Button may be incorporated into the bedside station. Code pink stations are to be used all NICU and Patient rooms, pediatrics zones, emergency, and trauma areas. Trauma areas to include both code blue and code pink buttons.

7.10.20.3(30) Provide a code blue and code pink system that achieves the following sequence of operation:

7.10.20.3(30)(a) Upon a code blue or code pink button activation a priority call signal will be annunciated at the VoIP nurse console and the Existing Hospital back-up annunciation system as designed in conjunction with the Authority through the Review Procedure;

7.10.20.3(30)(b) Provide dome/zone lights at all corridor intersections elevator lobbies to direct and lead the code response team to the origin of the code blue call as designated by the Authority through the Review Procedure;

7.10.20.3(30)(c) Upon cancellation of the code blue call at the patient station all systems will reset and resume normal operation; and

7.10.20.3(30)(d) Coordinate with the Authority on the full functionality and workflow of both the code blue and code pink systems.

7.10.20.3(31) Provide adequate Staff terminals in all Clinical Space to ensure that tones are heard and audible throughout each department. Provide the capability to mute at each staff terminal, including the following locations:

7.10.20.3(31)(a) Clean utility rooms;

7.10.20.3(31)(b) Soiled utility rooms;

7.10.20.3(31)(c) Medication rooms;

7.10.20.3(31)(d) Equipment storage rooms;

7.10.20.3(31)(e) Technician workstations in Diagnostic Imaging Satellite rooms;

7.10.20.3(31)(f) Care Team Bases;

7.10.20.3(31)(g) Conference rooms; and

7.10.20.3(31)(h) Staff lounges and Staff locker rooms.

7.10.20.3(32) Final locations to be determined in collaboration with the Authority through the Review Procedure.

7.10.20.3(33) Provide four button station as workflow stations at locations determined in consultation with the Authority through the Review Procedure, including:

7.10.20.3(33)(a) Intentionally deleted;

7.10.20.3(33)(b) Staff locations;

7.10.20.3(33)(c) Exam rooms;

7.10.20.3(33)(d) Isolation rooms;

7.10.20.3(33)(e) Interview/consultation rooms;

7.10.20.3(33)(f) Trauma rooms;

7.10.20.3(33)(g) Secure rooms;

7.10.20.3(33)(h) Treatment rooms;

7.10.20.3(33)(i) Interventional areas;

7.10.20.3(33)(j) Planned ORs;

7.10.20.3(33)(k) Anesthesia prep rooms;

7.10.20.3(33)(l) NICU room;

7.10.20.3(33)(m) Pre/Post rooms;

7.10.20.3(33)(n) DI areas; and

7.10.20.3(33)(o) Medical-Surgical areas.

7.10.20.3(34) Intentionally deleted:

7.10.20.3(34)(a) Intentionally deleted;

7.10.20.3(34)(b) Intentionally deleted; and

7.10.20.3(34)(c) Intentionally deleted.

7.10.20.3(35) Locate workflow stations separately from bedside stations in patient rooms, treatment rooms and exam rooms. Locate workflow station in close proximity to the room entrance, not at the patient bedside or at the side of the patient exam table. Exact location of the workflow station will be determined in consultation with the Authority through the Review Procedure.

7.10.20.3(36) Provide separate 2-jack auxiliary stations in all patient care rooms and patient bed or stretcher locations with the ability to interface with relay/dry contact medical equipment alarms for medical monitoring and patient monitoring, such as bed exit.

7.10.20.3(37) Provide workflow and workload management functionality as determined in consultation with the Authority through the Review Procedure.

7.10.20.3(38) Intentionally deleted.

7.10.20.3(39) Provide an interface to the Authority's Clinical Communications & Collaboration Platform for additional monitoring and vectoring of calls.

7.10.20.3(40) Provide integration with the Authority's existing PBX SIP VoIP server and provide sufficient audio channels, as determined in consultation with the Authority through the Review Procedure, for the requirements of the Facility.

7.10.20.3(41) The nurse call system will be connected to the Authority's network, while maintaining ULC compliance, and the central nurse call server to track calls via the nurse call management software. The call management software will record all calls from all departments, response times and allow for trending and report generation. The Authority will provide the management software.

7.10.20.3(42) Provide all required licensing to integrate the new nurse call system with the existing nurse call to create a facility wide solution.

7.10.20.3(43) Provide programming servers and Staff communication device allocation server locally on the Facility network to allow care team base computer access to monitor status of the system and with appropriate password implement program changes.

7.10.20.3(44) Provide connection to Patient Bedroom smoke detection system to annunciate on the nurse call dome lights as per code.

7.10.20.3(45) 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.

7.10.20.3(46) 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 will be non-ligature and tamper-resistant where accessible by Patients.

7.10.20.3(47) 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.

7.10.20.3(48) Provide a staff assist system with buttons at locations determined in consultation with the Authority through the Review Procedure, including Tub Rooms and Secure Outdoor Spaces.

7.10.20.3(49) Provide a code blue system with code blue buttons at locations determined in consultation with the Authority through the Review Procedure including: Tub Rooms, ECT treatment & recovery areas, and strategic corridor locations to be coordinated with the Authority.

7.10.20.3(50) Provide a code blue system that achieves the following sequence of operation:

7.10.20.3(50)(a) Upon a Code Blue button activation, a priority call signal will be annunciated at the staff console;

7.10.20.3(50)(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;

7.10.20.3(50)(c) Upon cancellation of the code blue call at the Patient station all systems will reset and resume normal operation.

7.10.20.3(51) 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.

## 7.10.21 Distributed Antenna System (DAS)

### 7.10.21.1 System Description

7.10.21.1(1) Project Co will deploy a DAS solution in the Facility. The DAS solutions being considered by the Authority are:

7.10.21.1(1)(a) A Hybrid-Fibre-Coax DAS where single mode fibre connects the DAS head end in the Phase 1A MER to radio repeaters situated in the Facility's Communications Rooms to distribute the required frequencies and bands. From the radio repeaters, RF energy is distributed to passive antennas located throughout the Facility over horizontal coax cabling; and

7.10.21.1(1)(b) An Active DAS where single mode fibre connects the DAS head end in the Phase 1A MER to radio to expansion units situated in the Facility's Communications Rooms to distribute the required frequencies and bands. From the expansion units, signals are distributed to active cellular access points located throughout the Facility over hybrid cabling that has both fiber and copper conductors for DC power distribution.

7.10.21.1(2) The non-commercial low band services provided over the Hybrid-Fibre-Coax DAS will be paging, ECOMM, and private two-way radio services for building security and FMO.

7.10.21.1(3) The cellular services will operate in the LTE, HSPA and 5G bands offered by Bell, Rogers, TELUS, and Freedom Mobile. The range of

frequencies supported by the DAS will extend from the UHF band (450 MHz) to 3800 MHz.

7.10.21.1(4) The DAS will provide ubiquitous coverage for the above bands and frequencies in all rooms, areas and spaces within the Facility. This includes utility rooms (mechanical, electrical, elevator machine), interstitial floors, stairwells, parking levels, service links, bridges and tunnels.

7.10.21.1(5) The EF Room in the Phase 1A will accommodate telecommunications carriers' base transceiver stations or Node B equipment for LTE, HSPA and 5G services, as well as fibre connectivity to enable backhauling of cellular traffic to the telecommunications carriers' core cellular equipment

7.10.21.2 Design and Construction Coordination

7.10.21.2(1) The Design of the DAS is largely dependent on the Design of the Facility. As such, the Design of the DAS will be iterative and commence once Project Co can confirm that the shell and core of Facility is largely finalized. The final iteration of the Design of the DAS will be complete after the IFC submission is issued by Project Co.

7.10.21.2(2) Project Co will:

7.10.21.2(2)(a) Provide, in the format requested by the Authority, all Design documentation related to the Facility that is required to complete an accurate software based predictive Design of the DAS. This includes, but is not limited to floor plans, reflected ceiling plans, elevation and section drawings, furniture and equipment layouts and information on building materials and finishes.

7.10.21.2(2)(b) Provide, in the format requested by the Authority, a progress update of all of the Facility's architectural floor plans every three months during the Construction period reflecting all accepted changes to the design.

7.10.21.2(2)(c) Meet all requirements stated in the Authority's design stages submittals expectations as it relates to:

7.10.21.2.2.(c).1 Identifying specific elements of the DAS Design on the construction drawings;

7.10.21.2.2.(c).2 Coordinating specific elements of the DAS Design on the construction drawings; and

7.10.21.2.2.(c).3 Updating the construction drawings to reflect changes to the DAS Design throughout the duration of the Project.

7.10.21.2(2)(d) Ensure the proper operation of the DAS system by:

7.10.21.2.2.(d).1 Keeping all metal 1200 mm away from DAS antennas and cellular access points and placing no metal underneath DAS antennas and cellular access points. This includes but is not limited to pipes and ducting (insulated or otherwise) and EMT conduits of all sizes. This requirement also applies to any new Design and Construction undertaken by Project Co in the existing Hospital. If this requirement is not achieved during Construction, Project Co will be responsible to re-locate the metal infrastructure at no cost to the Authority; and

7.10.21.2.2.(d).2 Adequately spacing all Project Co RF emitting devices and antennas 1200 mm from DAS antennas and cellular access points to ensure sufficient isolation. If this requirement is not achieved during Construction, Project Co will be responsible to re-locate its RF emitting device and antennas at no cost to the Authority.

