

SCHEDULE 1

STATEMENT OF REQUIREMENTS

VALLEYVIEW PROJECT

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SCHEDULE 1

STATEMENT OF REQUIREMENTS

1. INTERPRETATION

1.1 Definitions

In this Schedule, in addition to the definitions set out in Section 1 of the Agreement:

“BC Building Code” means the British Columbia Building Code;

“Borrowed Natural Light” means light that is transmitted to an interior space through an interior window and that comes from an adjacent space having an exterior window;

“Care Team Station” means a staff-only workspace located within a Neighbourhood, as described in more detail in the Functional Program;

“Client” means recipients of the integrated mental health care delivered at the Facility;

“Client residential area” means the residential zone described in Section 2.3.12.1;

“Complex Care Unit” means the Maples program described in Section 3.12 of the Functional Program;

“CPTED” or **“Crime Prevention Through Environmental Design”** means a multi-disciplinary approach to deterring undesirable and criminal activity and behavior through environmental design;

“Crossroads” means the Maples program described in Section 3.11 of the Functional Program;

“DALA” means the Maples program described in Section 3.10 of the Functional Program;

“Direct Natural Light” means light that:

- (a) is transmitted through an exterior window measuring not less than 1.7 square meters; and
- (b) reaches the center of the relevant space from a light radius of no more than 10 meters, if the space is over 45 square meters in size, or 8 meters for all other spaces, as measured from the entire length of the window;

“FM Network” has the meaning set out in Section 7.8.1.2(1);

“Functional Program” has the meaning set out in Section 2.2.2 of this Schedule;

“General Building Services” means the Facility component described in Section 3.13 of the Functional Program;

“Indicative Design” has the meaning set out in in Section 2.2.1 of this Schedule;

“IT Systems” refers to the data communication systems equipment provided by either the Owner or the Design-Builder including: systems described in Section 7.8 of this Schedule; data networks and equipment; wireless infrastructure; wireless staff communication system; telephony; video conferencing; user information systems; Wireless communications system; and all related equipment, printers, fax machines, servers, cabling and other related hardware, software and applications;

“LEAN” means a structured way of continuously exposing and solving problems to eliminate waste in systems that deliver value to customers and as defined by the Lean Enterprise Institute;

“Maples” has the meaning set out in Section 1.2.2.1 of this Schedule;

“Neighbourhood” means an accommodation and living area, as described in Section 2.3.12 of this Schedule;

“Net Area” or **“Net Square Meters”** 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;

“PAC” has the meaning set out in Section 1.2.2.2 of this Schedule;

“Program Requirements” has the meaning set out in in Appendix 1B – Functional Program and Clinical Specification;

“Project Design Philosophy” has the meaning set out in Section 3.4 of this Schedule;

“Project Guiding Principles” has the meaning set out in Section 3.2 of this Schedule;

“Project Objectives” has the meaning set out in Section 3.3 of this Schedule;

“Project Vision” has the meaning set out in Section 3.1 of this Schedule;

“Rain-Screen Principles” has the meaning set out in Section 5.6.2.11 of this Schedule;

“Response” means the Maples program described in Section 3.9 of the Functional Program;

“Room Data Sheets” has the meaning set out in Section 2.2.3 of this Schedule;

“Sally Port” means the secure fenced and gated enclosure for vehicular drop off for Clients;

“TAB” means testing, adjusting and balancing; and

“Void Space” means space which is trapped between walls and/or structure and is not intended to be finished or used.

1.2 Overview

- 1.2.1 The Statement of Requirements describes key functional requirements for the Design and Construction. They are written in the imperative form and except where otherwise expressly stated within the Statement of Requirements, all work described in or required by the Statement of Requirements will be an obligation of the Design-Builder. All things to be provided, delivered, performed or done by the Design-Builder as prescribed within the Statement of Requirements are deemed to be read and to be interpreted as "Design-Builder will".
- 1.2.2 The purpose of this Project is to relocate the following Provincial programs from their current location at 3405 Willingdon Avenue in Burnaby, B.C. to the Facility, a new, purpose-built building at the Construction Site:
- 1.2.2.1 the Maples Adolescent Treatment Centre – operated by the Ministry of Children and Family Development ("**Maples**"); and
- 1.2.2.2 the Provincial Assessment Centre – operated by Community Living BC under the auspices of the Ministry of Social Development and Social Innovation ("**PAC**")

1.3 Acronym List

- AAMA – American Architectural Manufacturers Association
- AAS – Aluminum Association Standards
- AASHTO–American Association of State Highway and Transportation Officials
- AIBC – Architectural Institute of British Columbia
- ACI – American Concrete Institute
- AFUE - Annual Fuel Utilization Efficiency
- AHC – Architectural Hardware Consultant
- AISI – American Iron and Steel Institute
- AMCA - Air Movement and Control Association
- ANSI - American National Standards Institute
- ARI - Air Conditioning and Refrigeration Institute
- ASCC – American Society of Concrete Contractors
- ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers

- ASME - American Society of Mechanical Engineers
- ASPE - American Society of Plumbing Engineers
- ASTM - American Society for Testing and Materials
- APEGBC – Association of Professional Engineers and Geoscientists of BC
- AWCC – Association of Wall and Ceiling Contractors
- AWMAC – Architectural Woodwork Manufacturer’s Association of Canada
- AWPA – American Wood Protection Association
- AWWA – American Water Works Association
- BCBC – British Columbia Building Code
- BCICA - British Columbia Insulation Contractors Association
- BCLNA - British Columbia Landscape & Nursery Association
- BCSLA - British Columbia Society of Landscape Architects
- BICSI - Building Industry Consulting Service International
- BMS - Building Management System
- CAC – Ceiling Attenuation Class
- CaGBC – Canada Green Building Council
- CCI – Canadian Carpet Institute
- CCTV – Closed Circuit Television
- CEC – Canadian Electrical Code
- CGA - Compressed Gas Association
- CGSB – Canadian General Standards Board
- CISC – The Canadian Institute of Steel Construction
- CISCA - Ceiling Interior Systems Construction Association
- CMCA – Canadian Masonry Contractors Association
- CPMA – Canadian Paint Manufacturers Association

- CPU – Central Processing Unit
- CPTED - Crime Prevention through Environmental Design
- CRTC – Canadian Radio-television and Telecommunications Commission
- CRI – Canadian Rug Institute
- CSA - Canadian Standards Association
- CSDFMA – Canadian Steel Door and Frame Manufacturers Association
- CSSBI – Canadian Sheet Steel Building Institute
- CTI – Cooling Technology Institute
- CWB – The Canadian Welding Bureau
- dB – Decibels
- dBA – A-Weighted sound pressure level
- DDC - Direct Digital Controls
- DHI – Door and Hardware Institute
- DISS - Diameter Index Safety System
- EHR - Electronic Health Record
- ENS – Environmental Notation System
- ESS – electronic safety & security
- ETL - Electronic Testing Laboratories
- FM – Facilities Management
- GCA – Glazing Contractors Association of B.C.
- HAZMAT - Hazardous Materials
- HEPA - High Efficiency Particulate Air
- HVAC - Heating, Ventilating and Air-Conditioning
- IEEE - Institute of Electrical and Electronic Engineers
- IGMAC – Insulating Glass Manufacturers Association of Canada

- IIC – Impact Isolation Class
- IP – Internet Protocol
- LEED – Leadership in Energy and Environmental Design
- MEP – Mechanical, Electrical and Plumbing
- MMCD – Master Municipal Construction Documents
- MPI – Master Painters Institute
- MTICS – Ministry of Technology, Innovation and Citizens' Services
- NAAMM – National Association of Architectural Metal Manufacturers
- NC – Noise Criteria
- NEMA - National Electrical Standards Association (see CSA)
- NFCA – National Floor Covering Association of Canada
- NFPA - National Fire Protection Association
- NFCA – National Floor Covering Association
- NIC – Noise Isolation Class
- NLGA – National Lumber Grading Association
- NRC – Noise Reduction Coefficient
- NTSC – National Television Standards Committee
- OS&Y - Open Stem and Yoke
- PACS - Picture Archiving and Communication System
- PBX – Private Branch Exchange
- PI – Privacy Index
- PoE – Power Over Ethernet
- RCABC – Roofing Contractors Association of B.C.
- SSBC – Shared Services BC
- STC – Sound Transmission Class

- STI – Speech Transmission Index
- TIA – Telecommunications Industry Association
- TTMAC – Terrazzo and Tile Manufacturers Association of Canada
- TVOC – Total Volatile Organic Compounds
- ULC - Underwriters' Laboratories of Canada
- UPS – Uninterruptible Power Supply
- VFD - Variable Frequency Drive
- VLAN – Virtual Local Area Network
- VOC – Volatile Organic Compounds
- VoIP – Voice Over Internet Protocol
- WH – Warnock Hersey
- WHMIS – Workplace Hazardous Materials Information System
- WSBC – Work Safe British Columbia

2. GENERAL

2.1 Standards of Design and Construction

- 2.1.1 The Design and Construction is to be completed in accordance with:
- 2.1.1.1 the standards set out in this Statement of Requirements, including the BC Building Code;
 - 2.1.1.2 the requirements of all relevant CSA standards including CSA Z317.13, CSA Z32 and CSA Z8001-13, provided that CSA Z8000 is not applicable to the Project;
 - 2.1.1.3 the requirements of Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the latest version of the Mental Health Act (British Columbia), with respect to secure rooms;
 - 2.1.1.4 a regard for the concerns, needs and interests of the Owner and all governmental authorities having jurisdiction; and
 - 2.1.1.5 applicable Laws.
- 2.1.2 If the Design-Builder wishes to make reference to a code or standard from a jurisdiction outside of Canada, then the Design-Builder will demonstrate to the Owner's satisfaction that such code or standard meets or exceeds the requirements of this Schedule and other applicable governing bodies.
- 2.1.3 The Design and Construction is to be performed in compliance with the latest applicable Standards regardless of whether they appear in the document or not, including:
- 2.1.3.1 ANSI / ASHRAE:
 - 2.1.3.1(1) 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;
 - 2.1.3.1(2) 55: Thermal Environmental Conditions for Human Occupancy;
 - 2.1.3.1(3) 62.1:-Ventilation for Acceptable Air Quality;
 - 2.1.3.1(4) 90.1: Energy Efficient Design for New Buildings;
 - 2.1.3.1(5) 111:-Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;
 - 2.1.3.1(6) 129:-Measuring Air Change Effectiveness;

- 2.1.3.1(7) 135:-Data Communication Protocol for Building Automation & Control Networks; and
- 2.1.3.1(8) 0-2005 – The Commissioning Process.
- 2.1.3.2 ASHRAE:
 - 2.1.3.2(1) Handbooks: HVAC Applications, HVAC Systems and Equipment, Fundamentals, Refrigeration;
 - 2.1.3.2(2) Design of Smoke Control Systems;
 - 2.1.3.2(3) ASHRAE Guideline 12 - Minimizing the Risk of Legionellosis Associated with Building Water Systems; and
 - 2.1.3.2(4) ASHRAE Guideline 1 – The HVAC Commissioning process.
- 2.1.3.3 ANSI / ASME / AISA:
 - 2.1.3.3(1) B31.1 Power Piping Code, for steam systems;
 - 2.1.3.3(2) Section IX: Welding Qualifications;
 - 2.1.3.3(3) Unfired pressure vessels;
 - 2.1.3.3(4) AWS D1.3 - Structural Welding Code - Sheet Steel;
 - 2.1.3.3(5) ACI 315 - Details and Detailing of Concrete Reinforcement; and
 - 2.1.3.3(6) ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
- 2.1.3.4 ASPE Plumbing Engineering Design Handbook, Vol. 1-4;
- 2.1.3.5 ASTM:
 - 2.1.3.5(1) ASTM A27 - Specification for Structural;
 - 2.1.3.5(2) ASTM A775 - Specification for epoxy coated Reinforcing Steel;
 - 2.1.3.5(3) ASTM C568-03 - Standard Specification for Limestone Dimension Stone;
 - 2.1.3.5(4) ASTM C615-03 - Standard Specification for Granite Dimension Stone;
 - 2.1.3.5(5) ASTM C503-05 - Standard Specification for Marble Dimension Stone;
 - 2.1.3.5(6) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone;

- 2.1.3.5(7) ASTM C309 - Specification for Liquid Membrane Forming Compounds for Curing Concrete;
- 2.1.3.5(8) ASTM E1155 - Standard Test Method for Determination of FF Floor Flatness and FL Floor Levelness Numbers;
- 2.1.3.5(9) ASTM A307 - Specification for Carbon Steel Bolts and Studs (60,000 psi tensile);
- 2.1.3.5(10) ASTM A325 – Specification for Structural Bolts Heat-treated 120/105 KSI Minimum Tensile Strength;
- 2.1.3.5(11) ASTM A653 – Specification for Steel Sheet Zinc coated (galvanized) or Zinc-Iron Alloy Coated (galvannealed) by hot dip process;
- 2.1.3.5(12) ASTM A792 – Specification for Sheet Steel 55% Aluminum – Zinc Alloy coated by hot dip process;
- 2.1.3.5(13) ASTM A955 – Standard specification for Load Bearing (transverse and axial) Steel Studs, Runners (tracks) and bracing or Bridging for screw application of Gypsum Panel products;
- 2.1.3.5(14) ASTM F710-11 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring;
- 2.1.3.5(15) ASTM F1869-11- Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using anhydrous Calcium Chloride;
- 2.1.3.5(16) AISI S100 – North American Specification for Design of cold formed Steel Structural Members (including commentary);
- 2.1.3.5(17) AISI 200 – North American Standard for Cold Formed Steel Framing (general provisions);
- 2.1.3.5(18) AISI 201 – North American Standard for Cold Formed Steel Framing (Product Data);
- 2.1.3.5(19) ASTM B221M-07 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric);
- 2.1.3.5(20) ASTM F1233 Test Method for Security Glazing Materials And Systems;
- 2.1.3.5(21) ASTM F1450 Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities;
- 2.1.3.5(22) ASTM F1577 Test Methods for Detention Locks for Swinging Doors;
- 2.1.3.5(23) ASTM F1592 Test Methods for Detention Hollow Metal Vision Systems;

- 2.1.3.5(24) ASTM F1643 Test Methods for Detention Sliding Door Locking Device Assembly;
 - 2.1.3.5(25) ASTM F1758 Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors;
 - 2.1.3.5(26) ASTM F1915 – 03 Standard Test Methods for Glazing for Detention Facilities;
 - 2.1.3.5(27) ANSI Z97.1, Safety Glazing Materials Used in Buildings;
 - 2.1.3.5(28) ASTM C1036, Flat Glass;
 - 2.1.3.5(29) ASTM C1048, Heat Treated Flat Glass;
 - 2.1.3.5(30) ASTM C1349, Architectural Flat Glass Clad Polycarbonate; and
 - 2.1.3.5(31) HP White TP-0500-01, Transparent Materials for use in Forced Entry or Containment Barriers.
- 2.1.3.6 BCSLA and BCLNA:
- 2.1.3.6(1) BC Landscape Standard – Current Edition;
 - 2.1.3.6(2) BCICA Quality Standards Manual for Mechanical Insulation, latest edition.
- 2.1.3.7 BCLNA - British Columbia Landscape & Nursery Association:
- 2.1.3.7(1) Plant Materials;
 - 2.1.3.7(2) Growing Medium;
 - 2.1.3.7(3) Landscape Maintenance;
 - 2.1.3.7(4) Tree Protection and Preservation; and
 - 2.1.3.7(5) Irrigation Design.
- 2.1.3.8 BC Supplement to TAC Geometric Design Guide, latest edition.
- 2.1.3.9 CAN/CGSB:
- 2.1.3.9(1) CAN/CGSB-4.129-93 CORR.2 – Carpet for Commercial Use;
 - 2.1.3.9(2) CAN/CGSB 69.17 86 Bored and Preassembled Locks and Latches;
 - 2.1.3.9(3) CAN/CGSB 69.18 90 / ANSI/BHMA A156.1 81 Butts and Hinges;

- 2.1.3.9(4) CAN/CGSB 69.19 93 / ANSI/BHMA A156.3 94 Exit Devices;
 - 2.1.3.9(5) CAN/CGSB 69.20 90 / ANSI/BHMA A156.4 86 Door Controls (Closers);
 - 2.1.3.9(6) CAN/CGSB 69 21 90 / Auxiliary Locks and Associated Products;
 - 2.1.3.9(7) CAN/CGSB 69.22 90 / ANSI/BHMA A156.6 96 Architectural Door Trim;
 - 2.1.3.9(8) CAN/CGSB 69.29 93 / ANSI/BHMA A156.13 Mortise Locks and Latches;
 - 2.1.3.9(9) CAN/CGSB 69.30 93 / ANSI/BHMA A156.14 99 Sliding and Folding Door Hardware;
 - 2.1.3.9(10) CAN/CGSB 69.35 89 / ANSI/BHMA A156.19 84 Power Assist and Low Energy Power Operated Doors; and
 - 2.1.3.9(11) CAN/CGSB 4.162-M80 - Hospital Textiles - Flammability Performance Requirements.
- 2.1.3.10 CAN/ULC:
- 2.1.3.10(1) CAN/ULC S102.2-10 – Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
- 2.1.3.11 CSA:
- 2.1.3.11(1) C22.1-15 – Canadian Electrical Code;
 - 2.1.3.11(2) B52: Mechanical Refrigeration Code;
 - 2.1.3.11(3) B149.1: Natural Gas and Propane Installation Code;
 - 2.1.3.11(4) B651-95: Barrier Free Design;
 - 2.1.3.11(5) Z317.13: Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities;
 - 2.1.3.11(6) Z317.1: Special Requirements for Plumbing Installations in Health Care Facilities;
 - 2.1.3.11(7) Z317.1: Special Requirements for Plumbing Installations in Health Care Facilities;
 - 2.1.3.11(8) Z317.2: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;

- 2.1.3.11(9) Z8001-13: Commissioning of Health Care Facilities;
- 2.1.3.11(10) CSA Z32-15 Electrical Safety and Essential Electrical Systems in Health Care Facilities (excluding sections 5.3, 5.4, 5.5, 5.6.6, 5.9, 5.10, 5.11 and Part 6);
- 2.1.3.11(11) W186-M1990 (R2002) - Welding of Reinforcing Bars in Reinforced Concrete Construction;
- 2.1.3.11(12) A370-04 - Connectors for Masonry;
- 2.1.3.11(13) A23.1-14/A23.2-14 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete;
- 2.1.3.11(14) S832-06 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings);
- 2.1.3.11(15) A23.3-14 – Design of Concrete Structures;
- 2.1.3.11(16) S16-14 – Design of Steel Structures;
- 2.1.3.11(17) O86-14 – Engineering Design in Wood;
- 2.1.3.11(18) S136-07 – North American Specification for the Design of Cold-Formed Steel Structural Members;
- 2.1.3.11(19) S157-05 – Strength Design in Aluminum;
- 2.1.3.11(20) S304.1-04 – Design of Masonry Structures;
- 2.1.3.11(21) CSA B44 – Elevator Code;
- 2.1.3.11(22) S478 – Guidelines for Durability in Buildings Structures (Design);
- 2.1.3.11(23) A266.1 - Air Entraining Admixtures in Concrete;
- 2.1.3.11(24) A266.2 - Chemical Admixtures for Concrete;
- 2.1.3.11(25) A266.4 - Guidelines for use of admixtures in concrete;
- 2.1.3.11(26) A371 – Masonry Construction for Buildings;
- 2.1.3.11(27) A3000 – Cementitious Materials Compendium;
- 2.1.3.11(28) W47.1 – Certification of companies for Fusion Welding of Steel Structures;
- 2.1.3.11(29) W59 – Welded Steel Construction; and

2.1.3.11(30) W55.3 – Resistance Welding Qualifications Code for Fabricators of Structural members used in Buildings.

2.1.3.12 DHI:

2.1.3.12(1) Door and Hardware Institute.

2.1.3.13 MFCSI:

2.1.3.13(1) Master Floor Covering Standards Institute.

2.1.3.14 MPI:

2.1.3.14(1) Master Painters Institute (MPI) Architectural Specification Standards Manual.

2.1.3.15 NFPA:

2.1.3.15(1) 10: Standard for Portable Fire Extinguishers;

2.1.3.15(2) 13: Standard for the Installation of Sprinkler Systems;

2.1.3.15(3) 90A - Current Edition: Standard for Installation of Air Conditioning and Ventilation Systems;

2.1.3.15(4) 92A - Current Edition: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences;

2.1.3.15(5) 101 - Current Edition: Life Safety Code; and

2.1.3.15(6) NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, latest Edition.

2.1.3.16 Marble Association of Canada;

2.1.3.17 design and construction specifications for civil works set out in the Master Municipal Construction Document (MMCD), as modified by the City of Coquitlam's supplemental MMCD specifications;

2.1.3.18 Provincial Hand Hygiene Group – Best Practices for Hand Hygiene Facilities & Infrastructure in Healthcare Settings;

2.1.3.19 Terrazzo Tile and Marble Association of Canada.

2.2 Indicative Design

2.2.1 The Owner has developed an indicative design for the Facility (the “**Indicative Design**”).

- 2.2.2 The Owner prepared a “**Functional Program**”, attached as Appendix 1B – Functional Program and Clinical Specification. The functional space requirements specify all required departments and spaces, areas, adjacencies, circulation flows, functional characteristics, technical requirements, and furnishings. The Indicative Design was based on a preliminary draft of the Functional Program and also reflects preliminary consultations with Facility users. Drawings describing the Indicative Design have been made available to the Design-Builder.
- 2.2.3 The Owner prepared the room data sheets for the user components of the Project, which are attached in Appendix C – Room Data Sheets (the “**Room Data Sheets**”). The Room Data Sheets describe the technical requirements, spatial needs, furnishings, and primary equipment which needs to be addressed in order for the Project to successfully serve the needs of the Owner.
- 2.2.4 The Design-Builder may use the Indicative Design as both a reference and a baseline for its design. The Owner makes no representation as to the accuracy or completeness of any aspect of the Indicative Design. The Design-Builder will be completely responsible for all aspects of the Design and Construction to meet the general intent of functionality, adjacencies and quality, whether or not the Design-Builder uses all or any part of the Indicative Design. The Design-Builder will independently verify the accuracy of any information contained in or inferred from the Indicative Design, prior to the use of any such information in its Design.

2.3 Design Requirements

- 2.3.1 The Facility must be accessed from the roads within the Riverview Campus. This includes all vehicular access for parking, drop-off, and loading/deliveries. The Design-Builder will work with the Owner and the City of Coquitlam to develop a mutually satisfactory solution for these points of access and egress. The Design-Builder will arrange all meetings with the City of Coquitlam and will permit a representative of the Owner to be in attendance at all such meetings.
- 2.3.2 The Design-Builder will work with the City of Coquitlam regarding the design of the Facility and ensure the Facility’s conformance with applicable bylaws and requirements.
- 2.3.3 The Design-Builder will work with BC Housing regarding any requirements and protocols related to utilities, underground services, roads or similar infrastructure on the Site.
- 2.3.4 The Design-Builder will design and construct the Facility:
- 2.3.4.1 so that it accommodates all of the spaces, activities, functions and design features and adjacencies described in the Functional Program; and
- 2.3.4.2 in accordance with the requirements of the Functional Program, the Room Data Sheets and Appendix 1G – Equipment and Responsibility List.

- 2.3.5 The Net Square Meter area for all rooms must not be more than 2% smaller than the required area listed in the space requirements in the Functional Program. The Design-Builder must provide a rationale for each variation and demonstrate to the Owner's satisfaction that affected rooms retain their functionality. If, in the Owner's opinion, the room does not meet the required functionality, the full Net Square Meters must be provided as stated in the Functional program.
- 2.3.6 The Design-Builder will design the Facility to have a building footprint of not more than 4,190 sm.
- 2.3.7 The Design-Builder will design the Facility so that it is to be arranged in four zones:
- 2.3.7.1 residential;
 - 2.3.7.2 administration;
 - 2.3.7.3 education; and
 - 2.3.7.4 recreational,
- as described in more detail in Section 2.3(f) of the Functional Program.
- 2.3.8 The residential zone will be architecturally distinct and identifiable from the interior and exterior. The education zone will be architecturally distinct and identifiable from the interior. The administration zone will be architecturally distinct and identifiable from the interior and exterior. The recreation zone will be architecturally distinct and identifiable from the interior and exterior. The recreational zone will have gymnasium/enclosed play space area which will be designed so that it can be closed off from the remainder of the Facility for community use. Each zone will have its own entrance for privacy, security and separation of operational flows
- 2.3.9 The Site is sloped and falls in two directions: approximately 6-7 meters West to East and a gradual slope North to South. The topography of the Site to be used to enhance the design and reduce the scale of the Facility.
- 2.3.10 Outdoor environments are particularly important. The Design-Builder will design the Facility so that outdoor environment has a good relationship with the interior environment.
- 2.3.11 The Facility design is to reflect the Project Vision, the Project Guiding Principles, the Project Objectives and the Project Design Philosophy, as well as the following design principles:
- 2.3.11.1 a therapeutic, rehabilitative, and healing environment that respects the need for privacy and dignity of Clients;
 - 2.3.11.2 a clinical care model in line with best mental health practices;

- 2.3.11.3 industry best practices for operational efficiency and work environment for staff;
 - 2.3.11.4 that meets Clients' needs and optimizes service delivery efficiencies;
 - 2.3.11.5 home-like, non-institutional environment;
 - 2.3.11.6 secure access to landscaped outdoor spaces and terrace spaces, secure outdoor areas enclosed and integrated with the surrounding landscape;
 - 2.3.11.7 flexibility in the design to accommodate future work practices;
 - 2.3.11.8 maximize natural light and natural ventilation;
 - 2.3.11.9 maximizes connection to natural environment through access and views to landscaping, natural light and ventilation;
 - 2.3.11.10 maximize views of and through landscaping;
 - 2.3.11.11 provide landscape along the Construction Site parallel to Lougheed Highway to buffer the new Facility;
 - 2.3.11.12 achieve a human scale, specifically by articulating the building massing, at a minimum at building entrances;
 - 2.3.11.13 provide a variety of building component heights; and
 - 2.3.11.14 utilize sustainable design.
- 2.3.12 Neighbourhood Unit Design
- 2.3.12.1 Design the residential zone of the Facility to be comprised of the five Neighbourhoods (PAC, DALA, Response, Complex Care Unit and Crossroads). The main design principles for the Neighbourhood design are as follows:
 - 2.3.12.1(1) provide one Care Team Station for each Neighbourhood;
 - 2.3.12.1(2) arrange each Neighbourhood such that its Care Team Station is configured to always have direct back-of-house access to at least one other Care Team Station of another Neighbourhood should the need to assist arise;
 - 2.3.12.1(3) design each Neighbourhood to be generic and standardized to retain flexibility and the ability to transition any Neighbourhood to another level of care, if required, in the future;

- 2.3.12.1(4) design the Crossroads and PAC Neighbourhoods with access to an outdoor area enclosed with glass guards to retain views but designed to be high enough to prevent scaling as well as shield from wind and noise;
- 2.3.12.1(5) design each of the Neighbourhoods to be home-like, therapeutic environments that are distinct and self-contained;
- 2.3.12.1(6) locate staff wellness/retreat areas off of the Neighbourhood in staff only areas;
- 2.3.12.1(7) strategically locate centralized administration and back-of-house spaces to promote sharing of use between adjacent Neighbourhoods;
- 2.3.12.1(8) include staff meeting rooms in each Neighbourhood;
- 2.3.12.1(9) provide staff washrooms in each Neighbourhood;
- 2.3.12.1(10) with respect to sight lines and visibility:
 - 2.3.12.1(10)(a) maximize staff's direct observation of Clients and other staff in all Neighborhood spaces accessible by Clients to help increase Clients and staff's sense of safety, reduce incidents and reduce required staffing levels;
 - 2.3.12.1(10)(b) maximize sight lines down corridors from a Care Team Station and avoid dead ends and concealed spaces; and
 - 2.3.12.1(10)(c) use passive principles to provide good general surveillance while maintaining the Client's option for private day spaces;
- 2.3.12.1(11) centralize Care Team Stations within their Neighbourhoods and ensure clear sight lines down corridors. Direct observation is required to the on-unit activity and gathering areas;
- 2.3.12.1(12) ensure there are no concealed spaces in corridors that limit and obstruct observation;
- 2.3.12.1(13) use internal glazing for maintaining observation while retaining a sense of enclosure, privacy, and safety for the Clients;
- 2.3.12.1(14) provide a security vestibule to each Neighbourhood to control the entrance;
- 2.3.12.1(15) provide family visiting areas near the entry of the Neighbourhood;

- 2.3.12.1(16) equip the Maples Neighbourhood bedrooms with their own private washroom and shower designed to enhance a Client's feeling of privacy and dignity;
- 2.3.12.1(17) minimize travel distances for staff to bedrooms from Care Team Station;
- 2.3.12.1(18) maximize exposure to natural light, ventilation, views, and access to outdoor spaces;
- 2.3.12.1(19) locate secure rooms to avoid disruption to the other Clients in the Neighbourhood;
- 2.3.12.1(20) ensure Clients will be able to control their personal environment by controlling the lighting and natural ventilation into their rooms through secure operable windows. Interface the windows with the HVAC system to regulate the room climate;
- 2.3.12.1(21) provide the PAC Neighbourhood with a commercial kitchen, as described in more detail in Section 3.19. Access to the kitchen by Clients will be controlled by the staff;
- 2.3.12.1(22) provide each other Neighbourhood with a kitchen that is domestic in appearance, as described in more detail in Section 3.19. Access to the kitchen by Clients will be controlled by the staff. Design the kitchen with space for:
 - 2.3.12.1(22)(a) staff to service lunch and dinner to clients;
 - 2.3.12.1(22)(b) delivery of meals from the General Building Services food reheat area by way of vehicle heated and cooled trolleys; and
 - 2.3.12.1(22)(c) storage for food trolleys prior to return of dirty servicing trays to General Building Services food reheat area.

2.3.13 Materials and Appearance

- 2.3.13.1 The Facility will have simple palette of exterior materials.
- 2.3.13.2 The Design-Builder will use at least two of the following as primary materials for the Facility:
 - 2.3.13.2(1) architectural concrete;
 - 2.3.13.2(2) brick;
 - 2.3.13.2(3) composite wood cladding;
 - 2.3.13.2(4) aluminum curtain wall;

2.3.13.2(5) pre-engineered or tilt up concrete panels maybe used for the gymnasium (enclosed play space);

2.3.13.2(6) metal paneling;

2.3.13.3 Not used.

2.3.13.4 The balance of the materials and positioning to accentuate elements in the form such as the horizontal planes and vertical circulation. The use and composition of these materials are to create the appearance of a modern West Coast facility.

3. DESIGN PRINCIPLES

3.1 Project Vision

3.1.1 The Owner's vision for the Project includes the following (the "**Project Vision**"):

3.1.1.1 Optimism: Clients need spaces where they can discover and learn new life skills in a safe supportive environment. Staff need space where they fulfill their professional goals in a culture that allows for innovation without being overly risk adverse. Built environment provides:

- 3.1.1.1(1) Clients' choices based on their individual skills;
- 3.1.1.1(2) spaces that support Clients;
- 3.1.1.1(3) spaces that support family or friends;
- 3.1.1.1(4) spaces that support team work;
- 3.1.1.1(5) a choice of spaces where staff can do their administrative work; and
- 3.1.1.1(6) spaces that allow for personalization.

3.1.1.2 Mindfulness: Clients and staff need spaces to balance the intense and often chaotic therapeutic milieu with being fully involved and enjoying the treatment program or ones job. Built environment provides:

- 3.1.1.2(1) spaces that allow for one to connect one to one and eye to eye in a safe manner;
- 3.1.1.2(2) spaces where Clients can connect for mutual support and friendship;
- 3.1.1.2(3) spaces where staff can connect for mutual support and friendship;
- 3.1.1.2(4) spaces or methods that allow for concentrated or heads down work;
- 3.1.1.2(5) access to outdoor space;
- 3.1.1.2(6) calming spaces through careful selection of materials, textures, colour, lighting, views and acoustic treatments; and
- 3.1.1.2(7) spaces that address visual and auditory distractions or interference.

3.1.1.3 Authenticity: Clients, visitors and staff need spaces that will help them to feel part of the applicable program's culture, while feeling encouraged to express ones ideas and values. Built environment provides:

- 3.1.1.3(1) spaces to express oneself and to share ideas; and

- 3.1.1.3(2) space that is non-institutional and safe.
- 3.1.1.4 Belonging: For Clients it is providing spaces that allow them to feel connected while not creating dependency. For staff it is about providing spaces that foster feeling of connections amongst ones colleagues. Built environment provides:
 - 3.1.1.4(1) entrances that do not trigger negative emotions;
 - 3.1.1.4(2) design that provides for intuitive wayfinding;
 - 3.1.1.4(3) spaces where speech is clearly understood;
 - 3.1.1.4(4) creating circulation where staff can bypass activity on the [Unit]; and
 - 3.1.1.4(5) spaces for informal socialization.
- 3.1.1.5 Sense of Purpose: Visitors will require spaces to learn and acquire skills to support the Clients' goals. Staff will require spaces to educate, evaluate that will support training and research. Built environment provides:
 - 3.1.1.5(1) spaces for education;
 - 3.1.1.5(2) use of technology to teach, evaluate and to display real-time information; and
 - 3.1.1.5(3) spaces for collaboration of research with care.
- 3.1.1.6 Vitality: Clients require spaces that support physical and sensory experiences. Built environment provides:
 - 3.1.1.6(1) space to exercise;
 - 3.1.1.6(2) access to grounds and gardens;
 - 3.1.1.6(3) spaces for spiritual contemplation; and
 - 3.1.1.6(4) spaces to challenge ones creative energy.

3.2 Project Guiding Principles

- 3.2.1 The Design-Builder will design the Facility in accordance with the following overarching principles (the "**Project Guiding Principles**"):
 - 3.2.1.1 develop spaces to maximize the long-term flexibility and adaptability of interior spaces and to maintain a high level of utilization;

- 3.2.1.2 leverage and implement the seven LEAN flows of health services (Information, Client, Providers, Medications, Supplies, Process Engineering, equipment) through key design and operational commissioning stages of the Project;
- 3.2.1.3 incorporate Client-friendly design concepts to optimize Client experience;
- 3.2.1.4 incorporate standardization of spaces and incorporate lessons learned from other major capital mental health projects wherever possible;
- 3.2.1.5 focus on environmental sustainability stewardship through building design and future operations;
- 3.2.1.6 allow for future program growth and flexibility of future service delivery through spatial design; and
- 3.2.1.7 provide security and safety of staff, visitors and Clients through separation of flows and services.

3.3 Project Objectives

- 3.3.1 The Owner's objectives for the Project include the following (the "**Project Objectives**"):
 - 3.3.1.1 provide innovation in model of care and Client outcomes/safety through application of evidence-based design principles, and mental health care facility design and construction standards, that all have a Client-centered design philosophy;
 - 3.3.1.2 implement design features that enhance the well-being and safety of Clients, families, visitors, staff, and the community;
 - 3.3.1.3 create a healthy and safe work environment that optimizes engagement, recruitment and retention, and minimizes workplace injuries;
 - 3.3.1.4 provide a robust, flexible technical infrastructure that complies with Section 9 of the SSBC Technical Standards for Offices issued Dec 17, 2014;
 - 3.3.1.5 minimize impacts to existing Riverview Campus operations throughout the construction phase.

3.4 Project Design Philosophy

- 3.4.1 The Owner's design philosophy for the Project includes the following (the "**Project Design Philosophy**"):

- 3.4.1.1 the Design will demonstrate the evolution of mental health facilities from dull and depressing to fresh, bold, and state-of-the-art, creating a sanctuary for Clients and their families;
- 3.4.1.2 the Facility will form an integral part of the community by connecting to the Riverview healthcare precinct and larger urban context while maintaining privacy and confidentiality for Clients;
- 3.4.1.3 the Facility is to have a contemporary, West Coast architectural design, which provides a bold and progressive mental health statement;
- 3.4.1.4 the Facility will be constructed using warm and inviting architectural materials to provide a comforting and attractive ambience for its Clients, while conveying a facility at the forefront of mental health Client care and for supporting learning, recreational and education of Clients;
- 3.4.1.5 the Design will allow for the separation between a variety of different Client populations and a variety of uses;
- 3.4.1.6 the Facility is to be designed with the four distinct zones described in Section 2.3.7 of this Schedule;
- 3.4.1.7 the Design will maintain security and privacy for Clients;
- 3.4.1.8 provide a distinct separation between Client flow and staff/service flow to be achieved through thoughtful space planning providing separate corridors for each.
- 3.4.1.9 other Facility features to include:
 - 3.4.1.9(1) double height main entrance space for welcoming atmosphere;
 - 3.4.1.9(2) use of natural topography to reduce the scale of the Facility; and
 - 3.4.1.9(3) exterior pathways from each building component to provide a community feeling of walking from residence to school and gymnasium (enclosed play space).
- 3.4.1.10 the Facility to offer the following benefits:
 - 3.4.1.10(1) incorporating the latest in best practice design principles within the Facility, rather than adapting the clinical model to suit existing conditions;
 - 3.4.1.10(2) optimize operational efficiency and work environment for staff through sustainable design principles such as control of the indoor environment,

access to natural light and views, direct connection to the outdoors and thermal comfort;

3.4.1.10(3) access to outdoor recreation space for Clients; and

3.4.1.10(4) flexibility and adaptive design to accommodate future changes in clinical practice and expand Client care areas;

3.4.1.11 include secured underground parking for visitors and staff. Refer to Section 4.3.3.5 for more information;

3.4.1.12 achieve LEED Gold Certification; and

3.4.1.13 clinical and operational benefits of the Facility to include:

3.4.1.13(1) work flows and program adjacencies designed to achieve operational model described in Appendix 1B – Functional Program and Clinical Specification;

3.4.1.13(2) stairs and elevators to be located in optimal areas; and

3.4.1.13(3) decrease travel distances for staff, particularly by refraining from long institutional corridors.

3.5 Sustainable Design

3.5.1 The Project will be designed and built to meet the necessary prerequisites, credits and points required to achieve LEED Gold Certification.

3.5.2 As of the Effective Date, the Design-Builder will become the main contact with LEED Authority.

3.5.3 Where feasible, design the Facility to utilize alternate energy sources such as passive solar water heating and alternate heating and cooling sources.

3.5.4 The Design-Builder will prepare an energy model in accordance with Appendix 1A – Energy Model. In addition to any submissions required in Appendix 2A - Submittals, the Design-Builder will submit the energy model to the Owner concurrent with each submission of the energy model to the LEED Authority.

3.5.5 In addition to achieving LEED Gold Certification, the Design-Builder will:

3.5.5.1 design and construct the Facility using design methods, building materials, operational practices, energy and life cycle considerations that promote environmental quality, social benefits and economic vitality throughout the construction and operation of the Facility, including by minimizing the Owner's operating costs (for example in relation to utilities and carbon taxes);

- 3.5.5.2 give priority to efficient use of resources, protection of health and indoor environmental quality;
- 3.5.5.3 refrain from using materials on the interior of the Facility that are detrimental to human health; and
- 3.5.5.4 apply a total systems approach to minimize energy consumption and incorporate energy consumption management techniques that are targeted to stabilize and optimize energy flows.

3.6 Safety and Security

- 3.6.1 The Facility will be designed and constructed to achieve the following objectives related to the safety and security of Clients, staff, and visitors:
 - 3.6.1.1 provide security from criminal activity, such as personal assault or theft of property;
 - 3.6.1.2 safety from errors in the delivery of care;
 - 3.6.1.3 safety from environmental hazards;
 - 3.6.1.4 protection of physical privacy and personal dignity;
 - 3.6.1.5 safety from equipment hazards;
 - 3.6.1.6 protection of staff from physical hazards;
 - 3.6.1.7 mitigation of occupational hazards for common staff activities in each area of the Facility;
 - 3.6.1.8 protection of personal information;
 - 3.6.1.9 emergency preparedness and management of emergency conditions; and
 - 3.6.1.10 protection of the Client and caregiver.
- 3.6.2 Incorporate the following into the Design:
 - 3.6.2.1 CPTED principles in Site layout, Facility design, landscape development and lighting;
 - 3.6.2.2 provide a Design that responds to CPTED principles through the following:
 - 3.6.2.2(1) having particular regard for theft, mischief and vandalism;
 - 3.6.2.2(2) reducing opportunities for graffiti through the use anti-graffiti coatings, at a minimum providing anti-graffiti coating on the exterior; and

- 3.6.2.2(3) reducing opportunities for hiding spaces in both the interior and exterior;
and
- 3.6.2.3 guidelines for the physical security of chemicals, drugs and needles and syringes stored in healthcare facilities, as produced by the College of Pharmacists of British Columbia.
- 3.6.3 Risk Assessments, Analysis, Client Safety and Security
 - 3.6.3.1 Risk assessments and diagrams for each Client group have been developed with the clinical team. The Room Data Sheets classify levels of risk by room, which provides the basis for the construction components of the Facility (interior and exterior fabric) according to level of risk and supervision. The Design-Builder will design and construct the Facility in accordance with the risk level requirements set out below:
 - 3.6.3.2 Standard (Level 0)
 - 3.6.3.2(1) Standard (ST) is defined as non-Client access areas (staff only) in these rooms construction components will be commercial grade. These rooms will typically include administration offices and facility maintenance areas. Construction components to be designed to use of space.
 - 3.6.3.3 Low (Level 1)
 - 3.6.3.3(1) Applicability: Areas where Clients will be continually observed by staff and not left alone in the room. These rooms typically include classrooms, consultation rooms and interview rooms. Construction components in these rooms will be designed to be secure, robust, anti-ligature, vandal proof and tamperproof to as identified in the Room Data Sheets. For example a classroom will require walls to be robust against damage but ceilings may be suspended acoustic tile ceiling due to continual staff observation.
 - 3.6.3.3(2) Refer to the Room Data Sheets which identify the construction components for these rooms. Construction components will meet the minimum requirements in Section 3.6.3.3(3).
 - 3.6.3.3(3) Materials and Requirements
 - 3.6.3.3(3)(a) Architectural
 - (a).1 external glazing remains in frame when broken;
 - (a).2 operable external windows prevent Clients from exiting;
 - (a).3 operable external windows prevent objects being thrown from or into the room;

- (a).4 internal glazing remains in frame when broken;
- (a).5 impact resistant gypsum wallboard walls;
- (a).6 wall protection;
- (a).7 door and window assemblies to be one piece with no trims;
- (a).8 doors are dual swing to prevent barricading where identified in the Room Data Sheets;
- (a).9 doors will have anti-ligature hardware;
- (a).10 anti-ligature, vandal resistant washroom accessories including; coat hooks, grab bars, fully recessed soap dispensers, fully recessed toilet paper dispensers and mirrors; and
- (a).11 vandal resistant built-in furniture and millwork.

3.6.3.3(3)(b) Electrical

- (b).1 vandal resistant light fixtures, electrical and data outlet covers;
- (b).2 tamper proof screws and fittings; and
- (b).3 vandal resistant smoke detectors.

3.6.3.3(3)(c) Mechanical

- (c).1 industrial, anti-ligature, tamper-resistant sprinkler heads;
- (c).2 vandal resistant, anti-ligature plumbing fixtures;
- (c).3 vandal resistant, tamper proof pipe and valve covers;
- (c).4 vandal resistant, tamper proof and access panels; and
- (c).5 ability to isolate services remotely.

3.6.3.4 Medium (Level 2)

- 3.6.3.4(1) Applicability: Client accessible areas without continuous staff supervision.
- 3.6.3.4(2) Risk level 'Medium' qualities will require the following construction components to be secure, robust, anti-ligature, vandal proof and tamperproof. Components will allow no opportunity to hide contraband or disassemble building components to create weapons within client accessible areas. Provide components that will resist malicious damage to the greatest extent possible.
- 3.6.3.4(3) Materials and Requirements
 - 3.6.3.4(3)(a) Architectural
 - (a).1 external glazing remains in frame when broken;
 - (a).2 operable external windows prevent Clients from exiting;
 - (a).3 operable external windows prevent objects being thrown from or into the room;

- (a).4 internal glazing remains in frame when broken;
- (a).5 impact resistant gypsum wallboard walls;
- (a).6 wall protection;
- (a).7 impact resistant gypsum wallboard ceiling system;
- (a).8 door and window assemblies to be one piece with no trims;
- (a).9 doors are dual swing to prevent barricading where identified in the Room Data Sheets;
- (a).10 doors will be vandal proof and have anti-ligature hardware;
- (a).11 doors will have over door alarm system as set out in Appendix 1C – Room Data Sheets];
- (a).12 towel bars, shower curtains or rods not permitted;
- (a).13 anti-ligature, vandal resistant washroom accessories including; coat hooks, grab bars, fully recessed soap dispensers, fully recessed toilet paper dispensers and mirrors; and
- (a).14 vandal resistant built-in furniture and millwork.

3.6.3.4(3)(b) Electrical

- (b).1 vandal resistant light fixtures, electrical and data outlet covers; and
- (b).2 tamper proof screws and fittings.

3.6.3.4(3)(c) Mechanical

- (c).1 industrial, anti-ligature, tamper-resistant sprinkler heads;
- (c).2 vandal resistant, anti-ligature plumbing fixtures;
- (c).3 vandal resistant, tamper proof pipe and valve covers;
- (c).4 vandal resistant, tamper proof and access panels; and
- (c).5 ability to isolate services remotely.

3.6.3.5 High (Level 3)

3.6.3.5(1) Applicability: Generally, this category is applicable to spaces where Clients are at risk to harm themselves or others. The intent for these spaces is to confine and protect the Client. Examples include secure room and ante room.

3.6.3.5(2) Materials and Requirements

3.6.3.5(2)(a) comply with Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act, latest version;

3.6.3.5(2)(b) open fixed secure shelf and cupboard in ante room to store soap, shampoo and clean linen;

3.6.3.5(2)(c) secure room door to swings outward into the ante room; and

3.6.3.5(2)(d) impact resistant gypsum wallboard ceiling system.

3.6.4 Incorporate the following in the exterior design:

3.6.4.1 provide exterior lighting near Facility entrances, exits, walkways, public areas, staff and Client outdoor spaces and parking areas. Lighting will not cause glare, shadow, or high contrast with surrounding areas and will not flood onto neighboring buildings or property and will address IDA (International Dark Sky) principles;

3.6.4.2 lighting of public, staff and Client outdoor spaces which 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 and outdoor amenities;

3.6.4.3 shrubbery within 2m of walkways will not exceed 100cm in height;

3.6.4.4 provide video surveillance of all exterior areas including Facility entrances, exits, walkways, Client outdoor spaces and parking areas. Arrange camera locations to facilitate viewing as required to meet the functional requirements as determined through the User Consultation Groups as described in Schedule 2 [Review Procedure] of the Agreement. Avoid dead spots and corners. Arrange lighting to avoid backlighting of camera views, and provide adequate vertical illuminance for acceptable video in low light conditions;

3.6.4.5 Duress stations will be placed in well-lit areas and at all parking area entrances, and spaced such that no parking stall may be more than a maximum of 30m from a duress station and a maximum of 10m from the parking area edge; and

3.6.4.6 all Electronic Security Systems to reside on separate network independent of Facility business network and to utilize a fibre backbone.