7.10.21.2(2)(e) Provide the Authority and its representatives with all access to the Site as required to complete the Design and Construction of the DAS.

7.10.21.3 Responsibility Matrix

7.10.21.3(1) The following responsibility matrix outlines the responsibilities of Project Co and the Authority as it relates to the DAS.

| Deliverable | Responsibility | | Comments |
|---|---|---|---|
| | Project Co | Authority | |
| **Communications Pathway System** | | | |
| Cable Tray, Conduits and Sleeves | X | | Schedule 3 7.10.7 |
| Backbone Communications Pathway System | X | | Schedule 3 7.10.7 |
| Rooftop Communications Pathway System | X | | Schedule 3 7.10.7 |
| Enclosures, Electrical Boxes and Access Panels | X | | Schedule 3 7.10.19.4 |

| Deliverable | Responsibility | | Comments |
|---|---|---|---|
| | Project Co | Authority | |
| **Communications Rooms** | | | |
| Wall space | X | | Schedule 3 7.10.19.5 |
| Rack space | X | | Schedule 3 7.10.19.6, 7.10.10 |
| **Electrical** | | | |
| Power for wall mounted equipment | X | | Schedule 3 7.10.19.5 |
| Power for rack mounted equipment | X | | Schedule 3 7.10.19.6 |
| Lightning Protection | X | | Schedule 3 7.10.19.4 |
| **Mechanical** | | | |
| Cooling for wall mounted equipment | X | | Schedule 3 7.10.19.5 |
| Cooling for rack mounted equipment | X | | Schedule 3 7.10.19.6 |
| **Cabling Infrastructure** | | | |
| Inter-Building Fibre Backbone | | X | Schedule 3 7.10.19.4 |
| Intra-Building Fibre Backbone | X | | Schedule 3 7.10.19.5, 7.10.11 |
| Coaxial Cabling | X | X | Schedule 3 7.10.19.5 |
| Hybrid Fibre / Copper Cabling | X | X | Schedule 3 7.10.19.6 |
| Patch Cords / Jumpers | X | X | Schedule 3 7.10.19.4 / 7.10.11 |
| Labelling | X | X | Schedule 3 7.10.19.4 |
| **DAS** | | | |
| Design | | X | Schedule 3 7.10.19.4 |
| Third Party / Carrier Coordination and Connection | | X | Schedule 3 7.10.19.4 |
| Procurement of Passive / Active Components | | X | Schedule 3 7.10.19.4 |
| Installation of Passive / Active Components | | X | Schedule 3 7.10.19.4 |
| Labelling of Passive / Active Components | | X | Schedule 3 7.10.19.4 |
| Commissioning | | X | Schedule 3 7.10.19.4 |
| **Roof Top Antennas** | | | |
| Antenna Masts and Mounts (attaching /penetrating bldg..) | X | | Schedule 3 7.10.19.7 |
| Gravity / Ballast Mounts | | X | Schedule 3 7.10.19.7 |
| Antennas / Mounting Hardware / Transmission Cable | | X | Schedule 3 7.10.19.7 |
| Lightning Protection | X | | Schedule 3 7.10.19.7 |
| Grounding of Transmission Cable | | X | Schedule 3 7.10.19.7 |

7.10.21.4 General Requirements

7.10.21.4(1) The Authority will:

7.10.21.4(1)(a) Design the DAS system;

7.10.21.4(1)(b) Procure, configure, install and commission all passive components and active equipment required to make the DAS fully operational including cellular access points, antennas, radio, repeaters, expansion hubs, donor antennas, bi-directional amplifiers element management hardware and software, combiners, splitters, antenna power supplies and head end equipment;

7.10.21.4(1)(c) Label DAS components and equipment, cable ends close to connectors and patch panels used for the termination of hybrid fibre / copper cabling;

7.10.21.4(1)(d) Supply and install coax jumpers and specialized fiber patch cords (ex. patch cords with E2000 connectors) that connect to DAS components and equipment;

7.10.21.4(1)(e) Supply and install fiber patch cords that are required to connect to fibre inter-building cabling infrastructure;

7.10.21.4(1)(f) Undertake the Design and Construction of the fibre inter-building cabling infrastructure in the CPPS necessary to physically connect the DAS head end in the Phase 1A and Phase 1B MER's to the Facility's backbone cabling subsystem. All inter-building DAS fibre and copper backbone cables between Phase 1A and Phase 1B MERs and Phase 1A EF shall be under the Authoritys scope; and

7.10.21.4(1)(g) Coordinate with the telecommunications carriers and other third parties to provide the equipment and services required to connect the DAS to cellular, paging and the emergency communication networks. This includes the Design and Construction of additional Point of Interconnect (POI) cabling between the DAS headend and telecommunications carriers' base transceiver stations or Node B equipment for LTE, HSPA and 5G bands.

7.10.21.4(2) Project Co will:

7.10.21.4(2)(a) Obtain, if required, a code variance from the AHJ to ensure DAS antennas and cellular access points can be placed in stairwells to provide low band and cellular service coverage to the stairwell. Coverage in stairwells is essential for first responder, security and critical communications in the Facility and it standard practice for Authority to place DAS antennas and cellular access points in stairwell landings in all of its buildings.

7.10.21.4(2)(b) Undertake the Design and Construction of a Communications Pathway System that will support all DAS cabling in accordance with the requirements stated in Section 7.10.9.

7.10.21.4(2)(c) Supply and install all copper cabling required to bond rooftop antenna mounts to the Facility's lightning protection system.

7.10.21.4(2)(d) Supply, install and label indoor/outdoor NEMA rated cellular access point enclosures to protect DAS equipment from the environment, theft or vandalism in the parking levels and other areas inside the Facility as specified by the Authority.

7.10.21.4.2.(d).1 Enclosures will be UV stabilized for exposure to direct sunlight, virtually transparent to wireless signals, and work with all variations of Authority provided DAS equipment;

7.10.21.4.2.(d).2 Project Co if requested, will provide samples of the enclosure to Authority for RF testing purposes and to check for interoperability with DAS equipment; and

7.10.21.4.2.(d).3 Enclosures provided will come with locking hardware.

7.10.21.4(2)(e) Supply, install and label ceiling (hard cap and tile) enclosures to house DAS equipment in areas of the Facility where the Authority identifies a high risk to Patient and Staff safety. These enclosures will hide wireless equipment from view and prevent unauthorized access to the access point and the connecting cabling.

7.10.21.4.2.(e).1 Enclosures will be high abuse security grade, anti-ligature, tamper-proof, and vandal resistant;

7.10.21.4.2.(e).2 Enclosures will work with all variations of Authority provided DAS equipment, allow RF transmissions to penetrate with little or no attenuation and match the surrounding ceiling colour;

7.10.21.4.2.(e).3 Project Co, if requested, will provide samples of the enclosure to Authority for RF testing purposes and to check for interoperability with DAS equipment; and

7.10.21.4.2.(e).4 Enclosures provided will come with locking hardware.

7.10.21.4(2)(f) Supply, install and label electrical boxes of suitable dimensions as approved by the Authority through the

Review Procedure in locations determined by the Authority for mounting or housing DAS components and equipment.

7.10.21.4(2)(g) Supply, install and label access panels of suitable dimensions as approved for housing DAS components and equipment in areas inside the Facility that have inaccessible ceilings (where an enclosure is not required by the Authority). Access panels will be of high abuse security grade, anti-ligature, tamper-proof, and vandal resistant where required by the Authority.

7.10.21.4(2)(h) Supply and install in all inaccessible and exposed ceilings, the conduits necessary to connect enclosures, electrical boxes and access panels used for mounting or housing DAS components and equipment to each other and to the nearest communications cable tray or Communications Room.

7.10.21.4(2)(i) Supply and install coloured vanity skins or covers for DAS equipment where required by the Authority or Project Co for aesthetic reasons.

7.10.21.4(2)(j) Supply and install specialized or customized mounts and brackets to install and or suspend DAS equipment;

7.10.21.4(2)(k) Take on full responsibility (including cost) for all alterations in the Design and Construction of the Facility required to install any aspect of the DAS.

7.10.21.4(2)(l) Replace ceiling tiles and repair walls and ceilings in the Facility when necessary in the event that DAS equipment needs to be moved prior to Substantial Completion to improve coverage and or avoid sources of interference.

7.10.21.4(2)(m) Supply and install labelling in accordance the following requirements:

7.10.21.4.2.(m).1 A temporary (hand generated) label at the ends of each coaxial and hybrid fibre / copper cable at the time of rough in. This label will reflect the cable ID provided in the cable routing report supplied by the Authority.

7.10.21.4.2.(m).2 Apply a label to each coaxial and hybrid fibre / copper cable every 6m when installed in cable tray as well as within 1 m of entering or exiting a

conduit or sleeve. These specific labels will convey information as to what DAS system the cable belongs to. The specifics of what information will be on the label will be provided by the Authority prior to shop drawing submittal.

7.10.21.4.2.(m).3 In those instances where DAS cabling enters into conduit, Project Co will label the conduit with a disclaimer stating: “DO NOT BEND OR MOVE THIS CONDUIT”. These labels will be applied every 6 meters along the entire length of the conduit.