3.7 The Site

3.7.1 The Site is part of the broader Riverview Campus owned by BC Housing. The Site and the Riverview Campus have significant historical and cultural aspects that are to be considered in the Design and Construction of the Facility. The Design-Builder should familiarize themselves with the December 2015 Vision for Renewing Riverview document prepared by BC Housing. This document notes the importance of trees and open spaces on the Riverview Campus, stating *“A strong public commitment to maintaining the natural environment and open spaces at Riverview, particularly the site’s diverse collection of trees.”*

- 3.7.2 The Design- Builder may refer to the Site Reports for information regarding the two existing retaining walls (and a portion of slab), the location of which are shown in Appendix 1E – Site Plan.
- 3.7.3 The Site is approximately 11,279 sqm (2.78 acres).
- 3.7.4 The Design-Builder will only access the Site from Holly Drive.
- 3.7.5 The Design- Builder may refer to the Site Reports for information regarding existing tree surveys related to the Site.
- 3.7.6 Existing trees and vegetation within the Site boundary should be incorporated into the Site planning wherever possible. Refer to Section 3.16 for additional requirements related to trees.
- 3.7.7 Attenuate any noise from the Facility to acceptable levels at neighbouring properties, including from new mechanical equipment.
- 3.7.8 Visually shield any mechanical and electrical equipment installed as part of the Project.
- 3.7.9 The Design-Builder will comply with all terms and conditions set out in any charges and encumbrances, including rights of way and easements, registered against the Site.
- 3.7.10 Address the following on the Site and on any immediately adjacent areas impacted by the Project:
 - 3.7.10.1 Physical safety and after-hours security of staff, visitors and Clients is paramount. Design the Site to permit safe access and egress and secure pathways to and from on-Site parking.
 - 3.7.10.2 Way-finding and clear connections between the Facility and roads and pathways leading to the rest of the Riverview Campus and the City of Coquitlam.
 - 3.7.10.3 Sheltering of Facility walkways and entrances: ensure users are reasonably shielded at entrances from rain and wind carrying dust and precipitation.
 - 3.7.10.4 Ensure the Design accounts for the fact that the City of Coquitlam receives large quantities of rain and on occasion, snow.
 - 3.7.10.5 The maximum design grade for the garbage truck will be 10%, the maximum design grade for the loading vehicle access will be 5% and the maximum design grade for the firefighting and emergency access will be 8%. The design vehicle template for the garbage truck will be SU9. The design template for the largest delivery vehicle will be a 5 ton straight truck (SU9).

- 3.7.10.6 Unless otherwise permitted by the Owner, the maximum design grade for pedestrian walkways will be 5%.
- 3.7.10.7 Security will follow modern principles of CPTED, which includes the development of welcoming environments that establish a sense of ownership among Facility users and the community at large, as well as Clients and visitors.
- 3.7.10.8 Access to and from the Site is to meet the needs of staff, Client and visitor traffic, vehicles for emergencies as well as service and delivery vehicles. Delivery zones around and within the Facility will be provided such that any backing up of service, loading and delivery vehicles will occur within the Site boundary and such vehicles, services, loading and deliveries will comply with the acoustic requirements set out in Appendix 1D - Acoustics and Noise Control (table 2, subsection 5.1 and 5.4).
- 3.7.10.9 Safe, well-lit spaces for non-ambulatory individuals, to be included in conjunction with walkways and other outdoor areas.
- 3.7.10.10 The Design will support informal surveillance of the walkways from the Facility to help create a safer public space.
- 3.7.10.11 Provide a covered drop off area Sally Port of adequate size to offer protection to vehicles and people including shelter from the southerly winds.
- 3.7.10.12 Install fencing around the Site as required to safely separate the Site during construction from the remainder of the Riverview Campus. Provide road safety barriers.
- 3.7.10.13 Tree protection and preservation fencing as per the City of Coquitlam's requirements is required for all trees that are to be preserved. This fencing must be in place prior to any construction and / or staging work occurring on the Site.
- 3.7.10.14 The Design-Builder must ensure that any existing trees outside and adjacent to the Site boundary are not harmed or damaged through the construction process without the prior written consent of BC Housing.
- 3.7.10.15 Protection of historic artifacts:
- 3.7.10.15(1) Any excavations will require a heritage observer as per BC Housing's "Riverview Lands Tools & Templates: Lands Administration and Archaeological Process Flow" policy. The Design-Builder will comply with such policy.
- 3.7.10.15(2) The Design-Builder will provide an archaeological observer for relevant excavation under the direction of Brown & Oakes Archaeology.

- 3.7.10.15(3) Private property, relics, antiquities, items of historical or scientific interest and similar objects found on Site remain the property of the Owner vis-à-vis the Design-Builder.
- 3.7.10.15(4) Brown & Oakes Archaeology currently holds an investigation permit pursuant to the Heritage Conservation Act (permit # 2014-0069). The Design-Builder will retain Brown & Oakes Archaeology as a Subcontractor and will comply with, or will cause Brown & Oakes Archaeology to comply with, permit # 2014-0069 to the extent applicable to the Project, as well as all applicable Laws regarding heritage conservation.

3.8 Architecture

3.8.1 Qualitative Aspects

- 3.8.1.1 Access to visible daylight to staff work areas is desired.
- 3.8.1.2 Equitable and respectful - with the confidentiality and dignity of all Facility users and Clients maintained.
- 3.8.1.3 Restorative – with staff workspaces that are comfortable, peaceful, attractive, and that feel connected to the day and the seasons.
- 3.8.1.4 Efficient - reducing Facility users' distances to travel within the functional departments.
- 3.8.1.5 Flexible - to accommodate continuous programmatic change and growth including but not limited to the use of modular office and exam room furniture.
- 3.8.1.6 The Design is to consider the safety and the well-being of staff, visitors and Clients. The Design and Construction approach to sustainability will therefore include the following characteristics:
 - 3.8.1.6(1) Ease of access – both to and within the Facility for all staff, visitors and Clients, and for delivery of materials and equipment;
 - 3.8.1.6(2) Benign – the Facility will be energy efficient, water balanced, toxin free, with minimal and well-managed waste consistent with the spirit and intent of LEED; and
 - 3.8.1.6(3) Secure – ensure security for staff who will occupy parts of the Facility 24 hours per day while permitting the public to access the Client collection area and user offices during working hours.

3.8.2 Entrance vestibules will:

- 3.8.2.1 be protected from snow and rain by canopies (covered entries) designed for that purpose;
 - 3.8.2.2 deal effectively with water, mud, sand and dirt;
 - 3.8.2.3 be used for after-hours access and control of the Facility and be of barrier free design; and
 - 3.8.2.4 facilitate ease of deliveries and be able to accommodate movement of large equipment.
- 3.8.3 Incorporate the following in the interior design:
- 3.8.3.1 video surveillance at all main entrances to the Facility, all department entrances, and other areas as per the Room Data Sheets. Surveillance equipment will be visible to people entering the area. Cameras will be positioned to provide surveillance sufficient for facial identification of persons entering and exiting;
 - 3.8.3.2 card access control of all exterior entrances, department entrances, and other areas as per the Room Data Sheets. The Card Access System will have the capability of having multiple areas, access levels and door groups at a minimum;
 - 3.8.3.3 locate two pay phones in the Client reception lobby; and
 - 3.8.3.4 incorporate concrete foundations in the form of post footings and continuous grade beams for all perimeter security fencing as part of the secure perimeter fence design.

3.9 Flexibility

- 3.9.1 Locate permanent building elements such as main corridors, stairs, elevator and duct shafts to minimize constraints on configurational change.
- 3.9.2 For ceiling heights refer to Room Data Sheets.
- 3.9.3 Minimize interior columns and shear walls for ease of planning and re-planning of the Facility.
- 3.9.4 Locate interior shear walls and structural bracing to minimize constraints on future configurational change.
- 3.9.5 The structural support grid will be established to maximize spans between columns to accommodate flexibility in the layout of the Facility and to ensure Project spaces are delivered as required. The gymnasium (enclosed play space) structural grid is to be established to ensure clear span, column free construction between perimeter walls.

- 3.9.6 Provide internal departmental corridors that link adjacent departments to allow staff to flow between residential departments to increase inter-departmental communication and work flows.
- 3.9.7 Design-Builder is to identify logical and accessible locations of future floor penetrations throughout changeable areas of the building for future installation of service lines, plumbing, duct chases, electrical conduit, etc.
- 3.9.8 Facilitate future flexibility by providing the ability to reconfigure departments, offices and exam rooms if desired.
- 3.9.9 Design-Builder may use demountable walls in administrative office areas outside the restricted Client residential units provided they meet STC and privacy requirements.
- 3.9.10 Design the Facility so it can accommodate the rapid cycle of innovation and change to support development and implementation of new work processes and technology changes.
- 3.9.11 Design the Facility to accommodate program, service, work and equipment changes with minimized utility infrastructure and Facility impact, including down time.
- 3.9.12 Design the Facility to support future flexibility of components, and capacity as a whole, including planning zones for flexibility, loose fit design to optimize functionality within a given floor area, and multi-use adaptable space.
- 3.9.13 Design and Facility with an infrastructure that incorporates excess systems capacity and includes systems and components that support future flexibility with minimized disruption and allows for upgrades in Owner's technology or technological progression.

3.10 Use of Wood

- 3.10.1 As contemplated by the *Wood First Act* (British Columbia), the Design-Builder will incorporate wood products into the design of the Facility to the extent that the use of wood products is consistent with the requirements of this Schedule.
- 3.10.2 Wood is an appropriate material for such design features as: structural columns and beams in the Facility entry, canopies (covered entries), lobby, and gymnasium (enclosed play space).
- 3.10.3 If required by the building code, implement alternative code solutions, for the use of wood in such areas.
- 3.10.4 Use wood as a featured material in both the interior and exterior of the Facility. Wood will be used where indicated as "Appropriate" in Table 1. Wood will not be used where indicated as "Inappropriate", unless the Design-Builder can demonstrate that the solution complies with applicable Laws and addresses the concerns in the 'Justification'

column in Table 1 to the satisfaction of the Owner. Wood studs will be used where the Design-Builder determines that they are appropriate at the Design-Builder's discretion.

3.10.5 Table 1. Wood First - Appropriate Use

Area of Usage		Appropriateness	Justification
Substructure			
Forming (temporary)		Appropriate	The use of wood in this process is a traditional method within the construction process.
Structure			
Main Floor Deck		Inappropriate	Loads required for the main floor deck are in excess of wood's capabilities. Furthermore wood is subject to deterioration when exposed to moisture and would require a heated and insulated crawlspace outfitted with automatic fire sprinklers. As a non-combustible structure, the use of a wood main floor deck would require fire protection.
Beams		Inappropriate	As a non-combustible structure, the use of wood structural beams would require fire protection. Long spans used to minimize permanent vertical support are beyond the practical structural capability of wooden beams.
Columns		Inappropriate	Wooden structural columns would require fire protection. Wooden columns encased in fire protective materials would be large in dimension and would restrict future flexibility.
Upper Floor Deck		Inappropriate	Point and live loads required for the upper floor deck are in excess of wood's capabilities. Wood is subject to rapid deterioration when exposed to moisture. Also vibration and long spans on the structural grid would create an overly complicated structure.
Roof Deck		Inappropriate	As a non-combustible structure, the use of structural wood beams would require fire protection. Long spans used to minimize permanent vertical support are beyond their practical structural capability.
Exterior Cladding			
Roof Deck (Flat Roof)		Inappropriate	There is no known wood product for this application.
Cladding and strapping		Appropriate	Wood can be used in limited quantities as part of a rain screen envelope assembly. Wooden strapping is also permitted.

Area of Usage		Appropriateness	Justification
Windows		Inappropriate	Wooden window frames cannot be used in a non-combustible structure as they lack the durability of metal frames and are difficult to clean.
Curtain Wall		Inappropriate	There is no known wood product for this application.
Doors		Appropriate	Metal clad wooden doors can be used.
Interior Partitions and Doors			
Partition Studding		Inappropriate	Support studs used for the framing of the walls.
Interior Doors		Appropriate for offices	Framing, core and facing of door can be wood for locations not requiring greater than a 90 minute fire resistance rating. Wood doors in high metal cart and material transport traffic areas would need protection.
Vertical Movement			
Stairs (Structural)		Inappropriate	The performance of wood in these locations will be challenged due to the load capacities and precluded by the BC Building Code due to fire resistance rating limitations.
Handrail		Appropriate for non-exit stairs	Use of wood can be utilized in the aesthetic completion of the staircase.
Guardrails		Appropriate for non-exit stairs	Wood can be used in these locations where there is a low to medium risk of impact.
Finishes, Fittings and Equipment			
Hardwood Floor		Appropriate	Wood could be used in certain locations as a floor finish; this would be limited to high end finished areas which are not subject to low acoustic or high usage requirements.
Ceiling Tiles		Appropriate	Wood could be used in ceiling tiles for aesthetic requirements in certain areas within the building. This would be limited to high end finished areas which are not subject to low acoustic or high usage requirements
Wall Finish		Appropriate	Wood could be used as a wall finish for aesthetic and acoustic requirements in certain areas within the building. This would be limited to high end finished areas which are not impaired by acoustic requirements and high usage. Handrails and bumper guards can be made of wood.
Toilet		Appropriate	The core material for the partitions can be

Area of Usage		Appropriateness	Justification
Partitions			made from wood particles.
Signs		Appropriate	The base material on which the sign is mounted can be of wood.
Loose Equipment (Desks, chairs, etc.)		Appropriate	The core material for the desks, chairs, etc. can be made from particles and complete wood substrate.
Fixed Equipment (Millwork)		Appropriate	The carcass, core material and substrate for millwork can be constructed with wood.
Modular Lab Benches		Appropriate	The carcass, core material and substrate for modular lab benches can be constructed with wood.
Specialized Equipment		Inappropriate	User equipment and associated environment cannot utilize wood as these environments need to be inert.
Mechanical			
None Known			
Electrical			
None Known			
Construction Site Development			
Landscaping (Architectural, decorative, site furnishings, etc.)		Appropriate	Wood could be used in Landscaped areas for the Arts, Architectural features/site furnishings; seats, pagodas, etc.
Design-Builder			
Site establishment			Where appropriate the Design-Builder is to endeavor to utilize materials of wood and wood derivative for their site establishment

- 3.10.6 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/communication rooms, copings, cant strips, finish carpentry and architectural woodwork, including but not limited to exterior fascias, cabinets, casework which is included in Division 12, 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.

3.11 Mechanical Engineering

3.11.1 General standard of design principles:

- 3.11.1.1 The HVAC, plumbing, fire protection, and specialty systems will be designed to provide a healing, comfortable and productive environment for the Facility users.
- 3.11.1.2 The HVAC, plumbing, fire protection, and specialty systems will be designed to be accessible by stairs (unless otherwise permitted by the Owner) and allow for enough access to replace major pieces of equipment in the future without removal of other non-associated equipment or services. For equipment located in ceiling spaces, ensure adequate service clearances are maintained to provide periodic maintenance as well as allow future replacement of equipment without removal of other non-associated equipment or services.
- 3.11.1.3 All serviceable and vibration isolated equipment will be mounted on a minimum of 100mm (4 inch) high reinforced concrete housekeeping pads solidly anchored to the structural slab.
- 3.11.1.4 Provide access doors to concealed mechanical devices for operations, inspection, adjusting and servicing with allen head lock. Provide heavy duty access doors suitable for mental health facilities in secure areas. Provide medium duty access doors suitable for mental health facilities for all other accessible public spaces. Do not locate in paneled or special finished walls. Prepare detail drawings showing locations, sizes, and type of all access panels in coordination with other trades and submit to owner for approval of locations before proceeding with installation.
- 3.11.1.5 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. The codes, standards and guidelines will include, but not be limited to, the following:

3.11.1.5(1) Codes:

- 3.11.1.5(1)(a) B.C. Building Code (BCBC);
- 3.11.1.5(1)(b) National Building Code (NBC);
- 3.11.1.5(1)(c) National Energy Code for Buildings (NECB);
- 3.11.1.5(1)(d) Canadian Electrical Code;
- 3.11.1.5(1)(e) B.C. Fire Code;

- 3.11.1.5(1)(f) National Fire Code (NFC);
 - 3.11.1.5(1)(g) B.C. Plumbing Code;
 - 3.11.1.5(1)(h) City of Coquitlam Bylaws;
 - 3.11.1.5(1)(i) British Columbia Safety Authority (BCSA) Regulations, Safety Orders, Directives & Information Bulletins;
 - 3.11.1.5(1)(j) Ministry of Environment – Environment Protection Act – Regulation 346 (MOE);
 - 3.11.1.5(1)(k) Natural Gas Utilization Code;
 - 3.11.1.5(1)(l) Installation Code for Oil Burning Equipment;
 - 3.11.1.5(1)(m) British Columbia Landscape Standard (BC Landscape Standard).
- 3.11.1.5(2) Standards:
- 3.11.1.5(2)(a) Canadian Standards Association (CSA);
 - 3.11.1.5(2)(b) National Fire Protection Agency (NFPA);
 - 3.11.1.5(2)(c) American Standards for Testing and Materials (ASTM);
 - 3.11.1.5(2)(d) American National Standards Institute (ANSI);
 - 3.11.1.5(2)(e) American Water Works Association (AWWA);
 - 3.11.1.5(2)(f) Underwriters Laboratories of Canada (ULC);
 - 3.11.1.5(2)(g) ASHRAE/IES 90.1 “Energy Standards for Buildings Except Low-Rise Residential Buildings”;
 - 3.11.1.5(2)(h) CAN/CSA B64.10 Selections and Installations of Backflow Preventers;
 - 3.11.1.5(2)(i) CAN/CSA B149.1 Natural Gas and Propane Installation Code with BC Amendments
 - 3.11.1.5(2)(j) CAN/CSA B149.2 Propane Storage and Handling Code;
 - 3.11.1.5(2)(k) CAN/CSA-Z317.2 “Special Requirements for HVAC Systems in Health Care Facilities”;
 - 3.11.1.5(2)(l) CAN/CSA-Z317.1 “Special Requirements for Plumbing Installations in Health Care Systems”;

- 3.11.1.5(2)(m) Z316.5 Fume Hoods and Associated Exhaust System;
- 3.11.1.5(2)(n) NFPA 10 Standard for Potable Fire Extinguishers;
- 3.11.1.5(2)(o) NFPA 13 Standard for the Installation of Sprinkler Systems;
- 3.11.1.5(2)(p) NFPA 14 Standard for the Installation of Standpipe and Hose Systems.

3.11.1.5(3) Guidelines:

- 3.11.1.5(3)(a) American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbooks;
- 3.11.1.5(3)(b) American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) System Design Manual for Hospitals and Clinics;
- 3.11.1.5(3)(c) American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Advanced Energy Design Guide (AEDG) for Large Hospital: Achieving 50% Energy Savings Toward a Net Zero Energy Building;
- 3.11.1.5(3)(d) Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) Manuals;
- 3.11.1.5(3)(e) Industrials Ventilation Manual;
- 3.11.1.5(3)(f) Hydronics Institute Manuals;
- 3.11.1.5(3)(g) Factory Mutual (FM) to the extent specifically required by the Statement of Requirements;
- 3.11.1.5(3)(h) Associated Air Balance Council (AABC);
- 3.11.1.5(3)(i) National Environmental Balancing Bureau (NEBB); and
- 3.11.1.5(3)(j) Leadership in Energy and Environmental Design (LEED) Program.

3.11.1.6 The mechanical, plumbing, fire protection, and specialty systems will minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems.

3.11.1.7 For Type II areas and rooms as defined by CSA, mechanical and plumbing equipment will be configured and located in such a way that maintenance and repair can be performed without entering these areas.

- 3.11.1.8 The mechanical, plumbing, fire protection, and specialty systems component selection, system design, and installation will incorporate the flexibility and adaptability without major disruption or alteration to the facilities infrastructure.
 - 3.11.1.9 The mechanical, plumbing, fire protection, and specialty systems will be developed to provide reliability of continual operation. Make accommodation for 20% additional capacity and growth in system design for the administration and educational areas of the building, including shafts and chases for horizontal and vertical distribution.
 - 3.11.1.10 Provide water, sanitary, storm and gas utilities as required and sized to suit the consumption and discharge needs of the Facility. Water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, buildup of deposits, disease and bacteria and to prolong the equipment life.
 - 3.11.1.11 All mechanical, HVAC, plumbing, fire protection, and specialty systems will be vibration isolated to minimize noise and vibration through the structure or other components of the Facility.
 - 3.11.1.12 All mechanical, HVAC, plumbing, fire protection, and specialty systems will comply with standard acoustic requirements in Statement of Requirements and requirements as per CSA.
 - 3.11.1.13 All pipes, ducts and fittings will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns.
 - 3.11.1.14 Specialty systems will include acid waste and vent.
 - 3.11.1.15 The following minimum entrances will be protected by vestibules and forced air heaters: the main entrance to the Facility.
 - 3.11.1.16 All louvers, fresh air intakes, and exhaust openings will be designed to operate in high snow conditions.
- 3.11.2 Sound Attenuation and Vibration Isolation
- 3.11.2.1 Design Principles
 - 3.11.2.1(1) Design all mechanical systems to prevent sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces and maintain sound to levels as per ASHRAE standards. Design mechanical systems located at or near the Facility exterior to minimize sound transmission to the neighboring residential community.

- 3.11.2.1(2) Provide vibration isolation devices on all equipment with rotating components.
- 3.11.2.1(3) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.
- 3.11.2.1(4) Provide flexible connectors on all pump, duct, and wiring connections to isolated equipment.
- 3.11.2.1(5) Refer to Appendix 1D – Acoustics and Noise Control for additional information.

3.11.2.2 Performance Criteria

- 3.11.2.2(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.
- 3.11.2.2(2) Utilize fibre free internal insulation.

3.11.3 Product Manufacturers and Suppliers – Mechanical

- 3.11.3.1 The Design-Builder is responsible to ensure the mechanical engineering products supplied operate as intended, and meet the performance requirements of the Statement of Requirements for this Project. Products used for this Project will:
 - 3.11.3.1(1) have a proven track record of at least ten years field operation in the Lower Mainland of British Columbia in similar environments and of similar configuration;
 - 3.11.3.1(2) be efficient, reliable, and maintainable equipment;
 - 3.11.3.1(3) have good factory engineering expertise;
 - 3.11.3.1(4) have proper catalogue and/or website technical data;
 - 3.11.3.1(5) be provided by a supplier or manufacture with:
 - 3.11.3.1(5)(a) an office location in BC;
 - 3.11.3.1(5)(b) local staff with proper technical knowledge and ability to troubleshoot / follow-up on problems; and
 - 3.11.3.1(5)(c) local backup and maintenance personnel (in particular for equipment such as rooftop unit, chillers, cooling towers, boilers, etc).

3.12 Electrical Engineering

3.12.1 General standard of design principles:

- 3.12.1.1 Provide lighting and associated controls that are energy efficient, environmentally friendly, and convenient to operate for different expected task and use scenarios in each area.
- 3.12.1.2 Provide power distribution systems which are convenient to service and add to, with spare capacity for future loads. Major equipment to be located in secure service rooms.
- 3.12.1.3 Fixtures, fittings and devices suited to the risk level in Client areas, which are tamper resistant, vandal resistant, robust, anti-ligature (where required), and suited to the particular task and area.
- 3.12.1.4 Integrate communications systems where this integration provides an efficiency, operational and/or cost advantage.
- 3.12.1.5 Ensure a safe environment for staff, visitors and Clients by proper utilization of access control, video monitoring, and lighting.
- 3.12.1.6 All systems will integrate and be compatible with MTICS systems.
- 3.12.1.7 Ensure that all electrical equipment includes noise and vibration controls as outlined in Appendix 1D – Acoustics and Noise Control.

3.13 Civil Engineering

3.13.1 General Standard of Design Principles

- 3.13.1.1 The civil engineer of record will be a professional engineer registered in the Province of B.C. experienced in the design of institutional and commercial facilities of similar size and have good standing with APEGBC.
- 3.13.1.2 The Design-Builder will construct all on-site servicing to meet or exceed the design and quality requirements of the City of Coquitlam and the needs of the Facility.
- 3.13.1.3 All on-site water, sanitary sewer, and drainage systems will be sized as required for the Facility use and designed to connect with the existing on-site and City of Coquitlam municipal infrastructure.
- 3.13.1.4 The Design-Builder will protect all existing Site utilities (storm, sanitary, and water) so that they remain in full operation during the construction process.

- 3.13.1.5 The Design-Builder to confirm that all downstream utilities (storm, sanitary and water) are capable of handling the flows from the building.

3.14 Structural Engineering

3.14.1 Structural Design Principles

- 3.14.1.1 The structural engineer of record will be a professional engineer registered in the Province of B.C. experienced in the design of institutional and commercial facilities of similar size and will have designated structural engineer 'StructEng' standing with APEGBC.
- 3.14.1.2 The structural design will meet the minimum requirements of the BC Building Code and all other applicable codes, material standards, and local by-laws and the loading and performance requirements detailed in this section.
- 3.14.1.3 Prior to construction, the structural engineer of record will have a qualified independent professional engineer carry out a concept review in accordance with the requirements of APEGBC quality management by-law.
- 3.14.1.4 The structural engineer of record will perform field review of the construction at sufficient frequency and review shop drawings and reports of inspection and testing agencies to verify that the Facility structure has been built in substantial conformance with the approved issued for construction drawings and specifications.
- 3.14.1.5 The Design-Builder will use a geotechnical consultant to provide recommendations for the design of foundations, retaining structures, slabs on grade, and superstructure, including seismic design parameters. A supplementary geotechnical investigation may be required. The geotechnical consultant will be part of the Design-Builder's project team to provide recommendations for slope, stability site works and soil anchor capacities and properties if required.
- 3.14.1.6 The Design-Builder will include in the structural design and construction of the Facility provision to allow for an additional future Facility expansion of not less than 1500 square meters. Such provision for future expansion will account for future gravity and lateral loading conditions, and will include a minimum live load allowance of 2.4KPa.

3.14.2 Structural Systems

- 3.14.2.1 The preferred structural systems for the suspended floor and main roof consist of cast-in-place concrete flat slab construction and steel framing respectively. Any other proposed system is to provide similar performance for

flexibility for change, vibration resistance, fire rating, acoustic separation, ceiling space available for services, and overall Facility height.

- 3.14.2.2 Reinforced cast-in-place concrete construction will be used for the lower storey of the structure.
 - 3.14.2.3 The Facility's lateral seismic and wind loads will be resisted by reinforced concrete shear walls or structural steel bracing located at stair and elevator cores and at exterior walls. Shear walls and bracing should be avoided within interior spaces in order to leave flexibility for future changes.
 - 3.14.2.4 Post tensioned or precast concrete structural systems will not be used.
 - 3.14.2.5 Roofs may be concrete slab or structural steel construction. Structural steel open web joists will not be used for the design of floors.
 - 3.14.2.6 Depressions in wet areas will be filled with cementitious or epoxy based screeds laid to falls so that a positive fall to drains results. The top of drain will finish 40mm below surrounding level floor levels.
- 3.14.3 Design loads
- 3.14.3.1 Performance criteria:
 - 3.14.3.1(1) unless required by the specific use and occupancy, and equipment loads, the following minimum floor design live loads will apply:
 - 3.14.3.1(1)(a) level 0 and upper level corridors, stairs, lobbies and gymnasium (enclosed play space): 4.8 kPa;
 - 3.14.3.1(1)(b) upper floor levels 2.40 kPa;
 - 3.14.3.1(1)(c) mechanical room level 0 6.0 kPa;
 - 3.14.3.1(1)(d) mechanical rooms upper levels 4.8 kPa;
 - 3.14.3.1(1)(e) parking level 4.80 kPa;
 - 3.14.3.1(1)(f) driveways 12.0 kPa; and
 - 3.14.3.1(1)(g) record storage areas 12.0 kPa.
 - 3.14.3.1(2) upper floor will be designed to accommodate concentrated loads from equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted;
 - 3.14.3.1(3) floors will be designed for a minimum superimposed dead load allowance of 1.0 kPa to allow for partitions, ceilings and suspended

mechanical equipment. The roof will be designed for a superimposed dead load of 1.0 kPa plus all related roofing membrane weights;

- 3.14.3.1(4) roofs will be designed for the minimum wind, snow and rain loads as required by the BC Building Code. Notwithstanding other requirements, the minimum live load for design of roofs will be 1.0 kPa and roofs will be designed to accommodate concentrated loads from roofing materials, ceilings, equipment, machinery and features, whether roof- or ceiling-mounted;
- 3.14.3.1(5) floors and roofs above mechanical and electrical service rooms and penthouses will be designed for a superimposed suspended equipment dead load in addition to the minimum dead load allowances specified above; and
- 3.14.3.1(6) the structural design will include specific provisions for support of universal gym equipment with a minimum weight of 5000 lbs (22.24^{kN})

3.14.4 Seismic Design

- 3.14.4.1 The Facility's structures, structural components, and non-structural components and equipment restraints, will be designed for normal construction in accordance with the BC Building Code.

3.14.5 Flexibility for future change

- 3.14.5.1 The Facility will be designed to accommodate renovations for change including equipment, medical techniques, and Facility services.

3.14.5.2 Performance criteria:

- 3.14.5.2(1) the selection of a structural system that will readily accommodate future changes for similar design load parameters without the addition of structural members, welding, noise, dust, or demolition will be a primary structural design criteria.

3.14.6 Deflection limitations

- 3.14.6.1 The structure will be designed to minimize the effects of deflection and long-term creep.
- 3.14.6.2 The design of the structure is to meet the deflection limits of the BC Building Code, and applicable CSA standards as a minimum and as required for the non-structural components of the Facility. Notwithstanding the above, the deflection limit will not exceed the levels specified in this section.
- 3.14.6.3 Performance criteria:

- 3.14.6.3(1) for 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, plus immediate deflection due to additional live load, will not exceed span/480;
- 3.14.6.3(2) for steel roof construction, the maximum live load deflection will not exceed span/ 360, and total deflection will not exceed span/240;
- 3.14.6.3(3) for steel floor construction, the maximum live load deflection will not exceed span/480 and the total load deflection will not exceed span/360. The total load deflection will include effects of shrinkage of concrete topping slabs and long term shrinkage (creep); and
- 3.14.6.3(4) the floor and roof perimeter edge will be designed to limit short and long term deflection occurring after the installation of exterior wall components, including effects of creep, to a maximum of 25mm.

3.14.7 Vibration limitations

- 3.14.7.1 Design the structural system to minimize the effects of floor vibration due to use, occupancy and equipment. Vibration is to be limited to acceptable levels for the use and occupancy of the floors and for the performance requirements of this section.
- 3.14.7.2 The Design-Builder will retain an acoustic and vibration consultant. The consultant will be a professional engineer licensed to practice in the Province of British Columbia with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance for buildings similar in function, size and complexity to the Facility.
- 3.14.7.3 Ensure that the design of the structural, mechanical and electrical systems of the Facility complies with the most stringent requirements of Table 3.14.7.10 Acceptable Vibration Levels for Various Typical Facility Spaces. The Design-Builder will ensure that the requirements of equipment manufacturers and the principles detailed in this section are complied with to result in control of the vibration of the structure of the Facility. The Design-Builder will further ensure that such requirements and principles are implemented such that performance of the equipment is not adversely affected.
- 3.14.7.4 The Design-Builder will undertake space planning to maximize the separation between vibration sensitive equipment and sources of vibration, particularly mechanical rooms, electrical rooms, telecommunications rooms and server rooms.
- 3.14.7.5 Floor system vibration characteristics are to be in accordance with Commentary D of the NBC 2010 Edition.

- 3.14.7.6 Table 3.14.7.10 lists the requirements for various typical areas of the Facility and the maximum vibration velocity allowed – note that the corresponding floor stiffness applies only to footfalls within the floor space in consideration.
- 3.14.7.7 Demonstrate using numerical analysis carried out by the structural engineer and vibration consultant that the vibration responses of the proposed building structure at the location of the space or equipment in question will not exceed the values specified in Table 3.14.7.10.
- 3.14.7.8 Select and design floor structural systems to have a vibration acceleration maximum limit of 0.5%g with a damping ratio of 0.02 when an excitation force of 0.29 KN is applied.
- 3.14.7.9 Select the damping ratio, based on generally accepted practice, to reflect appropriately the structural system, the influence of non-structural elements and the effect of building occupants.
- 3.14.7.10 Undertake field testing of the vibration response of the structure at the location of critical equipment or spaces to demonstrate that the as-constructed condition will satisfy the required maximum vibration response noted in Table 3.14.7.10.

Table 3.14.7.10: Acceptable Vibration Levels for Various Typical Facility Spaces

Occupancy or Equipment Requirements	Vibration Velocity (1)		Floor Stiffness KFn (2)
	Micro-ins/s	Micro-m/s	Kips/in-sec
Mechanical rooms on an unoccupied floor above or below an occupied floor	40000	1000	Not Applicable
Office areas, waiting rooms and corridors	16000	400	250-1500
Mechanical rooms on the same floor as an occupied area	12000	300	Not Applicable
Computer areas; Client areas (daytime)	8000	200	500-3000
Residential Night (ISO)	5600	140	250-1500

Notes: (1) As measured in 1/3rd octave bands over the frequency range 8 to 80 Hz.
(2) KFn depends on walker weight and gait Ranges indicated reflect average to conservative designs. Average walker weight (150lbs-75 steps/min) Conservative walker weight (185lbs – 100 steps/min).

3.14.7.11 Whenever possible, isolate the major sources of vibration at the source as opposed to isolation of the vibration sensitive equipment itself. Machinery that could be a source of vibration will be mounted using vibration isolation techniques.

3.14.7.12 Be aware that additional mass may be required to provide an inertial base for adequate isolation of Facility services or equipment and ensure that the structure accounts for this additional dead load.

3.14.8 Durability

3.14.8.1 The Facility's structure and structural components will be designed for a minimum 100-year life span. The rest of the building components to be designed to a minimum of 50 years.

3.14.8.2 Design of the Facility's structure will be in accordance with the BC Building Code and the applicable material and CSA standards including CSA S478 Guideline on Durability of Buildings.

3.14.8.3 Design of the Facility's structure and structural components will minimize effects of corrosion and deterioration due to environment and use in accordance with the following:

- 3.14.8.3(1) adequate concrete crack control joints and expansion/contraction joints; caulk exposed joints;
- 3.14.8.3(2) high strength concrete mixes proportioned to CSA durability requirements for exposure class;
- 3.14.8.3(3) reinforce concrete for crack control and repair exposed cracks;
- 3.14.8.3(4) chamfer corners of exposed concrete where possible;
- 3.14.8.3(5) hot-dip galvanize exterior exposed steel;
- 3.14.8.3(6) reinforcement and required curing for concrete toppings;
- 3.14.8.3(7) corrosion protection measures for concrete exposed to moisture in the parking area in accordance with CSA S413, including application of sealers to vertical concrete surfaces in splash zones and slopes for drainage; and
- 3.14.8.3(8) provide protective cap flashings and drips, sealers, raised concrete pedestals at grade supports, and roof overhangs to ensure that wood structural elements are not directly exposed to the weather.

3.14.9 Equipment Supports

- 3.14.9.1 Design and provide for support/anchorage of equipment. Equipment will be supported, anchored, and braced to resist gravity, operational, and seismic loads, as advised by the relevant manufacturers, in a manner required for the functional and service requirements for the specific equipment.]
- 3.14.9.2 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 this design engineer.
- 3.14.9.3 Performance criteria:
 - 3.14.9.3(1) floor and roof assemblies will be designed to support the gravity and seismic loads for floor-, wall-, or ceiling-mounted equipment;
 - 3.14.9.3(2) the structure will be designed for the vibration limitations specified by the manufacturer of the specified equipment. Carry out in-situ vibration testing when specified by the equipment manufacturer;

- 3.14.9.3(3) drilled insert-type anchors for equipment supports and anchorage will be rated by the insert manufacturer for seismic and cyclic loading applications and drop-in sleeve anchors will not be used.

3.15 Member Design Criteria

- 3.15.1 Design all floor and roof structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored loads.
- 3.15.2 Design all floor and roof structural members to have sufficient stiffness so as to remain serviceable under the specified gravity loads. The deflection criteria are presented in Section 3.14.6.
- 3.15.3 Lateral Load Resisting System Design Criteria
- 3.15.3.1 Design all structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored lateral wind pressures or seismic loads, whichever produces the more unfavorable effect.
- 3.15.3.2 Design all structural framing members to have sufficient stiffness so as to remain serviceable under the specified wind pressures. The maximum inter-storey drift under the 1 in 50 year service wind pressure and gravity loads will not exceed 1/500 of the storey height.
- 3.15.4 Cladding Support Design Criteria
- 3.15.4.1 Where the cladding system is to be supported by the structural members, design the members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored gravity, wind pressures and seismic forces, included applicable importance factors.
- 3.15.4.2 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. The deflection serviceability limits are shown in Table 3.11.1.4(2) Deflection/Span Ratios

Table 3.11.1.4(2) Deflection/Span Ratios

Maximum Deflection/Span - Cladding Support Members		
Member Type	Specified Loading	Deflection Limits
Precast/reinforced concrete floor members supporting cladding panels.	Long-term superimposed dead load plus live load (Vertical)	1:500 or 15mm max
Structural steel members of floors or roofs supporting cladding panels.	Live Load (Vertical)	1:500 or 15mm max
All cladding support members.	1 in 10 year wind (Horizontal)	1:360 max

3.15.5 Structural Integrity

3.15.5.1 Various levels of structural integrity, ranging from the minimum level of structural integrity as stipulated the BC Building Code to enhanced integrity as determined by a rigorous progressive collapse design approach will be considered. Design any structure and its structural members to have sufficient structural capacity and structural integrity to safely and effectively resist all loads and effects of loads and influence that may reasonably be expected over the service life of the structure including settlement.

3.15.6 Thermal Expansion

3.15.6.1 Design the primary and secondary structural elements to accommodate the effects of thermal movements of the Facility structure.

3.16 Landscape Architecture and Landscape Design

3.16.1 Landscape Design Principles

3.16.1.1 The Site trees are part of an overall important Riverview site-wide tree inventory and will be incorporated into and influence the Design wherever possible.

3.16.1.2 All areas of the landscape design will focus on health, healing, and wellness.

3.16.1.3 Plant materials will be predominantly indigenous in nature with a focus on increasing bio-diversity.

3.16.1.4 All landscaped areas will have a defined purpose and intension and where possible serve a multitude of functions.

3.16.1.5 The landscape design will reflect the overall natural, therapeutic garden, and pastoral nature of the Site.

3.16.1.6 The Site and landscape design will respond and reflect the importance of the connectivity of the Site.

3.16.2 Existing Trees, Tree Retention, and Tree Preservation

- 3.16.2.1 Existing trees are to be incorporated into the landscape design wherever possible.
- 3.16.2.2 In addition to tree removal requests from BC Housing, tree removal permits must also be obtained from the City of Coquitlam.
- 3.16.2.3 The Design-Builder will retain a qualified arborist to prepare reports for all trees on the Site.
- 3.16.2.4 The Design-Builder will comply with the BC Housing "Riverview Lands Tree and Plan Protection Specification".

3.16.3 Landscape Performance Criteria / Exterior Spaces

- 3.16.3.1 All planting to be non-toxic, varied in character with year round interest, native and/or adaptable, and used to influence healing and therapeutic measures.
- 3.16.3.2 All planting is to be irrigated with a high efficient automatic irrigation system.
- 3.16.3.3 Covered structures for shade and / or weather protection to be of a material which is shatter proof, non-climbable, anti-ligature and durable.
- 3.16.3.4 Landscape features and site furnishings to be durable, long lasting, comfortable, and functional.
- 3.16.3.5 If extensive green roofs are proposed they must be: irrigated, have a growing minimum depth of 150mm, be non-combustible, and contain a variety of low growing plant materials.
- 3.16.3.6 All green roofs to consist of sedum materials that is green and colourful all year round without a brown and/or decayed appearance.
- 3.16.3.7 Provide secure garden shed and / or area for garden equipment in urban agriculture areas.
- 3.16.3.8 All landscape gardens and roof tops to have access to secure all weather hose bibs.
- 3.16.3.9 Fencing in secure areas to be non-climbable, made of materials that are aesthetic and do not have an institutional character. Barbed wire, razor wire and broken glass or any material that deters entry by injury is prohibited.
- 3.16.3.10 Ensure landscape buffers separate the site parking to reduce visual impact.

3.17 Erosion and Sedimentation Control

- 3.17.1 The Site must be protected in accordance with the requirements of the City of Coquitlam 'Stream and Drainage System Protection By-Law No. 4403, 2013'.
- 3.17.2 Design and construct (and maintain throughout the Term) the erosion and sediment control measures as required to prevent the discharge of sediment laden water into the City of Coquitlam's storm sewer system, creeks or watercourses.

3.18 Acoustics and Noise Control

3.18.1 Acoustic Performance

- 3.18.1.1 Appropriate acoustical performance is critical to specific areas within the Facility including but not limited to private offices, conference rooms with teleconferencing, interview rooms, classrooms, Client rooms, etc. Furthermore, areas such as the gymnasium (enclosed play space) and service rooms, including the mechanical and electrical rooms and the generator room (if indoors in particular), all present unique challenges to minimize transmission of sound to adjoining spaces. Care must be taken throughout the detail design phase and during Construction to ensure that the level of design and workmanship achieves and maintains the desired room acoustic conditions (i.e. reverberation time, RT_{60}), sound isolation performance (i.e. Sound Transmission Class, STC) of the assemblies and appropriate background noise levels (i.e. Noise Criteria, NC) ratings.
- 3.18.1.2 The Room Data Sheets indicate these requirements for most spaces, either individually or as part of an element. Refer also to Appendix 1D – Acoustics and Noise Control for a summary of acoustic design targets.
- 3.18.1.3 Where a Room Data Sheet includes a number of spaces, or an entire element, the STC rating indicated applies to the perimeter of that grouping or element unless otherwise clarified. Where adjacent rooms have different STC requirements, the greater STC requirement will be applied to the demising wall. The NC ratings apply to all spaces within the grouping or element unless indicated otherwise.
- 3.18.1.4 The Design-Builder may develop assemblies in consultation with their acoustical consultant. The suitability of the proposed assembly will be scrutinized throughout design development and the final constructed assembly may be subjected to in-situ testing to determine the Apparent Sound Transmission Class (ASTC) by an independent agency prior to or after occupancy.
- 3.18.1.5 A sound insulating partition means a partition that has been specified to be STC 45 or greater. The STC ratings specified in Appendix 1C – Room Data

sheets and Appendix 1D – Acoustics and Noise Control will be considered the minimum required. Where it is determined to be impractical to extend a partition to the underside of the deck, an alternative design may be used provided that the specified STC indicated in the Room Data Sheet is met. Detailing of acoustical assemblies must take into account structure, and assembly, short and long-term deflection. STC ratings will apply to floor and ceiling construction, as well as walls.

- 3.18.1.6 Floor design will provide structure-borne noise isolation between critical spaces, and will address footfall sound.
- 3.18.1.7 Exterior glazing will be selected to sufficiently reduce exterior noise to meet the dBA requirement for the room, based on the 15 minute Leq of the predictable worst case hour of a typical 24 hour day. Refer to Table 2 in Appendix 1D – Acoustics and Noise Control.
- 3.18.1.8 Where the STC rating for a partition, door or window is not sufficient to reduce intrusive noise to meet the NC rating, partitions will be upgraded in design to meet the NC rating.
- 3.18.1.9 Building services sound levels will not exceed the NC ratings specified in the Appendix 1C – Room Data sheets and in Appendix 1D – Acoustics and Noise Control. Audible sounds from building services will not contain any readily identifiable unusual traits including buzz, whine, hiss, regardless of NC level. NC levels may be subjected to in-situ testing by an Independent testing agency prior to or after occupancy to ensure compliance of acoustical design criteria.
- 3.18.1.10 Access flooring will not generate drumming or footfall noise when walked on. Sound isolating partitions will extend from the structural floor slab to underside of slab or deck above, interrupting access flooring; except where approved to the contrary. Where cables pass through such partitions at the underside of the partition, the pass-through will be detailed to maintain the sound integrity of the partition.
- 3.18.1.11 For sound recording rooms, video- and tele-conferencing rooms, and meeting rooms larger than 15m², provide wall and ceiling sound absorbing finishes sufficient to provide high speech intelligibility. Refer also to Tables 1 and 3 Appendix 1D – Acoustics and Noise Control.
- 3.18.1.12 Vibration control and floating floor systems (if required) will be provided for all major mechanical rooms located above critical spaces including communications centres, offices, meeting rooms, boardrooms or any other area where structure-borne noise would create negative acoustic effects in occupied space. Proper vibration isolation mountings of any rotating or vibrating machinery or device will be provided.

- 3.18.1.13 The exterior building envelope including glazed areas, will be such as to meet the project dBA requirements as outlined in Table 2 of Appendix 1D – Acoustics and Noise Control.
- 3.18.1.14 Noise control measures will be applied to generator and other outdoor mechanical equipment to ensure that intrusive noise from the mechanical equipment does not exceed the dBA rating for any indoor spaces per Table 2 of Appendix 1D – Acoustics and Noise Control, and that sound levels emanating from the equipment do not exceed the requirements of the Noise Bylaw of the City of Coquitlam in terms of adjacent occupied areas.
- 3.18.1.15 REFERENCES
- 3.18.1.15(1) NC (Noise Criterion) – ASHRAE. 2003, 2003 ASHRAE Applications Handbook, Chapter 47.26
- 3.18.1.15(2) STC (Sound Transmission Class) – ASTM E90
- 3.18.1.15(3) Leq (Time Weighted Equivalent Sound Level)
- 3.18.1.15(4) NRC (Noise Reduction Coefficient) – ASTM C423

3.19 Food Services and Equipment

3.19.1 Basic Requirements

- 3.19.1.1 Provide a food reheat area in General Building Services on the basement level for storing hot and cold food products received in bulk format from the Centre for Mental Health and Addictions (CMHA) two times per day for Clients in the Response, Crossroads, Complex Care and Dala Neighbourhoods. Hot menu items will be delivered in hot holding cabinets capable of electrically heating/maintaining food temperatures. Cold menu items will be delivered in insulated food carts capable of maintaining cold food temperatures.
- 3.19.1.2 Provide kitchens in each of the Response, Crossroads, Complex Care and Dala Neighbourhoods to facilitate meal plating and service and dish washing.
- 3.19.1.3 In the PAC Neighbourhood, provide a commercial kitchen to facilitate storage, preparation, from scratch cooking, meals plating and service and dishwashing. Food products for the PAC unit will be received at the loading dock and transported to the PAC kitchen by PAC staff.
- 3.19.1.4 Provide all kitchen and food service equipment described in this Section 3.19.

3.19.2 Scope of Service

3.19.2.1 Design the Neighbourhoods to accommodate the food service procedures set out in Section 3.19, including the following requirements:

- 3.19.2.1(1) Clients will consume their meals in a dining room similar to a family style service. Meals will also be available to staff on each Neighbourhood;
- 3.19.2.1(2) dining rooms will be domestic in look and finish and will include a counter for buffet type service of hot and cold foods and beverages;
- 3.19.2.1(3) for the Response, Crossroads, Complex Care and Dala Neighbourhoods:
 - 3.19.2.1(3)(a) provide kitchens that are domestic in look and finish, and supplemented with commercial equipment for refrigerating and freezing foods and dishwashing; and
 - 3.19.2.1(3)(b) provide a pass through window between the dining room and the kitchen for use in special circumstances and for when a buffet type service in the dining room is not possible, such pass through window to be secured with a lock operable from the kitchen side only;
- 3.19.2.1(4) for the PAC Neighbourhood:
 - 3.19.2.1(4)(a) provide a kitchen that is commercial in look and finish with all commercial equipment; and
 - 3.19.2.1(4)(b) provide a door to the dining room for food transfer.

3.19.3 Activities and Workflow

3.19.3.1 Design the Facility to accommodate the following food product ordering, receiving, and storage practices:

- 3.19.3.1(1) All food products will be received from the CMHA facility and/or commercial food purveyors.
- 3.19.3.1(2) All incoming food carts for Response, Crossroads, Complex Care and Dala Neighbourhoods will be removed from transport vehicles and placed immediately within the General Building Services food reheat area. Provide a cart marwilling space to accommodate one full complement of hot holding cabinets for hot food and insulated holding cabinets for cold foods. Soiled hot and cold food carts will be held within the same space and exchanged for clean carts during the delivery process.