7.10.21.5 Hybrid-Fibre-Coax DAS

7.10.21.5(1) MER and TRs

7.10.21.5(1)(a) In the MER, Project Co will provide:

7.10.21.5.1.(a).1 6 m2 (8 ft. x 8 ft.) of contiguous dedicated wall space for active and passive DAS components; and

7.10.21.5.1.(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 1.5m of space in front of the wall will be required.

7.10.21.5(1)(b) In each TR in the Facility, Project Co will provide:

7.10.21.5.1.(b).1 3 m2 (4 ft. wide x 8 ft. high) of contiguous dedicated wall space for active and passive DAS components; and

7.10.21.5.1.(b).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 1.5m of space in front of the wall will be required.

7.10.21.5(1)(c) Should it be required to meet the space requirements for DAS equipment and cabling in a TR, Project Co will, in

accordance with Section 7.10.10, enlarge the TR to accommodate the additional wall space and all required clearances;

7.10.21.5(1)(d) For each 1219 mm (4 ft.) vertical section of wall space allocated for DAS wall mounted equipment, Project Co will supply and install two duplex 5-20R receptacles; one from the IM/IT UPS branch and the other from the vital branch. Receptacles are to be mounted beneath the perimeter cable tray.

7.10.21.5(1)(e) The heat load of the wall mounted DAS equipment is estimated at 2500 BTU/hr at full capacity. This heat load will be included as part of the overall heat load calculated at the time of the Design and will factor into the cooling capacity that is supplied and installed by Project Co in the MER and in each of the TRs.

7.10.21.5(2) DAS Intra-Building Fibre Backbone

7.10.21.5(2)(a) Project Co will undertake the Design and Construction of an intra-building fibre backbone that is dedicated for the DAS system in the Facility.

7.10.21.5(2)(b) The dedicated intra-building fibre backbone for the DAS system will be considered part of the backbone cabling subsystem in the Facility and, as such, its Design and Construction will conform to all requirements stated in Section 7.10.11.

7.10.21.5(2)(c) The configuration of the dedicated intra-building fibre backbone for the DAS system will be a hierarchical star topology where separate dedicated primary and secondary single mode fibre optic cables will be installed between the MER and each TR in the Facility.

7.10.21.5.2.(c).1 Primary and secondary single mode fibre optic cables will be installed utilizing the physically route diverse backbone Communications Pathway System between the MER and each TR; and

7.10.21.5.2.(c).2 Minimum strand count for each primary and secondary single mode fibre optic cable running between the MER and each TR will be twelve (12).

7.10.21.5(2)(d) All fibres in the dedicated intra-building fibre backbone for the DAS system will to be terminated using connectors that are approved by the Authority through the Review Procedure.

7.10.21.5.2.(d).1 Different types of optical connectors will not be mated as this may damage the fibres and connectors;

7.10.21.5.2.(d).2 All intra-building fibre cables will be OTDR-tested in accordance with the PHSA Communications Infrastructure Standards and Specifications and or the requirements of the Authority's DAS supplier; and

7.10.21.5.2.(d).3 All test results for the dedicated DAS intra-building fibre backbone are to be provided to the Authority at the same time as the test results for all other intra-building fibre backbone cables.

7.10.21.5(3) Coaxial Cabling

7.10.21.5(3)(a) Project Co will:

7.10.21.5.3.(a).1 Supply and install 1200 metre of coaxial cable. This cable will be installed in segments of varying lengths as determined by the Authority's Design of the DAS;

7.10.21.5.3.(a).2 Coax cable will be installed from the Communications Room to passive and active components of the DAS in a tree and branch topology as per the Authority's Design of the DAS, and

7.10.21.5.3.(a).3 Two (2) metre loops will be left at the ends of each segment of coax installed to enable termination and connection to passive and active components of the DAS.

7.10.21.5(3)(b) Prior to installation, the Authority will provide cable routing reports to Project Co that will specify the budgetary lengths for each coaxial cable run.

7.10.21.5.3.(b).1 Project Co will then verify exact install lengths for each cable run and inform the Authority as cable installation is occurring when actual lengths differ from what has been budgeted by 15% or more; and

7.10.21.5.3.(b).2 Provide an updated cable routing report with adjusted lengths along with mark-ups illustrating adjusted routing. Updated cable routing report and mark-ups will be immediately after the installation of cable has been completed on each floor in the Facility.

7.10.21.5(3)(c) The coaxial cable supplied and installed by Project Co to each DAS antenna will be equal to CommScope HL4RPV-50 or LDF4RK-50A depending on the Flame Test (FT) rating of the cable required by the AHJ. Project Co will identify which of the two types of approved coax cable it will install in the Facility prior to the Authority commencing its Design of the DAS.

7.10.21.5(3)(d) The Authority will terminate and conduct VSWR (Voltage Standing Wave Ratio) and sweep tests on all coaxial cable that are installed as part of the hybrid-fiber-coax DAS system. If the Authority determines a coaxial cable has been damaged and or that there is a performance issue with the coaxial cable such as excessive uplink noise Project Co will be responsible for replacement and re-installation of the entire affected segment of cable at no additional cost to the Authority.

7.10.21.6 Active DAS

7.10.21.6(1) MER and TRs

7.10.21.6(1)(a) In the MER, one of the four equipment racks already specified in Section 7.10.10 will be used for DAS equipment and cabling.

7.10.21.6(1)(b) In each TR in the Facility, Project Co will allocate half of a full height equipment rack (as defined in Section 7.10.10) for DAS equipment and cabling. This allocation of space will not be in an equipment rack that is dedicated for IM/IT Data, Wi-Fi and Voice network equipment and cabling.

7.10.21.6(1)(c) Should it be required to meet the space requirements for DAS equipment and cabling in a TR, Project Co will, in

accordance with Section 7.10.10, provide any combination of the following:

7.10.21.6.1.(c).1 The supply and install an additional full height equipment rack (including cable management and) over and above the minimum quantity required;

7.10.21.6.1.(c).2 The enlargement of the TR to accommodate the additional equipment rack and all required clearances;

7.10.21.6.1.(c).3 Provide power to the additional equipment rack. The average peak demand of a equipment rack that houses DAS equipment will be 4kW, but the Design will allow for the demand to scale to 8 kW; and

7.10.21.6.1.(c).4 Provide 6000 BTUs of cooling capacity to the additional equipment rack.

7.10.21.6(2) No additional intra-building fibre backbone cabling is required for the Active DAS over and above what is to be provided for Hybrid-Fibre-Coax DAS. Refer to Section 7.10.19.5(2) for further details.

7.10.21.6(3) Hybrid Fibre / Copper Cabling

7.10.21.6(3)(a) Project Co will:

7.10.21.6.3.(a).1 Supply and install 3000 metre of hybrid fibre / copper cable. This cable will be installed in segments of varying lengths as determined by the Authority's Design of the DAS;

7.10.21.6.3.(a).2 Hybrid fibre / copper cable will be installed from the Communications Room to each cellular access point in a star structure where each separate dedicated segment will be installed in a continuous fashion with no splices from the TR or MER to each cellular access point location specified on the Authority's Design of the DAS; and

7.10.21.6.3.(a).3 Two (2) metre loops will be left at the ends of each segment of hybrid fibre / copper cable to enable termination and connection to passive and active components of the DAS.

7.10.21.6(3)(b) The hybrid fibre / copper cable supplied and installed by Project Co to each DAS antenna will be manufactured either by Commscope or Belden.

7.10.21.6.3.(b).1 Riser rated - Commscope PFC-S04L12 (Powered Fiber Cable, OS2, 4 Fibers, Indoor/Outdoor, 12AWG).

7.10.21.6.3.(b).2 Plenum rated -

7.10.21.6.3.(b).3 Riser rated - Belden HDSD0040212RJ (Indoor/Outdoor Hybrid Breakout Cable, OS2, 4 Fibers, 12AWG)

7.10.21.6.3.(b).4 Plenum rated – Belden HDSD0040212PJ (Indoor/Outdoor Hybrid Breakout Cable, OS2, 4 Fibers, 12AWG).

7.10.21.6.3.(b).5 Flame Test (FT) rating of the cable will be as required by the AHJ.

7.10.21.6(3)(c) The Authority will terminate and test all hybrid fibre / copper on dedicated patch panels and DC power distribution equipment that it will provide and install in the equipment rack space allocated for DAS equipment. In the event a cable fails to pass testing, Project Co will be responsible for replacement and re-installation of the entire affected segment of cable at no additional cost to the Authority.

7.10.21.7 Roof Top Antennas

7.10.21.7(1) Donor antennas will be supplied and installed by the Authority on the rooftop of the Facility for ECOMM, Security, FMO, and Paging services.

7.10.21.7(2) A rooftop survey of the Facility will 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.

7.10.21.7(3) The antennas will either be mounted to a vertical surface such as a wall or rooftop screening system for mechanical equipment using 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.

7.10.21.7(3)(a) If the mounting location selected by the Authority requires the antenna masts or mounts to attach and or penetrate any aspect of the building, the mast or mounts for each antenna will be supplied and installed by Project Co. The pipe masts must be installed at least 2.5m above the roof and constructed to withstand local wind conditions as stipulated in the current National Building Code of Canada.

7.10.21.7(3)(b) Non-penetrating gravity or ballast mounts, antennas and associated hardware will be provided and installed on the pipe masts and or mounts by the Authority.

7.10.21.7(4) A minimum horizontal separation of 1m edge-to-edge is required between all antennas.