3.19.3.1(3) The hot holding cabinets and insulated food carts will be transported via elevator to the Response, Crossroads, Complex Care and Dala Neighbourhood kitchens prior to each meal period and:

3.19.3.1(3)(a) cold menu items will be held in a combination of the insulated food cart, a roll-in refrigerator, a reach-in refrigerator and an under counter freezer; and

3.19.3.1(3)(b) hot menu items will be held in the hot holding cabinets within each kitchen.

3.19.3.1(4) All incoming food products for PAC will be moved from the loading dock or General Building Services food reheat area directly to reach-in type refrigerated, frozen and dry storage areas within the PAC kitchen.

3.19.3.2 Cooking

3.19.3.2(1) For the Response, Crossroads, Complex Care and Dala Neighbourhood kitchen, provide:

3.19.3.2(1)(a) a domestic type range with oven for teaching purposes; and

3.19.3.2(1)(b) a domestic type microwave.

3.19.3.2(2) For the PAC kitchen, provide a restaurant grade range with six burners, 24" griddle and 24" broiler (below the griddle) and two convection ovens.

3.19.3.3 Meal Service

3.19.3.3(1) At service times, pans of hot food, pans of cold food and beverage containers will be moved from the kitchen to a buffet type counter within the dining room for Response, Crossroads, Complex Care and Dala Neighbourhoods. Clients and staff will help themselves to the food and beverage products.

3.19.3.3(2) At service times, meals will be portioned and plated within the PAC kitchen and moved to the dining room for service using a utility cart.

3.19.3.3(3) Coffee and tea will be brewed in the kitchen for Response, Crossroads, Complex Care, Dala and PAC Neighbourhoods and will be available to Clients throughout the day. Milk, juices and other cold drinks will be available as well throughout the day from the kitchen.

3.19.3.4 Dish Washing and Pot Washing

3.19.3.4(1) After meal service, Clients and staff will return their soiled service wares to the kitchen of their applicable Neighbourhood, where they will

separate the waste and place their dirty items directly into the dishwasher. Provide a commercial dishwasher for each of the Response, Crossroads, Complex Care and Dala Neighbourhood kitchens. Provide a commercial single tank, upright dishwasher with self-contained vent hood for the PAC kitchen.

- 3.19.3.4(2) Bulk food pans used for meal service in the dining rooms for Response, Crossroads, Complex Care and Dala Neighbourhoods will be returned to the CMHA facility in the same hot and cold carts that were used to deliver them.
- 3.19.3.4(3) Provide a 3 compartment pot sink in the General Building Services food reheat area for use in special circumstances or when the dishwashers are not functioning and proper wash/rinse/sanitizing procedures must be met.
- 3.19.3.4(4) Provide a cart washing area will be provided in the General Building Services food reheat area for spray washing any cart that might to be cleaned before returning to the CMHA facility.

3.19.3.5 Material Management

- 3.19.3.5(1) Foodservice supplies will be received at the loading dock and moved to the General Building Services food reheat area.
- 3.19.3.5(2) Kitchen linens (i.e. towels and cloths) and staff uniforms will be washed in the laundry or by an off-site laundry service provider.
- 3.19.3.5(3) Waste generated within the foodservice areas will be collected and sorted for organics, recyclables and general waste, held temporarily and then transported to the main waste handling area in lidded and mobile containers.

3.19.4 Design Criteria

3.19.4.1 Location and Adjacencies

- 3.19.4.1(1) Provide convenient access from the food reheat area via non-public corridor to the main receiving dock for the receipt of food products and related food service goods.
- 3.19.4.1(2) The General Building Services food reheat area must be located on the same level as receiving/loading dock.
- 3.19.4.1(3) Provide reasonable access from the food reheat area via non-public corridors wherever possible, to the Neighborhood kitchens for

distribution of foods and return of soiled carts. Ensure that this circulation is hidden from public view wherever practical.

- 3.19.4.1(4) Provide convenient access by corridor from the kitchens to a housekeeping room or janitor closet.
- 3.19.4.1(5) Locate the Neighbourhood kitchens immediately adjacent to the dining rooms.
- 3.19.4.1(6) Provide each kitchen with two doors to ensure staff safety.
- 3.19.4.1(7) Provide hand wash stations with soap dispensers and/or hand disinfectant stations in all work areas.
- 3.19.4.1(8) Provide eye wash stations where bulk chemical storage occurs and where chemicals are used predominantly.

3.19.4.2 Ventilation

- 3.19.4.2(1) Provide air-conditioned moderate velocity air as well as ventilation in all food service areas.
- 3.19.4.2(2) Provide a slight negative pressure for odour control in all food service areas.
- 3.19.4.2(3) Special exhaust meeting the NFPA code will be required over any and all cooking equipment within the PAC kitchen. Additional exhaust will be required to vent odours and to vent humidity from the dish and pot washing equipment.

3.19.4.3 Room Finishes

- 3.19.4.3(1) Heavy duty non slip flooring will be provided for all kitchens which is washable, impervious to food acids and oils, suitable for rolling equipment, and has anti-mould/anti-fungi characteristics.
- 3.19.4.3(2) All corners between walls, floors, and ceilings within the kitchens will be coved.
- 3.19.4.3(3) Ensure that all general areas in the kitchen are gradually sloped to central floor drains for general drainage and to enable mechanically assisted spray wash and chemical sanitation.
- 3.19.4.3(4) Provide wall finishes which are smooth, washable and durable in all food service areas and provide protection from cart damage.

3.19.4.3(5) The kitchens will include wall protection from the top of floor coving to at least 1.2 meters high to protect from cart damage.

3.19.4.3(6) Walls behind pot washing equipment will be protected with wall protection to underside of ceilings.

3.19.4.4 Emergency Power

3.19.4.4(1) At a minimum:

3.19.4.4(1)(a) commercial reach-in and roll-in refrigerators and freezers; and

3.19.4.4(1)(b) restaurant range and the exhaust hood in the PAC kitchen,

will be on emergency power. All other foodservice equipment may be on conditional power.

3.20 Commissioning Agent

3.20.1 The Owner may at any time, upon written request, require the Design-Builder to obtain a conflict of interest declaration from the commissioning agent for the purposes of allowing the Owner to assess the independence of the commissioning agent. The Design-Builder will promptly provide such declaration to the Owner. If necessary, the Design-Builder will, and will require the commissioning agent to, take steps, as determined by the Owner acting reasonably, to overcome or otherwise manage any potential conflicts of interest.

3.20.2 The commissioning agent will lead all the commissioning-related activities of the Project. It is anticipated that the commissioning agent will be required to complete commissioning activities that include the following:

3.20.2.1 review of the Owner's Project requirements;

3.20.2.2 review of the Design-Builder's basis of design;

3.20.2.3 commissioning-focused Design review at the 50% design stage;

3.20.2.4 review of commissioning specifications;

3.20.2.5 Design review back-check at 75-90% design stage to verify that previous comments were incorporated;

3.20.2.6 commissioning-focused review of shop drawings;

3.20.2.7 review of equipment static checks / pre-functional checks;

3.20.2.8 review of equipment operational checks / start-up checks;

- 3.20.2.9 review of functional performance testing;
- 3.20.2.10 review of operation and maintenance manuals; and
- 3.20.2.11 review of operation and maintenance training / demonstrations; and
- 3.20.3 In accordance with the Project requirements, at a minimum, the following energy-related systems will be commissioned:
 - 3.20.3.1 heating, ventilating, air conditioning and refrigeration and associated controls;
 - 3.20.3.2 lighting and day lighting controls;
 - 3.20.3.3 domestic water systems;
 - 3.20.3.4 renewable energy systems (e.g. wind, solar); and
 - 3.20.3.5 building envelope.
- 3.20.4 In addition to the above, the commissioning agent will be responsible for commissioning:
 - 3.20.4.1 electrical distribution;
 - 3.20.4.2 emergency generator and integration;
 - 3.20.4.3 security & access control;
 - 3.20.4.4 fire alarm & integration;
 - 3.20.4.5 communications and IT Systems;
 - 3.20.4.6 BMS;
 - 3.20.4.7 sanitary waste;
 - 3.20.4.8 storm drainage; and
 - 3.20.4.9 natural gas.
- 3.20.5 Quality Assurance
 - 3.20.5.1 Utilize a quality assurance system throughout the TAB and commissioning process to ensure that TAB and commissioning have been performed to all equipment and systems requiring TAB and commissioning. Demonstrate the quality assurance system to the Owner prior to beginning TAB and commissioning.
- 3.20.6 Testing, Adjusting, Balancing and Commissioning

- 3.20.6.1 Demonstrate to the Owner that the mechanical and electrical systems are substantially operational by testing, adjusting, balancing, and commissioning the systems in accordance with good industry practice.
 - 3.20.6.2 Provide system testing, adjustment, balancing and commissioning after 3 months of Facility and systems usage following occupancy.
 - 3.20.6.3 Retain complete records of all TAB and commissioning data; and provide the Owner with a copy of the final documents for review.
 - 3.20.6.4 Specify acoustic testing requirements, given the sensitivity and importance of these requirements.
 - 3.20.6.5 Ensure any Construction or installation errors are identified and systems have been balanced prior to the start of commissioning functional testing.
 - 3.20.6.6 Perform follow-up TAB and commissioning services during each season over the first year of the Facility's operation starting from Substantial Completion. A minimum of three follow-up reviews is required, one each during winter, summer, and shoulder season (spring or fall).
- 3.20.7 Overall Design Standards:
- 3.20.7.1 CSA Z318.5, Commissioning of Electrical Equipment and Systems in Health Care Facilities.
 - 3.20.7.2 CSA Z8001, Commissioning of Health Care Facilities.
- 3.20.8 Openings:
- 3.20.8.1 Design, Selection and Commissioning of Window Installations.

4. SITE DEVELOPMENT REQUIREMENTS

4.1 Exterior Spaces

- 4.1.1 All trees must be protected and preserved unless prior written approval has been provided by BC Housing. The Design-Builder will comply with any conditions imposed by BC Housing in any such approval.
- 4.1.2 Wherever possible, incorporate the existing trees into the overall landscape and Site design.
- 4.1.3 Provide exterior public spaces including areas that:
 - 4.1.3.1 welcome and engage visitors, Clients, and staff;
 - 4.1.3.2 provide access to nature;
 - 4.1.3.3 provide access to sun and shade within each exterior garden area;
 - 4.1.3.4 provide play, recreation, exercise and respite opportunities;
 - 4.1.3.5 provide protection from sun, wind and rain at main and emergency and loading entries;
 - 4.1.3.6 have visual appeal throughout the year;
 - 4.1.3.7 reinforce health and wellness for the residents, staff, and users;
 - 4.1.3.8 utilize roof areas for amenity, urban agriculture, and access to nature;
 - 4.1.3.9 are low maintenance;
 - 4.1.3.10 provide physical separation between the Construction Site and neighbouring buildings;
 - 4.1.3.11 provide visual privacy for neighbours buildings both in the building and their outdoor spaces;
 - 4.1.3.12 minimize intrusion of Facility activities on neighbouring buildings; and
 - 4.1.3.13 are safe, with visible areas with adequate lighting and seating for visitors waiting for transportation.
- 4.1.4 Locate trees or shrubbery, lighting and other elements to support way-finding with particular emphasis on building entrances.
- 4.1.5 Incorporate principles of Crime Prevention through Environmental Design (CPTED).

- 4.1.6 Determine any sources of outdoor contaminant to avoid infiltration into building and ensure intake/exhaust placed to avoid cross-contamination (e.g. loading docks, ministry vehicles/police zone, parking zones). Take into consideration contaminant infiltration into the building by wind/thermal inversions.
- 4.1.7 Utilize paving patterns which can easily be differentiated from vehicular paving by pedestrians where they cross vehicular traffic on the following streets: Palm Terrace, Iris Crescent and Holly Drive.
- 4.1.8 Construction Site furnishings will be durable, comfortable, and have a sense of permanence. Construction Site furnishings will be incorporated into landscape structures and elements to the greatest extent possible. If stand-alone features are required, they will be anchored in place and / or too heavy to lift manually.
- 4.1.9 Security fences will be non-climbable. Fencing character will be well considered so that it has a quality aesthetic look and not a penitentiary look or feel.
- 4.1.10 Plant materials will be utilized so that they reinforce the health and wellness aspects of garden design. Native plant material and reinforcing biodiversity are important in the planting design.
- 4.1.11 Provide tamper and weather proof exterior lighting.
- 4.1.12 Provide sheltered outdoor spaces for use by staff that:
 - 4.1.12.1 provide shelter from sun, rain and wind;
 - 4.1.12.2 offer views of trees and plants that reflect seasonal change; and
 - 4.1.12.3 are located to minimize noise and provide privacy from neighbouring buildings.
- 4.1.13 The Design-Builder will minimize surface irregularities and ensure that walking surfaces, inside and outside the Facility are free from surface irregularities that are a safety hazard.
- 4.1.14 Design exterior entryways, outdoor stairs, and similar with consideration given to the possible changes in weather and how it would affect the walking surface.
- 4.1.15 Design outdoor areas to reduce ice and snow accumulation.
- 4.1.16 Exterior lighting will allow for eyes to notice changes in depth or height of obstacles encountered.
- 4.1.17 Exterior handrails will be placed so that they can be recognized immediately as a safety precaution (wider stairs may require a railing in the middle of the stairs as well as on the sides).

4.1.18 Stair dimensions, handrails and lighting to decrease the risk of slip/trip/falls are to follow:

4.1.18.1 BCBC Stairs, Ramps, Handrails and Guard; and

4.1.18.2 WSBC OHS Requirements Part 4.62 and publications Slip, Trip, and Fall Prevention for Healthcare Workers Department of Health and Human Services, CDC/NIOSH (Bell, et. al. 2010).

4.2 Outdoor Program Requirements

4.2.1 Provide a Crossroads outdoor space with:

4.2.1.1 enclosed secure space with minimum 4m high non-climbable fence that is aesthetically pleasing;

4.2.1.2 a ½ sports court (½ basketball court), and / or resilient paving for play, seating and gathering spaces;

4.2.1.3 trees and planting that are non-climbable and reinforce sensory and provide access to nature;

4.2.1.4 20% of garden area to be covered with weather protection allowing light and / or shade to ensure comfort; and

4.2.1.5 adequate fixed site furnishings built into landscape elements. Seating surfaces to be predominantly wood.

4.2.2 Provide a Complex Care Unit garden with:

4.2.2.1 non-secure perimeter fencing 1.2m high with open aesthetic contemporary garden character, if the garden is located at grade. Refer to Section 6.8.2.9 if the garden is located on a terrace;

4.2.2.2 opportunities for urban agriculture and gardening;

4.2.2.3 plantings that reinforce sensory and provide access to nature;

4.2.2.4 adequate seating and site furnishings as part of the garden experience. Space provided for outdoor furniture such as tables and chairs to be incorporated. Seating surfaces to be predominantly wood;

4.2.2.5 covered space for weather protection and shade to be incorporated into garden design. This covered space may be separate structure; and

4.2.2.6 space for seating, gathering, urban agriculture, outdoor eating, access to nature, respite, exercise, and gardening.

- 4.2.3 Provide a communal garden that:
 - 4.2.3.1 is a non-secure area for residents, staff, visitors, and public.
 - 4.2.3.2 includes space for seating, gathering, urban agriculture, outdoor eating, access to nature, respite, and gardening.
 - 4.2.3.3 has opportunities for urban agriculture and gardening;
 - 4.2.3.4 has plantings that reinforce sensory and provide access to nature.
 - 4.2.3.5 has adequate seating and site furnishings as part of the garden experience. Space provided for outdoor furniture such as tables, chairs, and picnic tables to be incorporated. Seating surfaces to be predominantly wood.
- 4.2.4 Provide a PAC garden with:
 - 4.2.4.1 20% of garden area to be covered with weather protection allowing light and / or shade to ensure comfort;
 - 4.2.4.2 opportunities for urban agriculture and gardening;
 - 4.2.4.3 adequate seating and site furnishings as part of the garden experience to be built in and secure. Seating surfaces to be predominantly wood;
 - 4.2.4.4 art and / or chalk walls; and
 - 4.2.4.5 planting and access to nature.

4.3 Circulation and Adjacencies (Pedestrian and Vehicular)

- 4.3.1 Site circulation will co-ordinate, separate and emphasize safety in the movements of vehicles (including staff, visitors, transit, emergency, education and service), bicycles, pedestrian and wheelchairs.
- 4.3.2 Pedestrian Walkways
 - 4.3.2.1 Integrate pedestrian circulation around the Site and minimize conflict with vehicles.
 - 4.3.2.2 Design pathways to provide universal access to all entrances and exits to the Facility.
 - 4.3.2.3 Pathways and sidewalks will be configured to provide maximum amount of natural visual surveillance and:
 - 4.3.2.3(1) all sidewalks will be concrete with a minimum width of 1.5 meters; and

- 4.3.2.3(2) all sidewalks will have a maximum grade of 5.0% with a cross slope maximum of 3%.

4.3.3 Vehicular access and parking

- 4.3.3.1 Integrate vehicular circulation with layout of pedestrian zones to provide visible connections, to promote safe travel, and to minimize conflict between vehicles and other modes of travel.
- 4.3.3.2 Accommodate emergency vehicle access to the Facility.
- 4.3.3.3 Provide a loading and delivery dock to accommodate three delivery vehicles. Provide one loading space covered from inclement weather.
- 4.3.3.4 Provide all required turning movements for a 5 ton cube truck in order to permit full access to the loading dock.
- 4.3.3.5 Provide a minimum of 158 parking stalls on the Construction Site (including 11 stalls for service vehicles in a secure area) as follows:
 - 4.3.3.5(1) a minimum 69 parking stalls (of the 158 parking stalls) to be underground within the Facility footprint; and
 - 4.3.3.5(2) the remainder of the parking stalls are surface parking on the Construction Site.
- 4.3.3.6 Parking spaces to be delineated by line paint markings.
- 4.3.3.7 Parking areas within the Construction Site exterior to be broken up with landscape buffers.
- 4.3.3.8 Provide an enclosed garbage, composting and recycling area near the loading dock. The enclosure will be lockable.
- 4.3.3.9 Provide a Sally Port emergency vehicle drop off area with convenient and discrete access to service elevators.
- 4.3.3.10 The Sally Port area will have a minimum clear height to accommodate sheriff vans.
- 4.3.3.11 Provide minimum two manual gates on either side of the Sally Port to provide in and out access.
- 4.3.3.12 Sally Port enclosure to be constructed of privacy chain link fencing in keeping with security requirements.

4.3.4 Exterior Signage

- 4.3.4.1 Provide signs identifying the Facility entrances.
- 4.3.4.2 Signage will be designed and constructed to withstand typical weather conditions experienced at the Site. Signage will have lighting after dark so that major signs are legible at all times. Ensure that views to important signs, Site and Facility entrance are not obstructed by trees or shrubs. Wayfinding design must assist staff, visitors, emergency vehicles, deliveries and Clients to know:
 - 4.3.4.2(1) the Facility name;
 - 4.3.4.2(2) where to park;
 - 4.3.4.2(3) how to find the correct entrance;
 - 4.3.4.2(4) how to find the correct destination;
 - 4.3.4.2(5) where adjacent streets are relative to each exit;
 - 4.3.4.2(6) where the Sally Port entry is located;
 - 4.3.4.2(7) where the main entry is;
 - 4.3.4.2(8) how to exit the parking lot;
 - 4.3.4.2(9) where the delivery entrance is;
 - 4.3.4.2(10) where not to park throughout the Site; and
 - 4.3.4.2(11) that exit doors are not to be used for entry.
- 4.3.4.3 Signage will be designed to:
 - 4.3.4.3(1) minimize light spillage;
 - 4.3.4.3(2) use universal symbols and standard colours for parking signage; and
 - 4.3.4.3(3) resists wind loads as required by the BC Building Code, latest edition.
- 4.3.4.4 Provide all necessary exterior illuminated signage along Palm Terrace, Iris Crescent and Holly Drive identifying the Facility and the access points.
- 4.3.4.5 Signage must be legible for drivers at an adequate distance that they can safely slow down and enter appropriately for drop-off and parking areas.
- 4.3.4.6 Provide all temporary Site signage required prior to and during construction to notify public regarding the following, but not limited to:

- 4.3.4.6(1) vehicles – public, service and staff vehicle route changes;
- 4.3.4.6(2) walkways, sidewalks – public and staff closure, alternate routes locations, access;
- 4.3.4.6(3) Site and Facility access/egress – temporary closure of access or egress from any of the buildings on the Riverview Campus;
- 4.3.4.6(4) hours of closure – temporary hour changes;
- 4.3.4.6(5) relocated parking, drop-offs/pick-ups – temporary relocation of parking, drop-off pick-up stalls for public, taxi, etc.

4.4 Site Infrastructure

- 4.4.1 The Design-Builder will obtain BC Housing’s approval prior to commencing construction of utilities, underground services, roads or similar infrastructure on the Site.
- 4.4.2 All onsite and municipal services will meet or exceed:
 - 4.4.2.1 the City of Coquitlam Subdivision and Development Servicing Bylaw No. 3558, 2003;
 - 4.4.2.2 the City of Coquitlam’s Stormwater Management Policy and Design Manual; and
 - 4.4.2.3 the needs of the Facility.
- 4.4.3 On-Site Services Infrastructure
 - 4.4.3.1 All on-site servicing will meet the quality requirements for the corresponding municipal off-site services.
 - 4.4.3.2 Road and utility construction design, construction supervision, and quality control supervision of all on-site services and connections to off-site services, including ground recharge drainage collection and disposal systems, must be performed by a consulting civil engineer registered with APEGBC.
- 4.4.4 Off-Site Services Infrastructure
 - 4.4.4.1 The Design-Builder will protect from damage and avoiding causing any interruption of all existing site services surrounding the Site, and will be responsible for any such damage or interruption caused by the Design Builder or its Subcontractors. If the Design-Builder needs to relocate or tie-in to any such services, the Design-Builder will obtain BC Housing’s prior approval.
- 4.4.5 Sanitary Sewers

- 4.4.5.1 The Design-Builder's Civil Engineer will confirm the development requirements of this proposed development and establish the service needs.
 - 4.4.5.2 The sanitary sewers will be of a diameter, grade and depth to safely convey all effluent from the site. The sanitary sewer system includes the pipes, manholes, and all other required appurtenances to comply with applicable municipal and provincial standards.
 - 4.4.5.3 All sanitary sewers will discharge effluent from the Site towards the existing sanitary sewer.
- 4.4.6 Storm Sewers and Drainage
- 4.4.6.1 The storm sewers and drainage network will be of a size, grade and depth to safely convey all storm water.
 - 4.4.6.2 The Design-Builder must engage a consulting Civil Engineer to provide a storm water management plan for the Site, which meets the requirements of the City of Coquitlam. The storm water management plan must also include provision of lot grading plan and provision of a storm drainage service for the development and /or recommendations for onsite drainage containment and disposal systems which:
 - 4.4.6.2(1) at a minimum, maintains the pre-construction discharge rates after Facility completion; and
 - 4.4.6.2(2) includes storm water/oil and grit separation devices or other water quality treatment devices as required, capturing and treating runoff from all road and parking area surfaces.
 - 4.4.6.3 Provide an on-site stormwater management system designed to meet the City of Coquitlam's goals for storm water attenuation and runoff/recharge water quality.
 - 4.4.6.4 Comply with federal/provincial land development guidelines and Stormwater Planning: A Guidebook for British Columbia (2011).
 - 4.4.6.5 The Design-Builder will ensure neighbouring properties are protected from flooding and nuisance runoff issues and existing municipal capacities are not exceeded.
 - 4.4.6.6 All storm sewer discharge will be directed to the existing municipal system.
- 4.4.7 Watermain and Appurtenances
- 4.4.7.1 The watermain system (watermain and appurtenances) will be capable of providing domestic and firefighting capacity for the Facility.