7.10.21.7(5) Lightning Protection provisions will be engineered into the Facility design and installed by Project Co for effective roof-mounted antenna mast and support structure grounding.

7.10.21.7(5)(a) Project Co will 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.

7.10.21.7(5)(b) Project Co will incorporate into the Facility's lightning protection system connection points for bonding future antenna systems to the roof-top lightning protection system.

7.10.21.7(5)(c) Project Co will bond the antenna mount with a ground cable sized to match the primary lightning protection cable installed at the roof level.

7.10.21.7(5)(d) Conductor bonding will 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.

7.10.21.7(5)(e) The Authority will be responsible for grounding of transmission line.

7.10.21.7(6) Pathway

7.10.21.7(6)(a) Project Co will 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. Project Co will consult with the Authority through the Review Procedure on the exact location of the cable entry panel prior to installation.

7.10.21.7(6)(b) Project Co will provide a pathway from the antenna locations to the cable entry panel and from the cable entry panel to the nearest Telecommunications Room.

7.10.21.7(6)(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.

7.10.21.7(6)(d) The Authority will supply, install, and terminate the runs of coax cable from each antenna to the BDA rack in the MER of Phase 1A.

7.10.22 Radio System (UHF**)** – not in scope

7.10.23 Patient/Clinical Displays (PCD)

7.10.23.1 Basic Requirements

7.10.23.1(1) System Overview

7.10.23.1(1)(a) Patient/Clinical Display infrastructure will be provided in select areas of the Facility.

7.10.23.1(2) Applicable Areas

7.10.23.1(2)(a) Patient Rooms;

7.10.23.1(2)(b) Exam/Treatment Rooms;

7.10.23.1(2)(c) Staff and Family Lounges;

7.10.23.1(2)(d) Communal areas, On-Call rooms;

7.10.23.1(2)(e) Waiting Areas;

7.10.23.1(2)(f) Lecture Room;

7.10.23.1(2)(g) EOC;

7.10.23.1(2)(h) All locations identified in Appendix 3A [Clinical Specifications and Functional Space Requirements]; and,

7.10.23.1(2)(i) Other rooms and areas as determined in consultation with the Authority through the Review Procedure.

7.10.23.1(3) System Responsibilities

7.10.23.1(3)(a) Refer to Appendix 3K [Systems Responsibility Matrix] for Authority and Project Co scope summaries.

7.10.23.1(3)(b) Authority will:

7.10.23.1.3.(b).1 Coordinate with its designated telecommunications carrier and/or hospitality service provider to bring services into the Facility and to extend those services from the EF Room to the required TRs. This includes the Design and Construction of a backbone riser, active equipment and passive components; and

7.10.23.1.3.(b).2 Procure digital displays (42” standard), mounts and associated components required in the Facility.

7.10.23.1(3)(c) Project Co will:

7.10.23.1.3.(c).1 Supply and install PCD Outlets in the Facility in accordance with the Authority’s requirements.

7.10.23.1.3.(c).2 Install all Authority supplied displays and mounts throughout the Facility.

7.10.23.1.3.(c).3 Provide additional backing and additional structural supports where required for safe installation.

7.10.23.2 Performance Criteria

7.10.23.2(1) Ensure that the location of the Outlet and the associated power outlet is coordinated with the location and elevation of the HD digital display monitors such that cables and power cords will be hidden from view;

7.10.23.2(2) Install HD digital display monitors and mounts, including ceiling mounts where required.

7.10.23.2(3) Undertake the Design and Construction of the Communications Pathway System required for the PCD system in the Facility in accordance with requirements of this Section and Section 7.10.9;

7.10.23.2(4) Supply and install conditional power for each HD digital display monitor in the Facility. The only exception will be that the HD digital display monitors (televisions) in the EOC will be on vital power;

7.10.23.2(5) Supply and install 1200 mm x 2400 mm of wall space dedicated for PCD use only in the EF Room, MER and each individual TR in the Facility;

7.10.23.2(6) Supply and install two (2) 15 Amp, 120V AC duplex receptacles on a dedicated circuit for PCD equipment in the EF Room, MER and each individual TR in the Facility;

7.10.23.2(6)(a) Receptacles will be located on the dedicated wall space allocated for PCD equipment mounted at the top of the plywood beneath the perimeter cable tray; and

7.10.23.2(6)(b) One receptacle will be on conditional power and the other receptacle will be on vital at each of the locations in noted above.

7.10.23.2(7) Allocate four (4) rack units of space for PCD equipment in the MER and in each individual TR in the Facility;

7.10.23.2(8) Integrate HD digital display monitors and mounts and associated components seamlessly into the Design of the Facility and provide any wall and ceiling reinforcement required to support the HD digital display monitors, mounts and associated components;

7.10.23.2(9) Work with the Authority to assess the ideal viewing angles in each applicable area and room within the Facility in order to determine the precise location and elevation of each HD digital display monitor. Refer to and meet the Design requirements stated in the Fraser Health Design Stages Submittals Expectations;

7.10.23.2(10) 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 HD digital display monitor. This includes window coverings, paint colour, lighting and lighting control and the correct placement of HD digital display monitors relative to sources of light; and

7.10.23.2(11) Provide all necessary Ligature Resistant, tamper proof and vandal proof measures as required by the Authority in the Facility to house, protect and prevent unwanted access to the HD digital display monitors, mounts and associated components and cabling. This includes such preventative measures as lockable enclosures or

Millwork and anti-glare, non-breakable transparent polycarbonate panels.

7.10.23.3 At Patient bed locations, Patients will control content including channels, programming, and volume on HD digital display monitors via pillow speakers connected to the nurse call system. Refer to Section 7.10.18 for further requirements.

7.10.23.4 A PCD Outlet will:

7.10.23.4(1) Include two Category 6A horizontal cables and a one spare conduit.. The configuration of the system will be a star structure where the Category 6A horizontal cables will be run in a continuous fashion with no splices from the designated MER or TR to the PCD Outlet on the same floor;

7.10.23.4(2) Connect to the nearest communications cable tray by a 35 mm conduit; and

7.10.23.4(3) Consist of a 72171 backbox complete with a two-gang GWB ring, faceplate and inserts for the coaxial cable and Category 6A cables.

7.10.23.5 Category 6A horizontal cable will be supplied and installed in accordance with Section 7.10.9.

7.10.23.6 All horizontal cables will be identified by a self-adhesive label. The cable label will 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 the PHSA Communications Infrastructure Standards and Specifications.

7.10.23.7 Faceplates and jacks will be labelled in accordance with the PHSA Communications Infrastructure Standards and Specifications 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).

7.10.24 Locating Services

7.10.24.1 Basic Requirements

7.10.24.1(1) System Overview

7.10.24.1(1)(a) Location Services will be delivered through a RTLS that will be used to automatically identify and track the locations of tagged objects and people within the Facility.

7.10.24.1(1)(b) This system will consist of field antennas, structured cabling, software, and controller infrastructure.

7.10.24.1(2) Applicable Area

7.10.24.1(2)(a) Applies to the Facility.

7.10.24.1(3) System Responsibilities

7.10.24.1(3)(a) Refer to Appendix 3K [Systems Responsibility Matrix] for Authority and Project Co scope summaries.

7.10.24.1(3)(b) Authority through the Review Procedure will:

7.10.24.1.3.(b).1 Select the system.

7.10.24.1.3.(b).2 Review and approve the system infrastructure proposed by Project Co.

7.10.24.1.3.(b).3 Design, supply, install, integrate, and commission all system hardware and software; and

7.10.24.1.3.(b).4 Provide design feedback to Project Co through the process described in Appendix 2C [User Consultation and Review Procedure].

7.10.24.1(3)(c) Project Co will:

7.10.24.1.3.(c).1 Design, supply, install and commission all system infrastructure as determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

7.10.24.2 Performance Criteria

7.10.24.2(1) The Authority may implement a locating Services system in select areas of the Facility. This system will consist of field antennas, cabling and controller infrastructure.

7.10.24.2(2) This system is independent and separate of all other tracking systems specified in Division 28.

7.10.24.2(3) The locating services infrastructure will be based on two primary applications:

7.10.24.2(3)(a) Individual Room Detection Perimeter

7.10.24.2.3.(a).1 Intent is to confirm tag presence within an individual room perimeter or a

functional area as defined within the Functional Space Requirements;

7.10.24.2.3.(a).2 Typical Room Infrastructure Allowance:

(a).2.1 For each room or functional area identified, install one Authority supplied antenna(s)/beacon(s) at each door and/or perimeter threshold to establish the defined detection perimeter; and

(a).2.2 Provide supporting electrical installation services for complete physical mounting of each antenna/beacon onto adjacent ceiling or wall in accordance with manufacturer installation recommendations.

7.10.24.2.3.(a).3 Project Co will draw and update all individual room detection perimeters onto a set of working floorplans for regular coordination with and final approval from the Authority through the Review Procedure.

7.10.24.2(3)(b) Grouped Room Detection Perimeter

7.10.24.2.3.(b).1 Intent is to confirm tag presence within a perimeter boundary containing multiple rooms and/or functional areas as defined within the Functional Space Requirements;

7.10.24.2.3.(b).2 A grouped room detection perimeter typically consists of single or double portal detection thresholds within circulation corridors and unit entrances;

7.10.24.2.3.(b).3 Typical Single Portal Infrastructure Allowance:

(b).3.1 For each grouped room detection perimeter, install one Authority supplied antenna(s)/ beacon(s) at each door and/or perimeter threshold to establish the defined detection perimeter; and

(b).3.2 Provide supporting electrical installation services for complete physical mounting of each antenna/beacon onto adjacent ceiling or wall in accordance with manufacturer installation recommendations.

7.10.24.2.3.(b).4 Typical Double portal zone threshold:

(b).4.1 For each grouped room detection perimeter, install two Authority supplied antenna(s)/ beacon(s) at each door and/or perimeter threshold to establish the defined detection perimeter; and

(b).4.2 Provide supporting electrical installation services for complete physical mounting of each antenna/beacon onto adjacent ceiling or wall in accordance with manufacturer installation recommendations.

7.10.24.2.3.(b).5 Project Co will draw and update all grouped room detection perimeters onto a set of working floorplans for regular coordination and final approval from the Authority through the Review Procedure.

7.10.24.3 Project Co will:

7.10.24.3(1) Assist the Authority with planning, design and installation of all antenna(s)/beacon(s) and physical infrastructure required to implement the locating services solution within the Facility; and

7.10.24.3(2) Coordinate, as determined in consultation with the Authority through the Review Procedure, the placement of antennas/beacons with lighting, sprinklers, smoke detectors, and any other objects that are in or on the ceiling, such as other wireless systems, CCTV, mechanical air diffusers and grilles. Project Co will specifically identify antennas/beacons associated with locating services infrastructure on reflected ceiling plans and ensure they can be uniquely distinguished from other wireless systems that will be present in the Facility.

7.10.24.3(3) Install all equipment associated with the locating services system that is supplied by the Authority;

7.10.24.3(4) Undertake the Design and Construction of:

7.10.24.3(4)(a) The Communications Pathway System for the Structured Cabling and other types of Extra-low Voltage communications systems wiring associated with locating services system; and

7.10.24.3(4)(b) The Structured Cabling and other types of Extra-low Voltage communications systems wiring required by the locating services system.

7.10.24.3(5) Provide:

7.10.24.3(5)(a) Power where required by the locating services system;

7.10.24.3(5)(b) Wall and ceiling reinforcement required to support locating services equipment; and

7.10.24.3(5)(c) Mounting adapters/boxes in accordance with manufacturer installation recommendations.

7.10.24.3(6) Assist the Authority with tuning of the locating services system and relocate antenna/beacons and associated infrastructure as needed to ensure RF performance criteria is achieved.

7.10.24.4 Locating Services infrastructure will be installed in the following locations within the Facility:

7.10.24.4(1) All department/unit perimeter doors including stairwells;

7.10.24.4(2) All elevator landings/vestibules;

7.10.24.4(3) Individual room detection perimeter;

7.10.24.4(3)(a) All rooms within Emergency;

7.10.24.4(3)(b) All rooms within Perioperative Services;

7.10.24.4(3)(c) All Mental Health Rooms and Areas;

7.10.24.4(3)(d) All Medical Inpatient Rooms;

7.10.24.4(3)(e) All clean supply and storage rooms;

7.10.24.4(3)(f) All Operating Rooms; and

7.10.24.4(3)(g) All medication rooms.

7.10.24.4(4) Grouped room detection perimeter

7.10.24.4(4)(a) Each department/unit within Appendix 3A [Clinical Specifications and Functional Space Requirements].

7.10.24.5 Other areas as determined in consultation with the Authority through the Review Procedure.

7.10.25 Integration Engine

7.10.25.1 Basic Requirements

7.10.25.1(1) System Overview

7.10.25.1(1)(a) The integration engine supports automatic workflow by managing the exchange of information between operational systems throughout the Existing Hospital and Facility.

7.10.25.1(1)(b) The intergartion engine supports the ability to create rules and conditional logic which will allow workflow to adapt to changing operating conditions.

7.10.25.1(1)(c) The intergatopn engine currently in use by the Authority is Connexall version 7 and is anticipated to move to version 8 before project completion. Connexall is configured as a regional system, and there is a central instance that supports sites across the Authority, including the Burnaby Hospital. This central instance runs in an Authority data centre.

7.10.25.1(1)(d) Systems that currently interoperate with the integration engine include:

7.10.25.1.1.(d).1 Nurse call; and

7.10.25.1.1.(d).2 Fire Alarm.

7.10.25.1(1)(e) Within the Existing Hospital, Connexall is only used to monitor/dispatch code blue and code red (Siemen’s Fire Panel) by the switchboard operators. The current process at BH leverages the switchboard to run the downstream processes manually. It follows the below workflow: Code is triggered - Seen on Connexall by switchboard - Switchboard makes overhead announcement - Pages/calls the nurses or notifies fire/security depending on the code.

7.10.25.1(2) System Responsibilities

7.10.25.1(2)(a) Refer to Appendix 3K [Systems Responsibility Matrix] for Authority and Project Co scope summaries.

7.10.25.1(2)(b) The Authority preference is system to system integration wherever possible and Project Co is not required to use the Authority's integration engine.

7.10.25.1(2)(c) Project Co may elect to use the Authority's existing integration engine, in which case Authority will:

7.10.25.1.2.(c).1 Provide the integration engine software leveraging the existing instance;

7.10.25.1.2.(c).2 Provide for the data centre infrastructural prerequisites needed to support the integration engine, including servers, data storage, and network connectivity;

7.10.25.1.2.(c).3 Update the integration engine configuration with data specific to the Facility including, as examples, room numbers, location identifiers and call routing details. These configuration updates will be made in coordination with Project Co through the process described in Appendix 2C [User Consultation and Review Procedure];

7.10.25.1.2.(c).4 Program the integration engine so that it is expanded to cover the Existing Hospital and the Facility;

7.10.25.1(2)(d) If it wishes to use the Authority's integration engine, Project Co will:

7.10.25.1.2.(d).1 Provide all incremental software licensing to expand the integration engine to include the Existing Hospital and the Facility.

7.10.25.1.2.(d).2 Acquire, configure, deploy and commission all components needed to enable the exchange of data between the integration engine and specific Project Co supplied systems. This includes, all prerequisite hardware, software, and other equipment needed to achieve integration.

7.10.25.1.2.(d).3 Ensure that systems that currently interoperate with the Authority's integration engine are not disrupted.

7.10.25.1.2.(d).4 Assist in the process of updating the configuration of the Authority's integration engine related data (room numbers, location identifiers, etc.) through the process described in Appendix 2C [User Consultation and Review Procedure].

7.10.25.1(2)(e) Whether or not Project Co elects to use the Authority's existing integration engine:

7.10.25.1.2.(e).1 The Authority will provide integration engine design feedback to Project Co through the process described in Appendix 2C [User Consultation and Review Procedure].

7.10.25.1.2.(e).2 Project Co is responsible for ensuring that the integration engine meets the performance criteria below.

7.10.25.2 Performance Criteria

7.10.25.2(1) General

7.10.25.2(1)(a) Provide an integration engine to integrate with both existing and new systems at the Existing Hospital and the Facility.

7.10.25.2(1)(b) Integration engine will include software middleware, direct connect, manufacturer supported applications programming interfaces (API), and is not just limited to a single middleware application but a suite software integration.

7.10.25.2(1)(c) The integration engine will be capable of bidirectional communication, such that it will be able to receive events from one system and send notifications to other systems.

7.10.25.2(1)(d) The integration engine will be capable of displaying alerts at their origins on a graphical map of the Existing Hospital and the Facility, accessible via Authority workstations.

7.10.25.2(1)(e) The integration engine will be capable of triggering nurse call events and notifications via inputs from other systems.

7.10.25.2(1)(f) The integration engine will be a commercial software product that is proven for health care integration applications in large acute care environments.

7.10.25.2(1)(g) The integration engine will reside on the Authority provided servers.

7.10.25.2(1)(h) Project Co should consult with the Authority's through the process described in Appendix 2C [User Consultation and the Review Procedure] and program the integration engine to meet the workflow call routing requirements for Interface to Project Co provided systems.

7.11 Electronic Safety and Security (Division 28)

## PART 8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS

8.1 Earthworks

8.1.1 Site Grading/Excavation

8.1.1.1 Basic Requirements

8.1.1.1(1) Site grading to provide positive grading away from all building, structures and public paths throughout the Project site. No surface ponding is permitted on-site.

8.1.1.1(2) Site grading to avoid excessive slopes that may cause erosion, cause pedestrian instability and will not hold growing medium and plants.

8.1.1.1(3) All slopes and site grading will conform to accessibility requirements. Ensure accessibility to Persons with Disabilities at grade changes through sloped walkways and ramps and avoid the use of stairs.

8.1.1.2 Performance Criteria

8.1.1.2(1) Design of on-site grading, roadway, and walkway to be in accordance with the latest edition of the MMCD, the City of Burnaby's Engineering Design Manual and Standard Design Drawing and building codes.

8.1.1.2(2) A maximum slope of 4H:1V is permissible for lawn and landscape areas. Rip Rap is prohibited on slopes.

8.1.1.2(3) Slopes steeper than 4H:1V are to be retained using approved retaining wall systems.

8.1.1.3 Site Preparation

8.1.1.3(1) Clearing and Grubbing to conform to Burnaby Tree Bylaws, CLS and Section 8.2.8 [Integrated Pest Management].