- 4.4.7.2 The watermain system will include backflow preventers as per City of Coquitlam Bylaw requirements, to protect the municipal system and on site facilities from contaminants.
 - 4.4.7.3 Existing hydrants around the Facility are to remain active for the duration of construction.
 - 4.4.7.4 The Design-Builder's mechanical and civil engineer will determine the domestic and fire protection requirements of this proposed Facility and establish hydrant requirements and service needs to determine if additional hydrants around the Facility are required.
- 4.4.8 Electrical, Telecommunications, Gas Services
- 4.4.8.1 Provide electrical, telecommunications, and gas services to support the Facility; and
 - 4.4.8.2 The Design-Builder is responsible for making and paying for servicing applications with the respective electrical, telecommunications and gas companies to arrange for these services.

5. ARCHITECTURAL

5.1 Location and Siting

- 5.1.1 The Design-Builder will locate the Facility within the Construction Site identified in Appendix 1E – Site Plan.
- 5.1.2 Design to satisfy all City of Coquitlam requirements.
- 5.1.3 Valleview Lodge is located to the east adjacent to the Construction Site.
- 5.1.4 The Design-Builder will protect the Valleview Lodge and all other property located within the Site from damage throughout the Construction of the Facility.

5.2 Access to Daylight and Views

- 5.2.1 Clients and staff must be provided with access to daylight and views to the outside, to support the demonstrated improvement in well-being and care outcomes.
- 5.2.2 Provide the following minimum requirements for access to daylight and views:
 - 5.2.2.1 all principal horizontal public circulation routes, including corridors accessing Client care areas, will include natural lighting strategies and access to views in the form of windows;
 - 5.2.2.2 glazed doors at entrances to exterior accessible roof areas;
 - 5.2.2.3 windows in corridors located on the perimeter of the Facility;
 - 5.2.2.4 windows in all Client bedrooms rooms as follows:
 - 5.2.2.4(1) to provide Direct Natural Light;
 - 5.2.2.4(2) to provide an unobstructed view which is not filled with impediments, hindered or stopped within a 9 meter horizontal view line, 90 degrees to the glazing;
 - 5.2.2.4(3) the maximum sill height to be 900mm;
 - 5.2.2.4(4) minimum window head to extend so it aligns with top of interior door frame;
 - 5.2.2.4(5) width of the windows to be minimum 1800mm, except as otherwise permitted by the Owner.
 - 5.2.2.5 At a minimum, the following rooms will have Direct Natural Light:
 - 5.2.2.5(1) Care Team Stations

- 5.2.2.5(2) secure rooms
- 5.2.2.5(3) lounge, visitor
- 5.2.2.5(4) living room
- 5.2.2.5(5) dining room
- 5.2.2.5(6) games room
- 5.2.2.5(7) group room
- 5.2.2.5(8) break room, staff
- 5.2.2.5(9) board room
- 5.2.2.5(10) workstation, clinical support offices
- 5.2.2.5(11) waiting area
- 5.2.2.5(12) multipurpose area
- 5.2.2.5(13) large and medium meeting room
- 5.2.2.5(14) consultation room, admissions
- 5.2.2.5(15) therapy kitchen
- 5.2.2.5(16) activity room
- 5.2.2.5(17) fitness centre
- 5.2.2.5(18) classrooms, including:
 - 5.2.2.5(18)(a) English/Social Studies Room
 - 5.2.2.5(18)(b) Math/Science Room
 - 5.2.2.5(18)(c) Music Room
 - 5.2.2.5(18)(d) Wood Shop/Metal Shop
 - 5.2.2.5(18)(e) Art Room
 - 5.2.2.5(18)(f) Aboriginal Programs Room
 - 5.2.2.5(18)(g) Multipurpose/Experiential Learning Room
 - 5.2.2.5(18)(h) Classroom (CCU)

5.2.2.5(19) gymnasium (enclosed play space)

5.2.2.5(20) fitness/ weight

5.2.2.5(21) offices

5.2.2.6 At a minimum, the following rooms will have Borrowed Natural Light if Direct Natural Light is not achievable:

5.2.2.6(1) General Building Services food reheat area

5.2.2.6(2) reception

5.2.2.6(3) security office

5.2.2.6(4) meeting rooms

5.2.2.6(5) office, shared

5.2.2.6(6) office, shared, volunteers

5.2.2.6(7) office, shared, recreation therapists

5.2.2.6(8) activity room, pool table/ping pong alcove

5.2.2.6(9) retreat

5.2.2.6(10) office, shared, spiritual care practitioners/chaplain/ aboriginal liaison

5.2.2.6(11) Neighbourhood kitchens and Client kitchen in PAC Neighbourhood,

and the center of any such interior space requiring Borrowed Natural Light will fall within a 10 meter light radius, if the area is over 45 square meters, or otherwise within an 8 meter light radius.

5.2.2.7 Provide glare control and minimize heat gain with the provision of sun shades and other solar control measures at windows as required;

5.2.2.8 Design-Builder to provide a Facility interior design that maximizes natural light and views to the outside throughout the Facility.

5.2.2.9 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.

5.2.2.10 Capitalize on opportunities for outdoor areas of respite and repose to aid in providing a healing environment.

5.3 Facility Configuration and Global Circulation

- 5.3.1 The Facility will be arranged in three zones: residential, administration and education.
- 5.3.2 The recreation area (complete with gymnasium/enclosed play space) to be located so that the community and Clients can have access from an external entrance.
- 5.3.3 Minimum three centralized access controlled elevators to serve the Facility for Clients and staff.
- 5.3.4 The main entrance concourse to have a feature interior circulation staircase. Access and exit staircases are to be located on the periphery of the Facility.
- 5.3.5 The Facility will require separate route for back of house / service circulation, distinct from the public circulation.
- 5.3.6 Provide a separate and private access route from the Sally Port / drop off area for Crossroads Clients to the forensics suite. Elevator to be provided with lock down for secure forensic access to suite.
- 5.3.7 Vehicular access to the underground parking to be off Holly Drive to the north of the Construction Site.
- 5.3.8 Design the Facility to provide means of securely evacuating Clients, staff, visitors and the public, while maintaining security and public safety. The minimum width of exit stairs will be 1650mm for Client occupied floors.

5.4 Quality of Space/Interior Design

- 5.4.1 The Design-Builder will:
 - 5.4.1.1 incorporate the principles of evidence-based design;
 - 5.4.1.2 maximize opportunities for access to natural light and views through the use of windows. Skylights and light tubes are not acceptable;
 - 5.4.1.3 employ materials and detail surfaces to absorb and minimize sound transmission throughout user areas and staff work areas;
 - 5.4.1.4 create visual interest within public areas by varying colours, textures, and lighting and by employing wood finishes wherever reasonable;
 - 5.4.1.5 avoid 'blank' hallways with solid end walls wherever possible;
 - 5.4.1.6 provide views and/or direct or borrowed natural light at ends of hallways;

- 5.4.1.7 design Facility access and interior circulation systems which support the confidentiality of Client information and the security needs of staff at all hours of the day;
 - 5.4.1.8 design workplaces so that they are flexible and adaptable to a change in program or personnel and promote staff and Client safety;
 - 5.4.1.9 design workspaces and millwork to be ergonomic and conducive to workflow and processes, and based on Program Requirements;
 - 5.4.1.10 identify and include suitable spaces in public areas of the Facility for the display of two- and three-dimensional art complete with wall backing for mounting and donor recognition systems complete with required lighting, power, and data connectivity; and
 - 5.4.1.11 provide as a minimum, millwork, fixtures fittings etc., as indicated in Room Data Sheets.
- 5.4.2 Quality of Space
- 5.4.2.1 The Design-Builder will:
 - 5.4.2.1(1) ensure access to outdoor space is accommodated for the PAC, DALA, Response, Complex Care Unit and Crossroads programs;
 - 5.4.2.1(2) incorporate secure outdoor terraces into the design for staff/Clients;
 - 5.4.2.1(3) provide optimized line of sight between staff areas and Client care areas by reducing long corridors and optimal positioning of program spaces by eliminating the encumbrances of existing columns, mechanical shafts, electrical rooms and long corridors, all to facilitate, rather than inhibit clinical operations; and
 - 5.4.2.1(4) prevent aggravation of Clients by not using reflective surfaces including but limited to: highly polished or reflective floors, polished or reflective acrylic surfaces and reflective glass.

5.5 Interior Wayfinding and Signage

- 5.5.1 Overriding Principles
 - 5.5.1.1 The Design-Builder will:
 - 5.5.1.1(1) provide simple circulation systems and functions so that wayfinding is inherently easy;

- 5.5.1.1(2) locate major destinations, such as department entrances, along primary circulation paths for easy access;
- 5.5.1.1(3) make waiting areas as open as possible to build confidence in wayfinding;
- 5.5.1.1(4) design waiting areas to be distinct from circulation routes;
- 5.5.1.1(5) design public elevator and stair lobbies and public circulation routes to be distinct from service and from other non-public routes;
- 5.5.1.1(6) provide all signage required for Facility operations and as required by the BC Building Code;
- 5.5.1.1(7) design signage such that the materials, colours, letter fonts, sizes and other aesthetic and functional considerations, such as braille, conform to a conceptually coherent overall wayfinding design system and respect the wall finish modules;
- 5.5.1.1(8) provide signage that is resistant to graffiti and physical damage complete with concealed fasteners;
- 5.5.1.1(9) provide signage that is easy to replace when necessary;
- 5.5.1.1(10) use international symbols where required;
- 5.5.1.1(11) orient all Facility plan directories to reflect the direction from which they are viewed;
- 5.5.1.1(12) provide signage that directs visitors to departments and rooms within;
- 5.5.1.1(13) provide signage that is clearly visible day or night;
- 5.5.1.1(14) avoid multi-layered naming hierarchies and complex numbering systems;
- 5.5.1.1(15) use a professional signage/wayfinding designer to prepare a unified signage/wayfinding concept for review as part of the Design review; and
- 5.5.1.1(16) incorporate signage and wayfinding into the overall exterior and interior Facility design.

5.5.2 Design Requirements

5.5.2.1 The Design-Builder will:

- 5.5.2.1(1) review with, and obtain approval from, the Owner for the door/room/parking stall numbering system prior to placing order;

- 5.5.2.1(2) design the internal directional signs to include:
- 5.5.2.1(2)(a) a main directory, installed at the main public entrances to the Facility, that indicates the location of every area and department within the Facility that is accessible to the public;
 - 5.5.2.1(2)(b) a continuous 'trail' of signage from the entrances to each of the reception/information points listed on the directories;
 - 5.5.2.1(2)(c) installation of signage at each point at which a directional decision is required;
 - 5.5.2.1(2)(d) consistent terminology;
 - 5.5.2.1(2)(e) door signage to indicate restrictions on entry and warn of hazards;
 - 5.5.2.1(2)(f) door signage which is not obscured by emergency systems or other functional elements of the Facility;
 - 5.5.2.1(2)(g) door signage that will identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility;
 - 5.5.2.1(2)(h) door signage that will be located in a consistent location for every room in the Facility;
 - 5.5.2.1(2)(i) door signage that is consistent with the following room numbering protocol:
 - (i).1 each room has a unique identifier number;
 - (i).2 rooms are numbered in a manner that reflects normal movement through the Facility;
 - (i).3 labelling anticipates a person attempting to follow numbering along corridors in sequence;
 - (i).4 blocks of numbers are periodically skipped to allow for future flexibility of the numbering system if rooms are added through renovations;
 - 5.5.2.1(2)(j) corridors numbered with unique, two-digit numbers; and
 - 5.5.2.1(2)(k) stairwells numbered with unique, single-digit numbers; and
- 5.5.2.1(3) design external directional signage to:
- 5.5.2.1(3)(a) clearly indicate access for the public;
 - 5.5.2.1(3)(b) clearly indicate restrictions to 'after-hours' access and closest accessible entrance;

5.5.2.1(3)(c) be well illuminated, backlit, reflective or high contrast and easily visible at night; and

5.5.2.1(3)(d) ensure that illuminated external Facility signage:

- (d).1 clearly identifies the Facility;
- (d).2 minimizes light spillage; and
- (d).3 indicates the accesses, parking and restrictions for various vehicle types, as required.

5.5.2.2 Each room requires a number for service reasons and since many rooms will not have formal wall numbering panels, each door frame will be equipped with a lamacoid, or approved equivalent, number plate approximately 25 mm high by 50 mm long, attached to the head of the door frame on the hinge side; and as this numbering system is used for deliveries, repairs, fire alarm notifications, etc., it is important that room numbers be determined early in design. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).

5.6 Building Envelope

5.6.1 **“Rain-Screen Principles”** means that the applicable wall cladding system incorporates: a means to drain all accumulated water to the exterior of the building; materials installed to shed precipitation; means of preventing moisture penetration through the exterior of the wall assembly; and flashings, drips or overhangs, sufficient to deflect accumulated water away from the building face, at all:

- 5.6.1.1 changes in plane;
- 5.6.1.2 intersections of walls and roofs;
- 5.6.1.3 changes in cladding material; and
- 5.6.1.4 window and door heads or sills.

5.6.2 The Design-Builder will:

5.6.2.1 complete all Design and Construction so as to prevent the accumulation and stagnation of rain, snow, ice and dirt on the sloped horizontal and vertical surfaces of the Facility’s building envelope in the climate in which the Facility is, including but not limited to the installation of:

- 5.6.2.1(1) drains with cleanouts; and
- 5.6.2.1(2) access panels and/or heat tracing to keep passageways flowing continuously;

- 5.6.2.2 except for exposed architectural concrete exterior walls, design the exterior walls in accordance with Rain-Screen Principles;
- 5.6.2.3 include a continuous air space located within the exterior wall assembly, in accordance with the BC Building Code and manufacturer's recommendations, and as further defined in Section 5.6;
- 5.6.2.4 ensure that materials and systems employed in wall and roof assemblies contribute to reducing heat gain and loss with minimal decline in performance over their expected 50 year lifespan;
- 5.6.2.5 ensure continuation of the air barrier, vapour barrier, thermal barrier and rain barrier across the entire envelope including foundations, walls and roofs;
- 5.6.2.6 design building envelope details to avoid thermal bridging;
- 5.6.2.7 utilize a licensed professional building envelope consultant throughout Design and Construction;
- 5.6.2.8 utilize a roof that is inaccessible and not climbable;
- 5.6.2.9 house rooftop mechanical/electrical equipment in finished housing compatible with the exterior building design;
- 5.6.2.10 screen and incorporate small scale rooftop mechanical equipment into architectural elements as per requirements of the City of Coquitlam;
- 5.6.2.11 provide window washing roof anchors and rigging system;
- 5.6.2.12 design the building envelope of the Facility, including any structure and structural components, to minimize effects of malicious damage, corrosion and deterioration due to environmental impacts, by use of measures such as:
 - 5.6.2.12(1)(a) concrete crack control joints and expansion/contraction joints;
 - 5.6.2.12(1)(b) high strength concrete mixes, proportioned to durability requirements for exposure and use;
 - 5.6.2.12(1)(c) reinforcing of concrete for crack control;
 - 5.6.2.12(1)(d) hot-dip galvanize or paint with a two part epoxy paint system all exposed steel; and
 - 5.6.2.12(1)(e) embedded steel protection angles and skid plates for service areas;
- 5.6.2.12(2) design and construct the building envelope, including all wall and roof assemblies and systems, to prevent intrusion;

- 5.6.2.12(3) construct the secure exterior building envelope of systems of materials that, when combined, create a secure enclosure;
 - 5.6.2.12(4) design and construct exterior walls to be vandal proof to a minimum of 4 meters from the ground; and
 - 5.6.2.12(5) design and construct walls and facades to prevent climbing and accessing the roof and terraces.
- 5.6.3 The Design-Builder will design and construct a building envelope in accordance with the following:
- 5.6.3.1 meet all the requirements of the most current versions of BC Building Code and ASHRAE or NECB;
 - 5.6.3.2 except for exposed architectural concrete walls, in accordance with pressure equalized rain-screen wall design principles with an exterior insulated wall assembly and demonstrate that the proposed details fulfill the Rain-Screen Principles;
 - 5.6.3.3 insulate the wall assembly primarily exterior to the interior wythe or back-up wall;
 - 5.6.3.4 design and construct all exterior wall cladding systems for the Facility in accordance with Rain-Screen Principles and applicable BC Building Codes;
 - 5.6.3.5 design exterior walls in accordance with the 'rain-screen principles' as described by the "National Research Council Canada, Designing Exterior Walls According to the Rainscreen Principle, Construction Technology Update No.34, Dec. 1999" available on-line at:

http://www.nrc-cnrc.gc.ca/ctu-sc/ctu_sc_n34
 - 5.6.3.6 include a continuous air space of minimum 25 mm clear width;
 - 5.6.3.7 provide exposed architectural concrete exterior walls with an integral waterproofing in the concrete ensuring all joints are treated to ensure a waterproof construction;
 - 5.6.3.8 for exposed architectural concrete exterior walls, provide insulation on the interior side of the wall with a thermal separation from interior wall framing and finishes;
 - 5.6.3.9 having a predicted service life that exceeds 50 years as defined in CSA S478-95, and with components having a service life as follows:

- 5.6.3.9(1) for components and assemblies whose categories of failure are 6, 7, or 8 in Table 3 in CSA S478-95, use a design service life equal to the design service for the Facility;
- 5.6.3.9(2) for components and assemblies whose categories of failure are 4 or 5 in Table 3 in CSA S478-95, use a design service life equal to at least half of the design service life of the Facility; and
- 5.6.3.9(3) where component and assembly design service lives are shorter than the design service life of the Facility, design and construct so they can be readily replaced;
- 5.6.3.10 ensure that water, snow and ice sheds safely from exterior surfaces and is not trapped in the assembly where it may cause deterioration or staining, or present a danger to the safety of any person.
- 5.6.3.11 provide building envelope assemblies that separate spaces exposed to differing environmental conditions by controlling the flow of air, vapour, wind and water.
- 5.6.3.12 provide a building envelope that maximizes durability and lifecycle and minimizes maintenance requirements.
- 5.6.3.13 ensure continuity of the air barrier, vapour barrier, thermal barrier and rain barrier across the entire building envelope, including foundations, walls and roofs;
- 5.6.3.14 design and construct building envelope details to prevent thermal bridging;
- 5.6.3.15 ensure that condensation within building envelope assemblies or on interior surfaces does not occur under any operational condition;
- 5.6.3.16 accommodate differential movement due to temperature variations, and structural movement;
- 5.6.3.17 design the below-grade assembly to resist the ingress of water;
- 5.6.3.18 ensure the integrity of the building envelope is maintained and durable;
- 5.6.3.19 utilize a professionally-licensed accredited building envelope consultant throughout design, construction and commissioning of building envelope systems;
- 5.6.3.20 design and construct the Facility so as to prevent the opportunity for hiding of contraband. Interfaces between structural units in areas accessible by Clients will form straight lines; serrated edges such as between metal deck and concrete walls will not be permitted within 3.5m of a floor occupied by Clients;

- 5.6.3.21 construction materials that are not adequately secured or are breakable can become weapons. The Design and Construction of the Facility will use only durable materials, secured such that they cannot be dislodged by Clients;
- 5.6.3.22 the building envelope of the Facility will be suitable for the Site environmental conditions and will be designed to have a design service life of at least 50 years;
- 5.6.3.23 ensure back-up walls for outer cladding consist of concrete masonry units, precast concrete, poured in place reinforced concrete or structural stud backup system;
- 5.6.3.24 ensure the design for deflection of interior finishes conforms to BC Building Code in all conditions; and
- 5.6.3.25 the Design-Builder will submit building envelope test results to the Owner verifying that the building envelope meets all requirements.

5.7 Interior Design

- 5.7.1 The Design-Builder will:
 - 5.7.1.1 employ a professional registered interior designer;
 - 5.7.1.2 ensure the interior design reflects the values of the Facility;
 - 5.7.1.3 ensure the overall exterior and interior design throughout the Facility is integrated;
 - 5.7.1.4 provide a distinct character for the Facility which relates to its purpose and the Clients using the Facility;
 - 5.7.1.5 ensure the interior design is appropriate to a mental health facility;
 - 5.7.1.6 provide individual design concepts for each component area;
 - 5.7.1.7 ensure the interior design is sensitive to the user groups in different areas;
 - 5.7.1.8 provide Client centric design elements;
 - 5.7.1.9 ensure that the interior design is not stark or clinical in nature;
 - 5.7.1.10 provide complementary environmental wall graphics and other thematic décor with multiple layers of themes and colours; and
 - 5.7.1.11 coordinate the interior design with wayfinding concepts.

5.8 Ergonomic Design

5.8.1 The Design-Builder will provide:

- 5.8.1.1 detailed design features, which expressly facilitate the physical activities of the staff and Clients to increase their safety, efficiency and general well-being, and assist in eliminating ergonomic risk factors; and
- 5.8.1.2 ergonomic design, consistent with good industry practice, of all work spaces including millwork, modular casework, furniture, lighting, and finishes to eliminate strain and injury to staff.

5.9 Colour

5.9.1 The Design-Builder will:

- 5.9.1.1 provide three options for the colour scheme, consistent with this Statement of Requirements, for the Owner's selection;
- 5.9.1.2 the colour scheme will be appropriate for the emotional and psychological needs of Clients;
- 5.9.1.3 provide colour schemes that are appropriate to the type of Client care being provided in each component;
- 5.9.1.4 use natural colour palettes that contribute to the creation of a healing environment;
- 5.9.1.5 provide distribution of ambient full-spectral colour within typical staff and Client environments;
- 5.9.1.6 avoid glare-creating finishes; and
- 5.9.1.7 provide paint colours for secure rooms in accordance with the Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities (e.g. no white or gray).

5.10 Interior Building Components

5.10.1 The Design-Builder will design and construct the Facility's interior building components in accordance with the following:

5.10.1.1 the interior walls and partition systems will:

- 5.10.1.1(1) provide acoustic separations as required for the specific functions to be carried out in the spaces affected. Refer to Appendix 1D – Acoustics and Noise Control; and

- 5.10.1.1(2) provide all separations required for fire safety and protection;
 - 5.10.1.2 seismic resistance capabilities will conform to the requirements of CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings;
 - 5.10.1.3 interior walls and partitions, partition systems and interior finishes will be designed and selected to comply with and optimize the following criteria as may be relevant for the particular or specific functions enclosed:
 - 5.10.1.3(1) easily cleanable and maintainable and utilizing finishes which contribute to infection control (refer to the requirements in the Room Data Sheets);
 - 5.10.1.3(2) permanence and durability including impact resistance;
 - 5.10.1.3(3) flexibility and adaptability of services;
 - 5.10.1.3(4) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;
 - 5.10.1.3(5) aesthetic and design qualities to provide a positive environment for staff and visitors;
 - 5.10.1.3(6) cleaning, maintenance and infection prevention and control;
 - 5.10.1.3(7) wall finishes, in the vicinity of plumbing fixtures, will be washable wall protection using hospital grade disinfectant. Wall finishes will be smooth and water resistant;
 - 5.10.1.3(8) resistant to damage due to normal wear and resistant to damage due to collision in high traffic areas;
 - 5.10.1.3(9) permanence and durability including impact resistance;
 - 5.10.1.3(10) incorporate corner and wall protection resistance; and
 - 5.10.1.3(11) non-toxic/ non-allergenic.
 - 5.10.1.4 Void Space must be incorporated into the usable room/area if the Void Space is not of a size which can be outfitted in the future for a usable sole purpose. Void Space along corridors must be made available as completed alcoves; and
 - 5.10.1.5 the completion of Void Spaces will not be deemed a cost to the Owner.
- 5.10.2 Corridors

- 5.10.2.1 Provide minimum 2400 mm wide global circulation corridors and corridors accessing Client areas within the Facility.
 - 5.10.2.2 Provide minimum 2400 mm wide corridors in Neighbourhoods.
 - 5.10.2.3 Provide minimum 2000 mm wide corridors accessing the service areas.
 - 5.10.2.4 Provide minimum 1500 mm wide corridors in all other areas.
 - 5.10.2.5 In addition to the minimum corridor width noted above the size of the corridor ceiling space is to be designed to accommodate all mechanical and electrical services.
- 5.10.3 Line of sight
- 5.10.3.1 Lines of sight provide the ability to see what is important from where a person is located. The location and design of interior walls and columns will minimize disruption of exterior views and line of sight.
 - 5.10.3.2 The Design-Builder will design the Facility using, wherever possible, low walls and furniture, low equipment, glazed walls and corridors and doorways that line up.
- 5.10.4 The Design-Builder will provide passive direct line of sight:
- 5.10.4.1 as required for functionality and as indicated in Appendix 1B – Functional Program and Clinical Specification;
 - 5.10.4.2 from Care Team Stations to department entry points on Client areas/floors, or alternatively, if entry points are not visible from a Care Team Station, the Design-Builder will provide a video surveillance camera to view the entry with monitor and remote door release from the Care Team Stations;
 - 5.10.4.3 from Care Team Stations to all areas; and
 - 5.10.4.4 Support space must be arranged to provide passive direct line of sight as per the Functional Program.
- 5.10.5 Use of secure glass as indicated in the Room Data Sheets;
- 5.10.6 Backing
- 5.10.6.1 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 at videoconferencing and other applicable rooms.
 - 5.10.6.2 At a minimum, Design-Builder will provide wall backing:

- 5.10.6.2(1) full width of the wall to a minimum height of 1500mm in alcoves around hand hygiene sinks and scrub sinks;
- 5.10.6.2(2) full width and height of the walls in all medication rooms except where equipment is located;
- 5.10.6.2(3) full width and height of the walls in all clean and soiled utility rooms;
- 5.10.6.2(4) full width and height of walls as required to support wall mounted dumbbells and weights in exercise room;
- 5.10.6.2(5) partition design to allow for built in pass through where required; and
- 5.10.6.2(6) to provide protection against water damage in spaces that contain equipment or services by considering appropriate partition base design, such as concrete curbs.