8.1.1.3(2) Shrub and Tree Preservation

8.1.1.3(2)(a) Project Co to retain an arborist to assess and report on health of all trees and define root protection zones to meet City of Burnaby tree protection bylaw and standards.

8.1.1.3(2)(b) Project Co to consider the survey and evaluation of any specimen shrubs and or plants of interest for retention.

8.1.1.3(2)(c) Tree and Shrub preservation and pruning to conform to CLS.

## 8.2 Landscape

### 8.2.1 Basic Requirements

8.2.1.1 Project Co will include a registered landscape architect with recent experience with the scope and scale of the Project.

8.2.1.2 Project Co will prepare a design that incorporates site context, urban design, architectural expression, budget, and on-going maintenance requirements.

8.2.1.3 Project Co will familiarize themselves with current existing site including all existing landscape features, plantings and maintenance levels.

8.2.1.4 All existing areas of invasive species within the work zone will be assessed by a qualified professional to develop a removal and remediation plan to be implemented by Project Co.

8.2.1.5 Project Co will coordinate and review all arborist reports and coordinate with the Project team to ensure critical root zones requirements for protection are met.

8.2.1.6 Project Co to photo document all existing conditions to remain within and directly adjacent to work area, trade access points and construction vehicle traffic prior to the commencement of any work.

8.2.1.7 Project Co will document any damage to property or the surrounding environment without delay and will be promptly and completely repaired.

8.2.1.8 The specification of locally available, locally sourced and recyclable materials is preferred.

8.2.1.9 Project Co will consider life cycle costs including ongoing maintenance requirements when selecting materials for the BH Project.

### 8.2.2 Performance Criteria – All Areas

8.2.2.1 All landscape scope components to conform to the current version of the CLS, MMCD, Burnaby municipal standards and details.

8.2.2.2 Landscape site reviews and written reports to be provided by registered landscape architect with a minimum 5 years site experience and with projects with a similar scope and scale of work.

8.2.2.3 All landscape elements to conform to Design Life parameters as set out in section 3.7.2.

8.2.2.4 Landscape design to conform to Project LEED requirements as outlined in Section 3.6 [Sustainability].

8.2.2.5 Project Co landscape architect to ensure that all sample, testing and certification requirements are met for the landscape scope of work.

8.2.2.6 Project Co landscape architect to ensure the maintenance protocols for the establishment of planting material is included in the Project specifications.

8.2.2.7 Administration of Guarantees and Warranties.

8.2.2.8 Total performance for hard landscape elements will be given 55 days after Substantial Completion and warrantied for two (2) years.

8.2.3 Landscape Elements - All Areas

8.2.3.1 Hardscape Elements

8.2.3.1(1) Basic Requirements

8.2.3.1(1)(a) To be designed to be durable slip resistant and meet all accessibility requirements and building codes;

8.2.3.1(1)(b) Project Co will ensure that all landscape elements will be designed to deter and be resilient to skateboard damage;

8.2.3.1.1.(b).1 Deterrence methods to be durable, resilient against vandalism and integrated into the overall form and design of the element.

8.2.3.1(1)(c) All paving to be designed to accommodate the maximum anticipated pedestrian and vehicular loading;

8.2.3.1(1)(d) Utility connections must be planned to minimize potential disturbances to main public pathways. Locate conduits away from main pedestrian access points where possible;

8.2.3.1(1)(e) All manholes, catch basins, junction boxes and service connections to be installed flush with adjacent surfaces;

8.2.3.1.1.(e).1 Adapt paving including custom cutting of unit paving to ensure a tight fit between Utilities and paved surfaces.

8.2.3.1(1)(f) Prevent damage to landscaping, structures, curbs, sidewalks, trees, roads and adjacent property. Make good any damage;

8.2.3.1(1)(g) Project Co to take into account pattern layout and effect to provide a textured and interested pattern when viewed from interior spaces and rooms from above.

8.2.3.1(1)(h) Project Co to provide exterior hosebibs within 10m of all ground level Facility entrances and exits for maintenance and cleaning purposes.

8.2.3.1.1.(h).1 Hosebibs to be tamper proof and located in lockable flush mounted stainless steel boxes;

8.2.3.1.1.(h).2 Hosebib connections to be 5/8”.

8.2.3.1(2) Granular base course materials to conform to MMCD specifications.

8.2.3.1(3) Cast in Place Concrete Paving to conform to MMCD specifications.

8.2.3.1(4) Unit Paving. Project Co will ensure that:

8.2.3.1(4)(a) All pavers to be sloped to drain;

8.2.3.1.4.(a).1 The minimum slope for all surfaces will be 2%.

8.2.3.1(4)(b) A durable concrete surround will be incorporated around all Utility boxes and surface connections in unit paver areas to minimize settling and unsightly paver cuts;

8.2.3.1(4)(c) All paver cuts on the ground level to be no smaller than one third of a paver. No small or acutely angled cuts are acceptable;

8.2.3.1(4)(d) Pavers must be fully supported at the edges with a concrete band or permanently secured steel edging material;

8.2.3.1(4)(e) Apply polymeric jointing sand in joints to reduce weed growth in all unit paver locations;

8.2.3.1(4)(f) Stockpile additional pavers for easy replacement. Percentage of stockpile to be confirmed by the Authority through the Review Procedure.

8.2.3.1(5) Project Co landscape architect to fully coordinate all retaining walls with the Authority through the Review Procedure;

8.2.3.1(5)(a) Ensure all retaining walls conform to building code.

8.2.3.2 Landscape Structures including Fences, Trellis, Arbours and Shade Structures will conform to the appropriate architectural and structural sections of the DCS:

8.2.3.2(1) Structures to be reviewed for safety and security and harm reduction.

8.2.3.3 Project Co will ensure all landscape furnishings:

8.2.3.3(1) Relate to the scale and aesthetic of the building form and site character;

8.2.3.3(2) Located to support outdoor activities and functions as prescribed by the Authority;

8.2.3.3(3) Have a robust, contemporary, and timeless aesthetic;

8.2.3.3(4) Seating will be desirably located, provide views to activity, be contemplative, and natural spaces;

8.2.3.3(5) Selected with exterior grade finishes;

8.2.3.3(6) Resistant to vandalism and skateboards;

8.2.3.3(7) Selected to provide a consistent and coherent language throughout the furnishing package;

8.2.3.3(8) Will be permanently secured to the ground with an imbed post into concrete of secured with tamper proof bolts to a secure surface including:

8.2.3.3(8)(a) Concrete Pad;

8.2.3.3(8)(b) Concrete Footing.

8.2.3.3(9) All furnishing to meet Design Life and maintenance criteria;

8.2.3.3(10) Bollards specified in landscape and exterior spaces will:

8.2.3.3(10)(a) Meet minimum vehicle stopping requirements as outlined in DCS;

8.2.3.3(10)(b) Be Vandal Resistant;

8.2.3.3(10)(c) Have no sharp edges;

8.2.3.3(10)(d) Conform to lighting standards as outlined in Section 4.8 [Site Lighting].

8.2.3.3(11) Use of wood in exterior spaces will conform to section 3.13 [Use of Wood];

8.2.3.3(12) Custom furnishing will only be considered provided it is repairable, serves a unique function, located in a highly used and high traffic area, and meets Design Life and maintenance requirements;

8.2.3.3(13) Recyclable material use is encouraged. Project Co to consider product source and end of lifespan recyclability when specifying furnishing;

8.2.3.3(14) All furnishings to be vetted by Project Co and the Authority for potential safety issues and harm reduction.

8.2.3.4 Landscape Lighting

8.2.3.4(1) Employ a comprehensive lighting strategy for open spaces that will complement the overall design vision and aesthetic.

8.2.3.4(2) Lighting to highlight pedestrian circulation routes, nodes, landscape elements / art work.

8.2.3.4(3) Lighting to be prioritized at vehicle and pedestrian crossing areas.

8.2.3.4(4) Refer to section 4.8 for landscape lighting requirements.

8.2.3.4(5) Lighting fixtures to be selected to be:

8.2.3.4(5)(a) Durable in exterior environments;

8.2.3.4(5)(b) Reduce up-lighting for dark sky compliance;

8.2.3.4(5)(c) Shielded, provide cut off to reduce light spill;

8.2.3.4(5)(d) Provide visual comfort;

8.2.3.4(5)(e) Be dimmable to allow for adjustment in lighting levels;

8.2.3.4(5)(f) Be programmable and connected to an auto timer for custom control of the landscape lighting system.

8.2.3.4(6) Lighting to match the design aesthetic and finish of the site furnishing package.

8.2.3.5 Wayfinding

8.2.3.5(1) To be in accordance with DCS and constructed of materials suitable for use in exterior environments.

8.2.3.5(2) Signage integrated in the landscape to be easily read and does not compete with structures, elements, art.

8.2.4 Plant Material - All Areas

8.2.4.1 Basic Requirements

8.2.4.1(1) Project Co will provide all drawings, details and specifications for the outline of planting of trees shrubs and ground covers.

8.2.4.1(2) Project Co will compete design, detail and specification in accordance to current Canadian Landscape Standard (CLS) and Guide Specification for Nursery Stock of the Canadian Nursery Trades Association and ISA / ANSI, ANSI-A300, Standards for Tree Care Operations except where specified otherwise.

8.2.4.1(3) Project Co will design to meet the limits and frequencies of the BH maintenance practices and design accordingly for efficiency, accessibility, weed and pest control, drought tolerance.

8.2.4.1(4) Plant selection and massing to be designed to allow easy and free maintenance access.

8.2.4.1(5) Marginally hardy or planting that will require intensive maintenance and care will not be used on the Project.

8.2.4.1(6) Project Co to ensure that planting on slops is fully accessible by maintenance crews and equipment.

8.2.4.1(7) Project Co to provide all hose bibs, electrical connections for maintenance operations.

8.2.4.1(8) Project Co will develop a representative non-toxic plant list to be reviewed and approved by the Authority through the Review Procedure;

8.2.4.1(8)(a) All invasive planting types will be avoided;

8.2.4.1(8)(b) Vigorous spreading plants such as bamboo will not be used within the Project.

8.2.4.1(9) Source of all plant material to be grown in local hardiness zone in accordance with Agriculture Canada Plant Hardiness Zone Map;

8.2.4.1(9)(a) Planting to meet zone 6 hardiness as a minimum to ensure cold weather resiliency.

8.2.4.1(10) Planting to be designed to be clear of all overhangs, sheltered and covered space that may limit exposure to rain water during winter months to minimize risks of winter desiccation.

8.2.4.2 Performance Criteria

8.2.4.2(1) All planting to be supplied by a certified nursery. Nursery stock to be free of weeds, pest and disease.

8.2.4.2(2) Delivery, Storage and Protection of all plant material to meet CLS as a minimum standard.

8.2.4.2(3) Plant material installed less than 45 days prior to frost will be accepted in following spring, 30 days after start of growing season provided that acceptance conditions are fulfilled.

8.2.4.2(4) Project Co will guarantee all plant material as itemized on plant list, will remain free of defects in accordance with CLS standards for a period of two (2) years from the date of Substantial Completion.

8.2.4.2(5) Total performance will be given fifty-five (55) days after Substantial Completion provided that all deficiencies have been corrected to the satisfaction of the reviewing Authority.

8.2.4.2(6) Plant material will be accepted by the Project Co Landscape Architect at Total Performance provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms.

8.2.4.2(7) End-of-warranty inspection will be conducted by the Authority.

8.2.4.2(8) Project Co to warranty all planting material for a minimum of two (2) years.

8.2.4.2(9) If, at end of the Warranty Period, leaf development and growth is not sufficient to ensure future survival, these landscaping elements will be deemed to be a Defect and the Warranty Period will be extended for one additional year after such Defect is corrected.

8.2.4.2(10) Project Co will be responsible to oversee the design, specification and installation of trees with the following requirements;

8.2.4.2(10)(a) Basic Requirements

8.2.4.2.10.(a).1 Low maintenance trees to be selected;

8.2.4.2.10.(a).2 Suited to local conditions;

8.2.4.2.10.(a).3 Not weak wooded, prone to branch failure;

8.2.4.2.10.(a).4 Does not require a large input of maintenance to clean up fruits, seeds, excessive pollen;

8.2.4.2.10.(a).5 Pest and Aphid free;

8.2.4.2.10.(a).6 Free from aggressive root systems;

8.2.4.2.10.(a).7 Installed trees to be free of pernicious weeds in the rootball or pot;

8.2.4.2.10.(a).8 Installed trees to be free from root girdling;

8.2.4.2.10.(a).9 Trees to be selected to meet the characteristics of the typical form and habit including: straight trunks, well and characteristically branched for

species except where specified otherwise;

8.2.4.2.10.(a).10 To be supplied in a container, balled and burlap or wire basket only;

8.2.4.2.10.(a).11 Ensure the specification and installation of root barrier within 1m of hardscapes, pathways, trails. Root barrier to be a 450mm Depth and 3m length centred on trees;

8.2.4.2.10.(a).12 Where rootball space is confined within a paved surface, use current soil cell technology to achieve grow media volume. The use of structural soil is not permitted. Protect and prohibit soil erosion during excavation;

8.2.4.2.10.(a).13 Tree supports to meet CLS standards;

8.2.4.2.10.(a).14 Composted mulch: 50mm depth of organic mulch. Size, soil composition of amender by approved supplier to meet CLS.

8.2.4.3 Shrubs specification to meet CLS standards.

8.2.4.4 Sodded Lawns, Grass and Hydroseed

8.2.4.4(1) Basic Requirements

8.2.4.4(1)(a) To meet CLNA standards as a minimum;

8.2.4.4(1)(b) Maximum slope for mowed surfaces to be 4:1;

8.2.4.4(1)(c) All sod to be non-netted, chafer beetle resistant and comprised of a drought tolerant blend;

8.2.4.4(1)(d) Project Co landscape architect to review and approve source prior to order;

8.2.4.4(1)(e) Ensure lawns are graded to ensure positive drainage away from Facility and directed to drainage bodies;

8.2.4.4.1.(e).1 Drainage can include:

(e).1.1 Open or closed bodied lawn basins to MMCD standards;

(e).1.2 Rock pits and swales;

(e).1.3 All drainage will have an overflow or direct connection to storm as a minimum back up;

(e).1.4 Design to be coordinated with all Project Co to ensure no conflicts with Utilities or structures.

8.2.4.5 Growing Medium

8.2.4.5(1) Basic Requirements

8.2.4.5(1)(a) Growing medium will meet Canadian Landscape Standard, latest edition, unless otherwise specified;

8.2.4.5(1)(b) Project Landscape Architect to ensure that all growing medium has been tested by a qualified soil testing laboratory;

8.2.4.5(1)(c) Soils test to be commissioned specifically for the Project directly from soils intended for the Project site;

8.2.4.5(1)(d) The recommendations of the laboratory will be the basis of requirements for soil acceptance and soil amendments;

8.2.4.5(1)(e) Project Co will be responsible for arrangement and payment for soil analysis and amendments to growing medium as determined;

8.2.4.5(1)(f) Project Co Landscape Architect to approve soil supply prior to order and delivery to site;

8.2.4.5(1)(g) Failure to have the growing medium tested as indicated above will result in the removal of substandard soils at Project Co Landscape Contractor’s expense;

8.2.4.5(1)(h) Growing medium composition to be specified by Project landscape architect in accordance with CLS standards and proposed level of maintenance requirements;

8.2.4.5(1)(i) Soil amendments may include Peat moss, Sand, Limestone, Fertilizers and Composted manure in accordance with CLS guidelines, and Local Burnaby regulations;

8.2.4.5(1)(j) Soil Depth to be a minimum as follows unless otherwise stated in the contract documents;

8.2.4.5.1.(j).1 Sod Areas 150mm Depth;

(j).1.1 Sod Area depth to be increased for storm water retention purposes; Refer

to civil Storm Water Management Plan.

8.2.4.5.1.(j).2 Ground Cover Areas 300mm Depth;

8.2.4.5.1.(j).3 Shrub Areas 450mm Depth;

8.2.4.5.1.(j).4 Trees min 900mm depth, to meet CLS standards;

8.2.4.5.1.(j).5 Refer to Civil Storm water retention plans to ensure adequate soil volumes have been coordinated.

8.2.4.5(1)(k) All tree location to have the following minimum soil volumes;

8.2.4.5.1.(k).1 All proposed trees located in off-slab areas to have a minimum 15m3 of growing medium per tree;

8.2.4.5.1.(k).2 All proposed trees located on-slab or over roof deck areas to have a minimum soil volume of 5m3;

8.2.4.5.1.(k).3 Project Co will be responsible for the selection of tree species that are adequate for the soil volumes provided.

8.2.4.5(1)(l) Acceptance

8.2.4.5.1.(l).1 Project Co to compact soil to ensure that settling of planting bed, lawn do not settle adjacent to paved surface, behind retaining walls and drainage features;

8.2.4.5.1.(l).2 Project Landscape Architect will inspect the growing medium in place and determine acceptance of material, depth and finish grading.

## 8.2.5 Entrances

### 8.2.5.1 Basic Requirements

8.2.5.1(1) Provide a high quality contemporary design that maximizes the usability of all open space outside of the Facility footprint.

8.2.5.1(2) Covered spaces to be thoughtfully considered for pedestrian comfort and aesthetics.

8.2.5.1(3) Landscape lighting to be employed to provide safety and security as well as aesthetics in exterior spaces in covered locations.

8.2.5.1(4) The main pedestrian access to Phase 1A will be a minimum of 3m wide and be integrated into the design aesthetic of the entrance and drop off design and aesthetic.

8.2.5.1(5) Project Co to employ via trees, boulevard, treatments planting, pedestrian scale structures to ensure an adequate transition from the Facility massing down to the human scale for pedestrian comfort.

8.2.5.1(6) Coordinate all landscape structures with architectural columns and canopies at entry pints to ensure ease of pedestrian circulation;

8.2.5.1(6)(a) Ensure minimum pathway widths are met between structures, curbs, wall and columns.

8.2.5.1(7) Ensure that all transitions between paving types are fully accessible.

8.2.5.1(8) Provide clear circulation routes for pedestrian and bicycle traffic. An alternative design approach can be determined with the Authority through the process described in Appendix 2C [User Consultation and Review Procedure].

8.2.5.1(9) Provide raised pedestrian crossings at all intersections crossing vehicle travel lanes to ensure pedestrian crossing priority;

8.2.5.1(9)(a) Raised pedestrian crossing to be coordinated with the Authority to ensure that vehicle access requirements and traffic calming measures are met.