5.10.7 Surfaces

5.10.7.1 Surfaces will have the following characteristics, consistent with their functional purpose:

- 5.10.7.1(1) resistant to microbial spread and growth;
- 5.10.7.1(2) non-porous or smooth;
- 5.10.7.1(3) durable;
- 5.10.7.1(4) seamless;
- 5.10.7.1(5) resilient and impact resistant;
- 5.10.7.1(6) nontoxic/ non allergenic;
- 5.10.7.1(7) presenting minimal glare;
- 5.10.7.1(8) constructed in a way that will not soak up or harbour moisture; and
- 5.10.7.1(9) water impermeable in areas where water or dampness can occur.

5.10.8 Ceilings

- 5.10.8.1 The ceiling system will be considered as part of the interior spaces and may be accessible or inaccessible in total or in part as required to comply with each room's requirements as set out in the Room Data Sheets.
- 5.10.8.2 Accessible ceiling systems must provide access to the ceiling spaces throughout the system. Ceiling services in corridors will be grouped together

so that two or three services are installed on one ceiling tile allowing greater access to ceiling spaces.

5.10.8.3 Ceiling systems will comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed and will conform to the requirements of Appendix 1D – Acoustics and Noise Control.

5.10.8.4 Ceiling finishes will comply with and optimize the following criteria as may be relevant to the particular or specific functions of the space:

5.10.8.4(1) easily cleanable and maintained to facilitate infection control;

5.10.8.4(2) flexible and allowing access to the spaces above;

5.10.8.4(3) compatible with mechanical, plumbing, electrical, and communications services and fixtures;

5.10.8.4(4) producing low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.10.8.4(5) having aesthetic and design qualities to provide a positive environment for staff and visitors.

5.10.9 Floor Finishes

5.10.9.1 The floor and floor systems will be considered as part of the interior spaces and will be finished to be complementary and integral to the functional and aesthetic requirements of the interior space.

5.10.9.2 Floor finishes will be selected to suit the types and concentration of pedestrian and vehicular/wheel traffic anticipated. Floor finishes will be as indicated in the Room Data Sheets and acceptable to the Owner.

5.10.9.3 The following criteria will apply to the selection of floor finishes:

5.10.9.3(1) easily cleanable and maintained finishes which contribute to infection control;

5.10.9.3(2) the frequency and quality of joints and ease of replacement if and when required;

5.10.9.3(3) butterfly joints at outside corners of cove base;

5.10.9.3(4) imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture;

- 5.10.9.3(5) permanence, durability and resistance to concentrated service traffic both pedestrian and vehicular;
- 5.10.9.3(6) aesthetic and design qualities to provide a positive environment for staff and visitors;
- 5.10.9.3(7) Low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;
- 5.10.9.3(8) patterns and textures compatible with the requirements for pedestrian safety;
- 5.10.9.4 The Design-Builder will install 150mm high flash coved/cove base where indicated on Room Data Sheets.
- 5.10.9.5 Non-skid flooring will be used in wet areas, wash and change rooms.
- 5.10.10 Infection Control
 - 5.10.10.1 The Design-Builder will design and construction the Facility in accordance with infection prevention and control measures appropriate for a mental health facility, including measures set out in Z317.13-07 "Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities".
 - 5.10.10.2 The Design-Builder will examine the provisions made and satisfy that the provisions are adequate to properly protect the Riverview Campus during Construction of the Facility.
 - 5.10.10.3 The Design-Builder will ensure the Facility mitigates and prevents, where possible, the spread of infection including via contaminated surfaces.
 - 5.10.10.4 The Design-Builder will select materials and use simple detailing leading to quality workmanship and ease of accessibility for routine cleaning and maintenance.
 - 5.10.10.5 The Design-Builder will ensure ease of infection control in future alterations, modifications and additions to the Facility.

6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS

6.1 Procurement and Contracting Requirements (Division 01) – not used

6.2 Existing Conditions (Division 02) – not used

6.3 Concrete (Division 03)

6.3.1 Basic Requirements

6.3.1.1 See Section 2.1 for applicable standards. The technical references set out in this Schedule are not intended to be a complete list of applicable standards. Design and Construction will comply with applicable standards and practices whether listed in this section or not.

6.3.1.2 Exposed architectural concrete, with no finish materials, to be sealed:

6.3.1.2(1) Silicate-based sealers: At parking lot, and areas of exposed concrete, provide sodium or potassium silicate products that react chemically with the calcium in the concrete to densify, seal, and dustproof the concrete at the end of a 3 day wet cure period. Design-Builder will certify compliance with manufacturer's printed installation instructions for use as curing agent or as concrete sealer, as applicable.

6.3.2 Overriding Principles

6.3.2.1 Design and construct cast in place concrete of required properties for the intended use in accordance with the requirements of all applicable codes and specifications.

6.3.3 Quality Requirements

6.3.3.1 Inspection and testing of cast in place concrete and concrete materials will be carried out by a testing laboratory in accordance with CAN/CSA A23.1-14. Non-destructive Methods for Testing Concrete will comply with CAN/CSA A23.2-14.

6.3.3.2 Performance Criteria:

6.3.3.2(1) concrete floors will be finished with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1. Overlay toppings to level floors will not be used;

6.3.3.2(2) cracks in concrete floors and walls will be repaired to suit the floor finish and long-term serviceability requirements of the floor;

- 6.3.3.2(3) foundation walls for below-grade occupied spaces will be designed to prevent groundwater ingress by the use of a waterproofing chemical admixture added to the concrete mix at the batching or mixing stage to create a permanent self-sealing, corrosion free concrete waterproofing system. Construction joints will have purpose-made water stops. A perimeter draining system will be installed around the exterior of the earth-retained building foundation; and
- 6.3.3.2(4) exposed architectural concrete will comply with CAN/CSA A23.1-14 Section 8.3.

6.4 Masonry (Division 04)

6.4.1 Basic Requirements

- 6.4.1.1 Masonry design and construction that meets or exceeds current Canadian standards and practices as set out in this section, may be considered for building elements and systems.
- 6.4.1.2 Masonry construction may be considered for exterior walls and walls systems in those locations where permanence of finishes, both visually and functionally, and ease of maintenance are primary considerations in the exterior fabric of the building.
- 6.4.1.3 Masonry construction may be considered for interior walls and wall systems in locations where priorities include permanence and maintenance, sound transmission control, fire resistance and separation requirements and security.

6.4.2 Concrete Masonry Units

6.4.2.1 Overriding Principles

- 6.4.2.1(1) Concrete unit masonry may be used for both independent exterior walls and in exterior wall systems as a structural backing to other finish materials or systems; and
- 6.4.2.1(2) Concrete unit masonry for interior applications may be used as an integrally finished material, as a base for applied finish and as a structural backing to other finish systems:
 - 6.4.2.1(2)(a) unpainted concrete unit masonry will not be used as an exposed finish.

6.4.2.2 Quality Requirements

- 6.4.2.2(1) Masonry design and construction will comply with all applicable codes and standards including, but not limited to, CSA S304.1-04, the BC Building Code, and the standards listed in Section 2.1; and
- 6.4.2.2(2) Concrete unit masonry practices and work standards will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual, CSA-S304.1-04, and CSA-A371-04 (R2009).

6.4.3 Brick Masonry

6.4.3.1 Overriding Principles

- 6.4.3.1(1) Any exterior wall systems comprising brick masonry as a finish veneer to concrete, concrete masonry or metal framing will be a rain screen or cavity wall system;
- 6.4.3.1(2) No brick masonry will be used below grade for exterior applications; and
- 6.4.3.1(3) Brick masonry in interior applications will have integral finish and construction compatible with the maintenance and infection control requirements of the Owner.

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.
- 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.
- 6.4.4.3 Manufactured stone products are excluded.

6.5 Metals (Division 05)

6.5.1 Basic Requirements

- 6.5.1.1 Structural steel, steel deck, and cold-formed steel stud design and construction that meets or exceeds current Canadian standards and practices as set out in this section, may be considered for building elements and systems.

6.5.2 Performance Criteria

- 6.5.2.1 Structural steel, steel deck, and cold-formed steel stud systems will be designed to comply with the deflection and vibration criteria outlined in Structural Sections 3.14.6 and 3.14.7.
- 6.5.2.2 Erection tolerances for steel construction will be in accordance with CSA S16-01 Clause 29.7 except that the maximum out-of-plumb acceptable for exterior columns will be +/- 20mm over the full height of the building.
- 6.5.2.3 For steel floor and roof construction, the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs will be considered. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight will be considered in the Design.
- 6.5.2.4 Concrete topping slabs will be finished with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1. Thin overlay toppings to level floors will not be used.
- 6.5.2.5 Special attention will be paid to crack control of concrete topping slabs on steel deck. As a minimum, the following details and procedures will be implemented:
- 6.5.2.5(1) minimize wet weight deflections of steel decking and supporting structure;
 - 6.5.2.5(2) where practical, place concrete in alternate bays and avoid placing large areas at one time;
 - 6.5.2.5(3) use concrete topping with a low design slump and add superplasticizer to increase slump for placing and finishing;
 - 6.5.2.5(4) use 14mm or larger aggregate topping mix;
 - 6.5.2.5(5) avoid placing topping slabs on hot or windy days;
 - 6.5.2.5(6) reinforce topping slabs with a minimum 10M at 300mm centers each way chaired a minimum 20mm above steel deck;
 - 6.5.2.5(7) Provide extra topping slab reinforcement around openings, columns, at corners and over beams; and
 - 6.5.2.5(8) wet cure topping slabs for a minimum of three days using soaked burlap covered with polyethylene or similar methods.
- 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 will 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 BC Building Code fire rating requirements. Spray on or applied fireproofing material will not be used to achieve required floor deck fire rating.
 - 6.5.2.9 Structural steel floor/roof framing and supporting members will be fire-protected to meet the BC Building Code fire rating requirement.
- 6.5.3 Structural Steel
- 6.5.3.1 Quality Requirements
 - 6.5.3.1(1) quality of workmanship will be inspected by an approved testing laboratory;
 - 6.5.3.1(2) testing procedures as specified in CSA S16 to verify soundness of representative shop and field welds will be used;
 - 6.5.3.1(3) all full strength welds will be tested;
 - 6.5.3.1(4) material quality including sourcing and welding quality to be monitored by independent testing agency;
 - 6.5.3.1(5) preparation and painting of structural steel components will conform to the MPI standards; and
 - 6.5.3.1(6) exterior exposed structural steel will be hot dipped galvanized to 600g/m² to CAN/CSA-G164 or painted with a quality two part epoxy paint system.
- 6.5.4 Load Bearing Steel Studs
- 6.5.4.1 Overriding Principle
 - 6.5.4.1(1) 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 building envelope; and
 - 6.5.4.1(2) load bearing steel studs may be part of the Facility structure or may be independent of the principal Facility structural system.
 - 6.5.4.2 Quality Requirements

- 6.5.4.2(1) load bearing steel stud design will be carried out by a professional engineer registered in the Province of British Columbia and construction will comply with CSA-S136;
- 6.5.4.2(2) manufacturer will be certified in accordance with CSSBI Standard 30M and CSA-A660;
- 6.5.4.2(3) fabricator and erector will be experienced in the type of work undertaken;
- 6.5.4.2(4) erection will be reviewed by the professional engineer; and
- 6.5.4.2(5) conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

6.5.4.3 Performance Requirements

- 6.5.4.3(1) limit maximum deflection under specified wind loads to L/360, unless a smaller maximum deflection is specifically required due to wall finishes. For brick masonry used as an exterior finish over steel stud back-up, provide steel stud deflection of L/360 maximum;
- 6.5.4.3(2) design components to accommodate erection tolerances of the structure;
- 6.5.4.3(3) design wind-bearing stud end connections to accommodate floor/roof deflections and to ensure that studs are not loaded axially; and
- 6.5.4.3(4) design steel studs to take into account the anchorage of other materials being supported including but not limited to: sub-girts supporting metal cladding and composite panels, soffit finishes and the provision of lateral support at window heads.

6.5.5 Miscellaneous Metals

6.5.5.1 Quality Requirements

- 6.5.5.1(1) Primers and paints of miscellaneous metals will conform to MPI Architectural Specification Standards Manual;
- 6.5.5.1(2) Exterior elements will be hot dipped galvanized with 600g/m² to CAN/CSA-G164 or painted with a quality two part epoxy paint system.

6.5.5.2 Performance Requirements

- 6.5.5.2(1) Welding to be in accordance with CSA W59.

6.6 Wood Plastics and Composites (including Millwork) (Division 06)

6.6.1 Basic Requirements

6.6.1.1 Do not use products containing added urea formaldehyde in the Facility.

6.6.1.1(1) The intent is to prevent the use of wood product such as particleboard made with formaldehyde-based resins and binders.

6.6.1.2 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/communication rooms (minimum 8' AFF), roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including but not limited to exterior fascias, cabinets, casework (excluding math / science room, which is included in Division 12), frames, panelling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required:

6.6.1.2(1) to meet the requirements of this Schedule, support functionality as defined in the Schedule 1B – Functional Program and Clinical Specification and as required for operation of the Facility.

6.6.1.2(2) as required for wood products exposed to view in finished interior and exterior installations.

6.6.1.3 Provide solid polymer fabricated surfacing for:

6.6.1.3(1) all counters that incorporate sinks, with the exception of where counters are also stainless steel such soiled utilities and kitchens;

6.6.1.3(2) all reception desks and all Care Team Stations; and

6.6.1.3(3) other areas as required by the Room Data Sheets.

6.6.1.4 Provide acrylic plastic, stainless steel or epoxy products as required for wall cladding, wall protection, corner protection, casework finishing, trims, ornamental elements, door protection and other applications to achieve a quality of interior finish suitable for use by Clients and staff.

6.6.1.5 Use pressure treated wood for exterior exposed wood.

6.6.2 Performance Criteria

6.6.2.1 Finish Carpentry, Millwork and Architectural Woodwork

6.6.2.1(1) Conform to Architectural Woodwork Standards, current edition, as issued by Architectural Woodwork Manufacturer's Association of Canada (AWMAC). 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;

- 6.6.2.1(2) Architectural woodwork will be manufactured and installed to the current AWMAC Architectural wood work standards and will be subject to an inspection at the factory and/or site by an appointed AWMAC Certified Inspector as described in the AWMAC Guarantee and Inspections Services (GIS) program;
- 6.6.2.1(3) AWMAC Reports to be submitted to the Owner for review;
- 6.6.2.1(4) AWMAC inspection costs will be paid by the Design-Builder;
- 6.6.2.1(5) shop drawings will be submitted to the AWMAC Chapter office for review before Work commences. Work that does not meet the AWMAC Woodwork Standards, as specific, will be replaced, reworked and /or refinished by the architectural woodwork contractor, to the approval of AWMAC at no additional cost to the Owner. If the woodwork contractor is an AWMAC Manufacturer member in good standing, a two (2) year AWMAC Guarantee Certificate will be issued. Without limiting the general warranty set out in Section 38 of this Agreement, the AWMAC Guarantee will cover replacing, reworking and/or refinishing deficient architectural woodwork due to faulty workmanship or defective materials supplied and /or installed by the woodwork contractor, which may appear during a two (2) year period following the date issuance;
- 6.6.2.1(6) if the woodwork contractor is not an AWMAC Manufacturer member they will provide the Owner with a two (2) year maintenance bond, in lieu of the AWMAC Guarantee Certificate, to the full value of the architectural woodwork contract;
- 6.6.2.1(7) all bottoms of sink cabinet boxes and areas that may come into contact with water must have a marine-grade plywood substrate. Do not use fibreboard or particleboard;
- 6.6.2.1(8) use marine-grade plywood substrate for countertops and cabinets. Do not use fibreboard or particleboard;
- 6.6.2.1(9) for millwork and cabinets, seal all wood surfaces and edges. All door, drawer and other exposed millwork edges will have applied an appropriately sized PVC edge strip, heat applied. There will be no P-Lam to P-Lam edges;
- 6.6.2.1(10) adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian ‘Eco-Logo’ program, and CaGBC;

- 6.6.2.1(11) all exposed wood products on the interior of the Facility to be finished to meet infection control standards.
- 6.6.2.1(12) VOC emission levels will be in accordance with CaGBC to minimize adverse impact on indoor environmental and air quality;
- 6.6.2.1(13) adhesives will be non-toxic, non-solvent glue to comply with AWMAC Architectural Woodwork Standards, Canadian 'Eco-Logo' program, and CaGBC; and
- 6.6.2.1(14) timber structural elements will be glued-laminated structural units meeting the requirements of CAN/CSA-0122 and CAN/CSA-0177. Timber connector hardware will be hot dipped galvanized where there is exterior exposure. All nuts, washers and bolts will be galvanized.

6.6.3 Architectural Millwork

- 6.6.3.1 Wood and plastic products and procedures required in the construction process and as integral components of the building fabric, including but not limited to fabrication, assemblies, surfaces, and finishes, will conform to requirements outlined in Section 2.1 and to the requirements set out in this division.
- 6.6.3.2 Provide architectural millwork including all counters, cabinet units, shelving, hardware, finishing and installing as follows:
 - 6.6.3.2(1) all composite wood products and laminating adhesives used in the millwork will not contain added urea-formaldehyde resins;
 - 6.6.3.2(2) adhesives will be non-toxic, low VOC, non-solvent glue to comply with AWMAC Quality Standards Manual, and Canadian 'Eco-Logo' program;
 - 6.6.3.2(3) seal all wood surfaces and edges for infection control;
 - 6.6.3.2(4) all cabinets will be flush overlay construction;
 - 6.6.3.2(5) design millwork so that no sharp edges are exposed, provide minimum 25 mm radiused corner to countertops;
 - 6.6.3.2(6) all cabinets to be provided with locks as identified in the Room Data Sheets;
 - 6.6.3.2(7) incorporate all required mechanical, electrical and communication services into the millwork so that wires and pipes are hidden from view, provide access panels to all services to allow for future adjustment;

- 6.6.3.2(8) provide the millwork set out in the Room Data Sheets and coordinate millwork with Appendix 1G – Equipment and Responsibility List;
- 6.6.3.2(9) provide built in valance lighting underneath all upper cupboards for task oriented and staff areas; and
- 6.6.3.2(10) all architectural woodwork hardware to be stainless steel of durable quality to meet the standards of AINSI/BHMA grade 1 Cabinet Hardware.

6.6.3.3 Provide stainless steel counters and shelves as follows:

- 6.6.3.3(1) fabricate from Type 316, No. 4 finish stainless steel;
- 6.6.3.3(2) corners will be welded, ground, polished and crevice-free. Joints and welds will be polished to a uniform No. 4 satin finish. No filler or solders will be used. Straight lengths will be one-piece with all seams, including field joints, welded;
- 6.6.3.3(3) sound-deaden tops and reinforce with waterproof plywood core, bonded to tops with waterproof contact cement. Seal underside of top (plywood core) with a waterproof finish. The front edges of the tops will be marine edge. Form splashback as an integral part of the tops, radiused where the splashback occurs in the top. Bond all splashbacks to plywood core, bonded the same as specified for the tops. Fabricate countertops, splashbacks, and front aprons out of one piece of stainless steel. Weld counter and sink assemblies into single units without seams or joints. Drill splashbacks, tops and sinks to receive plumbing and electrical fittings; and
- 6.6.3.3(4) form integral sinks with all-welded rounded corners, seamless construction with all traces of welding removed. Weld stainless steel sinks integrally into tops without seams or joints. Slope tops for sinks and adjacent drain boards to sinks. Provide sinks with drain outlets with removable stainless steel strainer. Stainless steel bench and or counter tops are required where staining or similar procedures are performed.

6.6.3.4 At a minimum the architectural millwork in the Facility will be as follows:

- 6.6.3.4(1) all counters will be a minimum 1500 mm in length, except in locations where the room area is too small to accommodate the full length;
- 6.6.3.4(2) refer to the Room Data Sheets for minimum lengths of millwork for storage closets;
- 6.6.3.4(3) all storage closets, cabinets, wardrobes and closets will be a minimum 2100 mm high;

- 6.6.3.4(4) all upper cupboards, storage units, wardrobes and closets will have a filler panel from the top surface to the underside of the ceiling;
- 6.6.3.4(5) all nourishment/ kitchenette areas will be provided with millwork as follows:
 - 6.6.3.4(5)(a) counter, upper cupboards and under counter cupboards as follows:
 - (a).1 food preparation/ kitchenette/ break areas (except those located in lounges and boardroom): along 100% of the wall space available;
 - (a).2 nourishment/ kitchenette areas in lounges: dimensions of millwork to suit function but have a minimum 2100 mm of uninterrupted counter space, upper cupboards, under the counter cupboards and drawers;
 - (a).3 accommodate all the requirements of the equipment listed in Appendix 1G – Equipment and Responsibility List, for microwaves, integrated sinks etc.; and
 - (a).4 a minimum of three drawers in lower cupboards;
- 6.6.3.4(6) all nurse Care Team Station areas:
 - 6.6.3.4(6)(a) counter to extend across the full width of the room with lower drawers.
- 6.6.3.4(7) provide alcove workstations as follows:
 - 6.6.3.4(7)(a) to extend across the width of the alcove; and
 - 6.6.3.4(7)(b) depth to serve the intended clinical functions and equipment listed in Appendix 1G – Equipment and Responsibility List.
- 6.6.3.4(8) provide TV display millwork as follows:
 - 6.6.3.4(8)(a) freestanding millwork structures or wall mounted millwork installations;
 - 6.6.3.4(8)(b) designed to accommodate digital displays so visitors and the digital interface is easily accessed; and
 - 6.6.3.4(8)(c) millwork to be anti-ligature and vandal resistant;
- 6.6.3.4(9) provide Client built-in wardrobe cabinet and counter as follows:
 - 6.6.3.4(9)(a) wardrobe a minimum 900 mm in length and comes with hanging space, shelving and a keyless lockable cupboard for valuables. Rods or hooks will be anti-ligature, breakaway type;

- 6.6.3.4(9)(b) counter a minimum 1200 mm in length; and
- 6.6.3.4(9)(c) millwork to be anti-ligature and vandal resistant; and
- 6.6.3.4(10) refer to Appendix 1C – Room Data Sheets which illustrates rooms where anti-ligature and anti-vandal proof millwork is to be provided; and
- 6.6.3.4(11) provide Client built-in bed as follows:
 - 6.6.3.4(11)(a) domestic looking and non-institutional;
 - 6.6.3.4(11)(b) finish to match architectural millwork in room;
 - 6.6.3.4(11)(c) include surrounding edge to contain the mattress;
 - 6.6.3.4(11)(d) enclose the space below to floor to prevent hiding;
 - 6.6.3.4(11)(e) anchor bed down to floor; and
 - 6.6.3.4(11)(f) build-in bed frame to be anti-ligature and vandal resistant.