8.2.5.1(10) Provide a minimum of 6 class ‘B’ bike parking spaces at all public entrance locations including Phase 1A main entrance, Phase 1A Entrances, Phase 1B entrances.

8.2.5.1(11) Provide a variety of seating types the Main Entrance and Drop Off and Pick Up Areas;

8.2.5.1(11)(a) A covered seating area with a minimum 3m length;

8.2.5.1(11)(b) Uncovered seating area with a minimum 3m length;

8.2.5.1.11.(b).1 Provide an additional 3m of covered seating at entry area located under the parkade;

8.2.5.1.11.(b).2 All seating areas to include a paved area adjacent to seating for in-wheelchair users;

8.2.5.1.11.(b).3 Provide adequate areas for waiting for standing pedestrians.

8.2.6 Irrigation – All Areas

8.2.6.1 Provide an irrigation system for all plant areas required as identified on the landscape plans to support the establishment and continued plant health.

8.2.6.1(1) Layout of irrigation system must not adversely affect the Facility or cause debris to be sprayed onto building or building components.

8.2.6.2 Design of irrigation to be completed by a certified IIABC designer. All drawings to be stamped for review by reviewing Authority.

8.2.6.3 All installation to conform to harm reduction guidelines set out in BHS.

8.2.6.4 Irrigation must support plant life to meet maintenance goals developed during the design and planning phases.

8.2.6.5 All irrigation systems must be designed to achieve minimum water reduction requirements outlined in LEED and Environmental / Sustainability section 3.6.5.4 [Outdoor Water Use Reduction].

8.2.6.6 Design will take in account local water restrictions.

8.2.6.7 System to have a programmable controller to operate all zones of the irrigations system;

8.2.6.7(1) Complete with internet connection and remote monitoring capacity.

8.2.6.8 System to employ a rain sensor.

8.2.6.9 Drip Irrigation to include a sealed off pop up head at the end of all drip zones to ensure visual inspection of drip zone function.

8.2.6.10 Drip irrigation to be commercial grade to IIABC standards.

8.2.6.11 Show all sleeving locations in plans and coordinate with the Authority to ensure no conflicts with Utilities.

8.2.6.12 Quality Assurance:

8.2.6.12(1) All irrigation design work will be completed by an experienced and competent irrigation consultant that is certified by the IIABC with direct knowledge of the design of large irrigation systems for campus and health facilities.

8.2.6.13 Submittals

8.2.6.13(1) Project Co Landscape architect to review and approve all Shop Drawings for prior to the commencement of any work on site.

8.2.6.13(2) Project Co to provide photos of sleeving under all hardscape work prior to paving for inclusion in the Project record.

8.2.6.13(3) Submit to the Authority an as-built drawing (digital and hard copy) showing the location of all components, including all zoning information at time of final acceptance.

8.2.6.13(4) Documentation and confirmation of back flow test completed by Project Co Mechanical Engineer.

8.2.6.14 Warranty

8.2.6.14(1) Guarantee the sprinkler system, or any part thereof against defective material and/or workmanship for two (2) years from the Date of Total Performance. Correct same without expense to the Authority.

8.2.6.14(2) Repair any settling of backfilled trenches occurring during the guarantee after Substantial Completion without expense to the Authority. Include complete restoration of all damaged planting, paving or other improvements of any kind.

8.2.6.15 Inspection

8.2.6.15(1) To meet CLS and IIABC standards.

8.2.6.15(2) Backflow prevention to reviewed, coordinated and test by Project Co Mechanical Engineer.

8.2.6.16 Acceptance

8.2.6.16(1) Total performance will be given fifty-five (55) days after Substantial Completion provided that all deficiencies have been corrected to the satisfaction of the Authority. The system must be installed as specified, adjustments have been made and all submittals have been made to the satisfaction of the Authority.

8.2.6.17 Delivery and Storage to meet IIABC standards.

8.2.6.18 Protection and Damage to meet IIABC standards.

8.2.6.19 Products

8.2.6.19(1) Sprinkler heads to meet IIABC guidelines and be sourced from one approved supplier to be identified by the Authority;

8.2.6.19(1)(a) All irrigation heads will be as indicated by the specified manufacturer with distribution pattern as shown on the drawings;

8.2.6.19(1)(b) Coverage to be head to head;

8.2.6.19(1)(c) Spray heads for lawn areas to be rotors;

8.2.6.19(1)(d) Spray heads for planter areas to be on 12-inch pop ups on risers.

8.2.6.19(2) Automatic Control Valves to IIABC standards.

8.2.6.19(3) Low-Voltage Wiring to IIABC standards.

8.2.6.19(4) Valve boxes to be sized and type indicated on drawings.

8.2.6.19(5) Wire connectors to meet CSA standards.

8.2.6.19(6) Sleeving

8.2.6.19(6)(a) Pedestrian areas to be Schedule 40 PVC pipe. Sleeving to be twice the size of lateral lines and three times the size of main lines;

8.2.6.19(6)(b) Vehicular Areas to be confirmed by Civil Engineer.

8.2.6.19(7) Quick coupler valves complete with key as indicated on the drawings. To be located to adequate to allow for the drainage and blow out of the entire system to IIABC standards.

8.2.6.19(8) Automatic Controller to be programmable and meet LEED requirements.

8.2.6.19(9) Irrigation Chamber to conform to IIABC standards and be located in soft landscape.

8.2.6.19(10) Provide Reduced Pressure Backflow Preventer (RPBP) device(s) or other back flow preventer as per City of Burnaby requirements for hose bibs and irrigation system. Co-locate back flow devices in service room with irrigation control system and shut off valves. Provide a floor drain in the service room, slope floor to the floor drain. Provide a utility sink in the service room.

8.2.6.19(11) Backflow Preventer to IIABC standards .

8.2.6.19(12) Water Supply, to be potable.

8.2.6.20 Pipe Layout to IIABC standards.

8.2.6.21 Excavation and Backfill to IIABC standards.

8.2.6.22 Installation to meet IIABC standards.

8.2.6.23 Inspection to IIABC standards;

8.2.6.23(1) Adjust irrigation heads for optimum coverage and rate of flow. Set automatic controller to operate system at times instructed by Project Co Landscape Architect and Authority;

8.2.6.23(2) Ensure that system does not overspray onto building or structures including the spray of debris, growing medium on building surfaces;

8.2.6.23(3) Water Balance and Programming to be reviewed by Project Co Landscape Architect.

8.2.6.24 Cleanup

8.2.6.24(1) Any damage to paving, planting or any other structure due to settlement of improperly compacted trenches will be promptly repaired at Project Co's expense to the satisfaction of the Authority.

8.2.6.24(2) No activities of backfilling or hard/soft landscaping will cover up any Utility openings.

8.2.6.24(3) Surplus material will become property of the Project Co and removed from the Site.

8.2.7 Landscape Maintenance

8.2.7.1 All work must conform to CLS guidelines as a minimum standard and completed by a skilled and qualified operations Staff. Minimum Staff experience requirements must be identified at the time of maintenance plan development.

8.2.7.2 Appearance Standards will be set out during the Design stage to allow Project Co to accurately design for the intended maintenance outcome;

8.2.7.2(1) Project Co to use CLS maintenance levels as a reference guideline.

8.2.7.3 Maintenance Levels will be designed in concert with maintenance Staff and reflect that goals and budget to accurately apply the level of landscape maintenance desired.

8.2.7.4 Scheduling of maintenance work to reflect effort required for the upkeep of the minimum maintenance requirements developed with the Authority.

8.2.7.5 Project Co to develop a guideline for record keeping of maintenance tasks to meet CLS.

8.2.7.6 Project Co to provide an operations handbook should include as-built plans, operations manuals, plants, products used as well as all associated warranties.

8.2.8 Integrated Pest Management

8.2.8.1 Landscape plantings and hardscapes will be designed to minimize the need for toxic pesticides and herbicides. Design strategies must include:

8.2.8.1(1) Selecting pest and disease resistant trees and plant material;

8.2.8.1(2) Selecting hardy, vigorous, drought tolerant plants that can resist being overwhelmed by weed growth;

8.2.8.1(3) Emphasizing mass plantings of sub-shrubs and evergreen groundcovers to shade the soil surface and inhibit weed development.

8.2.8.2 Project Co will specify soils growing media, container and field-grown plant material that are guaranteed free of pernicious weeds and seeds as per Canadian Landscape Standard, and Canadian Nursery Stock Standard.

8.2.8.3 Project Co will specify organic mulches that are guaranteed free of weeds and seeds.

8.2.8.4 Project Co will provide adequate water through irrigation to ensure optimum plant growth and health.

8.2.8.5 Project Co will specify polymeric jointing sand or equivalent jointing materials in paving joints to inhibit organic residues and weed growth in paving joints.

8.2.9 Sustainability

8.2.9.1 Use mature and native vegetation, landscape structures where possible to reduce the heat island effect, ambient temperatures. Protect pedestrian seating areas for the sun, wind and precipitation.

8.2.9.2 Employ low impact and green infrastructure design methods including:

8.2.9.2(1) High albedo paving treatments;

8.2.9.2(2) selection of drought tolerant species;

8.2.9.2(3) slowing down and capturing run off from hardscape surfaces.

8.2.9.3 Fully coordinate with Project LEED requirements.