6.7 Thermal and Moisture Protection (Division 07)

6.7.1 Basic Requirements

- 6.7.1.1 Construction assemblies will be designed according to the building envelope principles outlined in Section 5.6 of this Schedule.
- 6.7.1.2 Construction assemblies will prevent the ingress of moisture or water vapour from the exterior into the Facility and the passage of air through the building envelope from the interior spaces to the exterior and vice versa.
- 6.7.1.3 Construction assemblies will prevent the ingress of moisture through foundation walls below grade, both subject and not subject to hydrostatic pressure.
- 6.7.1.4 Comfortable, livable interior environments will be created by providing protection such as insulation to resist the transfer of heat through exterior walls and roofs.
- 6.7.1.5 Resistance to the propagation and spread of fire will be provided for exterior walls and interior walls designated as fire-resistance rated separations.

6.7.2 Performance Criteria

- 6.7.2.1 Damp proofing

- 6.7.2.1(1) foundation wall surfaces will have damp proofing coverage that is sufficient to repel and prevent moisture ingress in accordance with BC Building Code section 5.8.2.

6.7.2.2 Waterproofing

- 6.7.2.2(1) waterproofing will be provided to prevent water ingress to occupied spaces below grade at below-grade vertical concrete walls except for the parking level structure;
- 6.7.2.2(2) sheet or fluid-applied membrane waterproofing will be used to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated. Use fluid-applied waterproofing for mechanical room floors; and
- 6.7.2.2(3) waterproof membranes in the form of air barriers will be provided in exterior walls as part of the building envelope and integral with rain screen or cavity wall assemblies.

6.7.2.3 Vapour Barriers

- 6.7.2.3(1) a continuous vapour barrier membrane will be provided to prevent water vapour transmission and condensation in wall assemblies, roofing assemblies, and under concrete slabs-on-grade within the Facility perimeter.

6.7.2.4 Air Barriers

- 6.7.2.4(1) air barrier assemblies will be designed to limit air ex-filtration 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;
- 6.7.2.4(2) air barrier assemblies will 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 to the standards as listed above. Provide air barriers to prevent water intrusion in accordance with Section 6.7.2.2(3) above. Air barriers may be sheet or fluid-applied; and
- 6.7.2.4(3) air barrier assemblies will prevent air leakage caused by air pressure across the wall and roof assembly in accordance with the standards listed above, including interruptions to the integrity of wall and roof systems such as junctions with dissimilar constructions.

6.7.2.5 Thermal Protection

- 6.7.2.5(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, dependent on seasonal conditions, and to resist the absorption of water;
- 6.7.2.5(2) Thermal protection materials will be of a type and quality that will provide consistent environmental quality to enclosed spaces;
- 6.7.2.5(3) Foamed plastic insulation will be CFC and HCFC free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.
- 6.7.2.5(4) Minimum insulation values will be as required to meet or exceed ASHRAE or NECB.

6.7.2.6 Roofing

- 6.7.2.6(1) Materials and workmanship for roofing will conform to the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) latest Standards and Ten (10) Year RoofStar Guarantee, as published in the RGC Roofing Practices Manual.
- 6.7.2.6(2) Roof materials will comply with RGC Roofing Practices Manual "Acceptable Materials List," including:
 - 6.7.2.6(2)(a) Flexible membrane – SBS modified (two-ply system)
 - 6.7.2.6(2)(b) Flexible membrane – 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)
- 6.7.2.6(3) Roof assembly design including deck, vapour barrier, insulation, board stock, and membranes will comply with the BC Building Code for fire classifications and with RGC requirements with wind uplift requirements for live loads, dead loads, snow loads, and wind uplift and comply with ULC Class 60 wind uplift classification.
- 6.7.2.6(4) Quality of roofing will undergo inspections by one of the "Accepted Inspectors" listed in the Inspectors Directory, as required by the RCABC and in accordance with RGC inspection standards.
- 6.7.2.6(5) Foamed plastic insulation will be CFC- and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.

- 6.7.2.6(6) A complete horizontal barrier to weather and climate will be provided, using one of the following construction systems as applicable to the installation required:
 - 6.7.2.6(6)(a) 2 ply SBS or single ply flexible membrane; and
 - 6.7.2.6(6)(b) other roofing systems including but not limited to sheet metal, shingles, and roof tiles.
- 6.7.2.6(7) Perform roofing quality inspections as required by the RCABC to obtain the RCABC warranty.
- 6.7.2.6(8) Use foamed plastic insulation that is CFC- and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.
- 6.7.2.6(9) Provide a complete horizontal barrier to weather and climate using one of the aforementioned roofing systems.
- 6.7.2.6(10) If a green roof is used, design the assembly so that the system dead load, measured according to ASTM D2397, when added to the weight of the roofing membrane system, do not exceed the maximum allowable dead load for the roof.
- 6.7.2.6(11) Roofing systems will include:
 - 6.7.2.6(11)(a) flashings and sheet metal;
 - 6.7.2.6(11)(b) thermal insulation;
 - 6.7.2.6(11)(c) roofing specialties and accessories required for completion;
 - 6.7.2.6(11)(d) interior access systems to roof areas;
 - 6.7.2.6(11)(e) wear protection from roof maintenance staff use, per RCABC;
 - 6.7.2.6(11)(f) personal fall restraint system; and
 - 6.7.2.6(11)(g) roof drainage, including overflow scuppers.
- 6.7.2.6(12) Sheet metal flashings will be designed to divert water away from membrane flashing termination and protect the membrane from deterioration due to the elements and mechanical damage. The roofing membrane will be continuous under the metal. Ensure that sheet metal components comply with wind uplift requirements established for roofing system

- 6.7.2.6(13) Metal roofing system 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. Building design and roof systems will ensure that entrance ways are protected from sliding snow and ice and will ensure that there are no accumulations of snow and ice in roof valleys.
- 6.7.2.6(14) Client terraces will have a monolithic concrete topping on the waterproofing system.

6.7.2.7 Fire and Smoke Protection

- 6.7.2.7(1) Barriers will be integrated into vertical and horizontal space separations to protect against the spread of fire and smoke, and protection will be applied to exposed building elements (structural and non-structural) susceptible to fire and subsequent damage.
- 6.7.2.7(2) Penetrations of vertical and horizontal fire-resistance rated separations will be protected.
- 6.7.2.7(3) Fire-stopping and smoke seal systems will consist of asbestos-free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.
- 6.7.2.7(4) Fire-stopping materials will:
 - 6.7.2.7(4)(a) be compatible with substrates;
 - 6.7.2.7(4)(b) allow for movement caused by thermal cycles; and
 - 6.7.2.7(4)(c) prevent the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.
- 6.7.2.7(5) When more than one product is required for an assembly, all products will be compatible and from the same manufacturer and will comply with requirements established by ULC tested assemblies. Note that damming materials, such as mineral fibre insulation, is usually not manufactured by the firestopping product manufacturer.
- 6.7.2.7(6) Fire stopping sealants and coatings will be silicone-based or urethane-based and guaranteed not to re-emulsify if subject to wetting or standing water; acrylic-based coatings and sealants are not acceptable.

6.7.2.8 Sealants

- 6.7.2.8(1) Sealant materials will be applied to achieve:

- 6.7.2.8(1)(a) seals to the building envelope systems or around openings in the building envelope systems as required to prevent water ingress;
 - 6.7.2.8(1)(b) seals around and over cavities in or behind surface elements to allow effective infection control;
 - 6.7.2.8(1)(c) seal and fill all gaps around pipe penetrations through walls in rooms, including inside millwork;
 - 6.7.2.8(1)(d) seal all grab-rails and tap fittings to walls in showers and other wet areas;
 - 6.7.2.8(1)(e) sealed joints between dissimilar or similar materials to allow a smooth or even transitions;
 - 6.7.2.8(1)(f) sealed expansion or controls joints in the building envelope systems or structural systems to allow movement; and
 - 6.7.2.8(1)(g) no finish cracks or cracks between materials in user areas.
- 6.7.2.8(2) The Design-Builder will use exterior building envelope materials that minimize the use of exterior sealants.
- 6.7.2.8(3) When used, exterior sealants will completely and continuously fill joints between dissimilar and/or similar materials.
- 6.7.2.8(4) Interior sealant (at frames such as those at doors and windows) will completely fill joints between dissimilar materials and will be one component, acrylic emulsion type.
- 6.7.2.8(5) Silicone caulking to washroom plumbing fixtures will be mildew-resistant and impervious to water.
- 6.7.2.8(6) Sealants applied to expansion and control joints in concrete floors requiring self-levelling properties will be two-component, traffic-grade urethane sealants for horizontal surfaces.
- 6.7.2.8(7) Sealants for exterior vertical expansion and control joints in masonry or wall cladding will be non-sag sealant.
- 6.7.2.8(8) Sealants will allow for minimum 25% movement in joint width.
- 6.7.2.8(9) In corridors and other traffic areas used by laundry carts, supply carts, material handling equipment etc., sealant will be traffic bearing type and suitable to support imposed load without deformation or failure.

- 6.7.2.8(10) Security caulking/sealants are required in all Client areas to ensure the inability for Clients to pick apart.

6.8 Openings (Division 08)

6.8.1 Basic Requirements

- 6.8.1.1 Except where fire rated glass is required in accordance with the BC Building Code, interior windows and sidelights will be constructed of tempered glass or laminated safety glass. Exterior glazing at doors and sidelights will be laminated. Where required by BC Building Code, label as safety glass. Where wire glass is required by code in Client occupied spaces, install ¼" polycarbonate type glazing on side(s) to which Client has access. Install the polycarbonate type glazing with tamper-proof fittings for secure installation.
- 6.8.1.2 Security glazing is required, where noted in the Room Data Sheets, and as described in Section 6.8.2.5.
- 6.8.1.3 Installation methods and locations for doors, frames, and hardware will conform to Door and Hardware Institute (DHI) standards.
- 6.8.1.4 Doors
- 6.8.1.4(1) Doors will be sized, fabricated, and installed to suit the intended function of spaces or rooms requiring acoustic or visual privacy, security, special HVAC requirements, fire-resistance rated separations or other closures.
- 6.8.1.4(2) Size Requirements for Doors
- 6.8.1.4(2)(a) Door openings (leaf sizes) will be of adequate width to suit the intended purpose of rooms on either side of the doors and allow the movement of people and equipment associated with those rooms. Sizes and types indicated in Room Data Sheets will be the minimum provided.
- 6.8.1.4(2)(b) Double doors will be provided into rooms where large pieces of equipment will be moved in or out during the lifetime of the Facility, and where such equipment cannot pass through 1200 mm single door openings.
- 6.8.1.4(2)(c) Door openings must accommodate movement of equipment.
- 6.8.1.4(2)(d) Double doors will be provided into corridors and major areas.
- 6.8.1.4(2)(e) Unless required otherwise, doors to Client areas, including doors to water closets and change room cubicles, will have a minimum width of 915mm.

- 6.8.1.4(2)(f) No single door will be less than 750 mm wide.
- 6.8.1.4(2)(g) No door or door leaf will be less than 2150 mm high, unless specifically required for access to services or other purposes where height is restricted.
- 6.8.1.4(3) Doors must meet the acoustic requirements set out in Appendix 1D – Acoustic and Noise Control.
- 6.8.1.4(4) Doors into or between major departments or activity areas through which cart traffic is anticipated on a routine basis will be automatically activated by an electronic device or manual push button, located to allow emergency access without the necessity to stop movement. All other doors through which cart, equipment or frequent staff traffic is anticipated on a routine basis will have hardware or automatic activation that allows the doors to stay in an open position.
- 6.8.1.4(5) Door sizes and designs will be applied consistently to rooms of similar use, location, and configuration.
- 6.8.1.4(6) Doors will not swing into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to spaces that are used infrequently and not subject to occupancy such as small closets.
- 6.8.1.4(7) Client room doors will swing into the room and are to be provided with hardware to allow the door to be opened out in an emergency situation.
- 6.8.1.4(8) Client rooms and secure room doors to be provided with unbreakable, shatterproof double glazed observation panels with integral blinds operable from the room exterior side.
- 6.8.1.4(9) Doors may swing into washrooms, provided they allow for ease of use. Such doors will be equipped with required hardware to allow the door to be opened out in an emergency situation.
- 6.8.1.4(10) Doors will have required hinges, be of solid core construction with edge protection and face protection of Acrovyn Sheet products or equal to minimize damage and resultant disruptive maintenance. Refer to the Room Data Sheets.
- 6.8.1.4(11) Doors and frames will have a suitable finish that prevents dirt and fingerprint accumulation, and can be easily cleaned and disinfected.
- 6.8.1.4(12) Blinds or window coverings suitable for the level of functional and operational requirements will be provided where privacy might be a concern. Blinds may be integral with the window air space, or surface applied in accordance with Section 6.12.2.1.

- 6.8.1.4(13) Doors and door frames will have the capability to withstand the varying and high levels of humidity and impact that are likely to occur at the Facility and to maintain their inherent aesthetic and functional capacities. Frames and anchors for doors, sidelights, and interior and exterior windows for special areas will be designed to withstand the heavy degree of impact anticipated and maintain their aesthetic and functional capacities.
- 6.8.1.4(14) In areas where security is considered paramount such as secure entrances, safety and security will be achieved with the required location, configuration, materials, construction, and detailing of doors and hardware in accordance with British Columbia Ministry of Health Standards.
- 6.8.1.4(15) Secure rooms / seclusion rooms will be designed and constructed to comply with requirements of the Provincial Quality, Health & Safety Standards and Guidelines for Secure Rooms in Designated Mental Health Facilities under the BC Mental Health Act, latest edition.

6.8.1.5 Windows

- 6.8.1.5(1) Windows will be sized, configured, and adequately constructed to suit rooms that require daylight, views and/or natural ventilation.
- 6.8.1.5(2) Maximize Borrowed Natural Light through interior windows to occupied rooms that do not have exterior windows, and ensure the center of any such rooms fall within a 10 meter light radius, if the area is over 45 square meters, or otherwise within an 8 meter light radius. The intent is to borrow light from areas that have windows and consequently create a more comfortable and less closed-in atmosphere.
- 6.8.1.5(3) Glazing heights will be coordinated with adjacent wall protection, handrails, door hardware, and other accessories to achieve functional and aesthetic cohesiveness.

6.8.2 Performance Criteria

6.8.2.1 Hollow Metal Doors and Frames

- 6.8.2.1(1) Materials and manufacture of metal doors and frames will conform to the requirements of the Canadian Steel Door and Frame Manufacturer's Association (CSDFMA).
- 6.8.2.1(2) Interior metal doors will have flush faced construction and use continuously welded, seamless edge construction using a steel sheet, 16 gauge (1.6 mm).

6.8.2.1(3) Exterior Metal Doors will have:

- 6.8.2.1(3)(a) flush faced construction using a steel sheet, minimum 16 gauge (1.6 mm) and insulated;
- 6.8.2.1(3)(b) edge seams to correspond with door function and minimize maintenance needed, using a continuously welded, seamless edge construction; and
- 6.8.2.1(3)(c) finishes on prepared surfaces that resist corrosion from exposure to weather using ZF180 coating.

6.8.2.1(4) Pressed Metal Frames will have:

- 6.8.2.1(4)(a) fully welded construction, using the same gauge as frames as at doors to optimize performance of assembly, including hardware;
- 6.8.2.1(4)(b) thermally-broken door frames at exterior, non-fire-rated openings; and
- 6.8.2.1(4)(c) anchors to each jamb to suit wall type and receive the frame.

6.8.2.1(5) Door Glazing

- 6.8.2.1(5)(a) Exterior glazing will be sealed units in thermally-broken frames to prevent heat loss.

6.8.2.2 Wood Doors

- 6.8.2.2(1) Wood doors will conform to the Architectural Woodwork Standards (First Edition) published by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC).
- 6.8.2.2(2) Wood doors will be sized, constructed and provided with hardware and finishes to suit the intended function and aesthetics of the Facility and its programs.
- 6.8.2.2(3) Construction, finish, and installation will attempt to minimize the requirement for maintenance and resulting disruption to Facility operations.
- 6.8.2.2(4) Wood doors will be flush custom grade quality, solid particleboard core.
- 6.8.2.2(5) Fire-resistance rated doors will be constructed with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.

- 6.8.2.2(6) Finish hardware will be installed securely to resist loosening over time and fastened to solid wood backing, except where hardware is designed to be through-bolted.
- 6.8.2.2(7) For wood finished doors, face veneer will be A-Grade hardwood veneer with AWMAC No. 3 edge and finished to suit the intended use. Clear urethane factory finish. For paint finished doors finish with primer and minimum two coats of paint.

6.8.2.3 Aluminum Entrances and Storefronts

- 6.8.2.3(1) Aluminum entrances and storefront framing and doors may form part of the exterior envelope of the Facility or provide glazed interior partitions as required to comply with Functional Program requirements.
- 6.8.2.3(2) Aluminum doors will be used within aluminum entrances and storefront. Provide with offset pivots or with heavy duty butt hinges to accommodate expected traffic.
- 6.8.2.3(3) Frames will be thermally-broken, flush glazed, aluminum sections, to accept insulating glass units at exterior openings.
- 6.8.2.3(4) Frames will incorporate drained and vented system (rain screen) with a complete air and vapour seal, allowing any moisture entering the frame to drain to the exterior and allowing air into the pressuring chamber.
- 6.8.2.3(5) Aluminum swing entrance doors will be heavy-duty commercial or institutional grade and may be automatically operated, motion-detector controlled.
- 6.8.2.3(6) Aluminum finish for exposed aluminum surfaces will be applied in the manufacturing process and be permanent and resistant to corrosion caused by weather exposure and climate.

6.8.2.4 Specialty Doors

6.8.2.4(1) Overhead Rolling Service Doors

- 6.8.2.4(1)(a) Lateral movement of door curtain slats will be restrained. Windlocks will be provided as required by door size or wind load requirements.
- 6.8.2.4(1)(b) Curtain slats will be interlocking flat slats, complete with bottom bar and contact type bottom astragal.
- 6.8.2.4(1)(c) Manual operation will be provided with inside lift handle and locking bar or chain hoist. Motor operation will be provided on

vehicle access doors and doors requiring constant usage. Chain operation will be by means of reduction gears and galvanized hand chain.

- 6.8.2.4(1)(d) For fire doors, automatic closing device will be operated by fire door release device connected to fire alarm system.

6.8.2.4(2) Overhead Rolling Grilles

- 6.8.2.4(2)(a) Overhead rolling grilles will be fabricated with metal components, and assembled to allow visual access to secure areas.
- 6.8.2.4(2)(b) Grille guides will be complete with aluminum or steel guides, fabricated to withstand vertical and lateral loads, counterbalanced by helical torsion springs, and sound-deadened.
- 6.8.2.4(2)(c) Manual operation will be provided with inside lift handle and locking bar or chain hoist. Motor operation will be provided on vehicle access grilles and grilles requiring constant usage. Chain operation will be by means of reduction gears and galvanized hand chain.

6.8.2.4(3) Overhead Rolling Counter Shutters

- 6.8.2.4(3)(a) Shutter curtains will be fabricated with extruded aluminum, galvanized steel, or stainless steel interlocking flat slats, complete with guides of similar materials.
- 6.8.2.4(3)(b) Shutters will have manual operation and locking capability.

6.8.2.4(4) Sliding Doors and Panels

- 6.8.2.4(4)(a) Door and track materials and assembly will operate smoothly and resist door derailment.
- 6.8.2.4(4)(b) Systems with a swing-type door(s) will attach to the slide door carrier(s) by means of top pivot bar and bottom pin guide, and contain a breakaway release latch for holding the door in the closed position during normal operation. Swing-out sidelights will allow the active sliding door to swing at 90° from any position in the sliding mode.
- 6.8.2.4(4)(c) Glass will be of safety type, capable of withstanding the impact of manually-wheeled vehicles in emergency situations.

6.8.2.4(5) Interior Aluminum Sliding Doors and Sidelights

6.8.2.4(5)(a) Interior sliding doors and sidelights will be top hung, with no recessed floor track per infection control requirements, with sliding and fixed panel(s), and suitable for single glazing with 6 mm clear fully tempered float glass.

6.8.2.4(6) Automatic Sliding Doors

6.8.2.4(6)(a) Automatic sliding doors will be installed where indicated in the Room Data Sheets.

6.8.2.4(6)(b) Doors equipment will accommodate medium to heavy pedestrian traffic and up to the following weights for active leaf doors: 100 kg for locations as designated bi-part, 200 kg for single slide.

6.8.2.4(6)(c) Door operator, including the motion and presence detection system, will be capable of operating within the temperature ranges existing at the Facility and be unaffected by ambient light or ultrasonic interference.

6.8.2.4(6)(d) Doors will be on motion sensors or push button activated as described in the Room Data Sheets and will be securable after hours.

6.8.2.4(7) Automatic Swing Doors

6.8.2.4(7)(a) Automatic swing doors may be installed at main entrances and may be used for other interior and exterior locations.

6.8.2.4(7)(b) Door equipment will accommodate medium to heavy pedestrian traffic and up to 98 kg weight of doors.

6.8.2.4(7)(c) Directional motion sensor control device, if used, will be unaffected by ambient light or ultrasonic frequencies.

6.8.2.4(7)(d) All in-swing doors that are required exits will be equipped with an emergency breakaway switch that internally cuts power to the operator. No external power switch will be allowed.

6.8.2.4(7)(e) Use of delayed panic hardware to meet exit route requirements is discouraged.

6.8.2.4(8) Aluminum Curtain Wall and Windows

6.8.2.4(8)(a) Aluminum curtain walls and windows will conform to the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

- 6.8.2.4(8)(b) Curtain wall and window framing will incorporate a drained and vented system with a complete 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.
- 6.8.2.4(8)(c) The design of the curtain wall framing will incorporate a thermal-break system.
- 6.8.2.4(8)(d) Aluminum finish for exposed aluminum surfaces will be permanent and resistant to corrosion resulting from weather exposure and climate.
- 6.8.2.4(8)(e) The assembly will resist climatic events (with a safety factor) as outlined in the BC Building Code.
- 6.8.2.4(8)(f) Operable windows are to be provided with opening size restrictions which limits the opening size to maximum 125mm.
- 6.8.2.4(8)(g) Client bedrooms are to be provided with operable windows which provide exterior air into the rooms. These operable windows are to be designed to prevent the passage of contraband to and from the exterior and the interior when in the open position and designed to prevent self-harm and provide staff override locking.

6.8.2.5 Glass and Glazing

- 6.8.2.5(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.
- 6.8.2.5(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, windows and ornamental glazing.
- 6.8.2.5(3) Glass and glazing assemblies will be designed to resist local seismic conditions.
- 6.8.2.5(4) Glass and glazing assemblies will resist 1-in-100 year climatic events (with a safety factor).
- 6.8.2.5(5) Laminated safety glass will be used in single-glazed windows, entry doors and sidelights, or as the inboard light of double-glazed windows.

6.8.2.6 Exterior secure glazing to all Client access areas noted low and medium risk on Room Data Sheet

- 6.8.2.6(1) Exterior lite: Min. 6.0mm, tempered “low E” glass;
 - 6.8.2.6(2) Air Space: 12.7mm;
 - 6.8.2.6(3) Interior Lite: Min. 3mm tempered laminated both sides of polyvinyl interlayer; and
 - 6.8.2.6(4) Limiting glazing dimensions to a maximum of 750 x 1525mm pane.
- 6.8.2.7 Exterior secure glazing to all Client access areas noted low and medium risk on the Room Data Sheet adjacent to outdoor spaces and at grade:
- 6.8.2.7(1) Exterior lite: Min. 3mm tempered laminated both sides of polyvinyl interlayer;
 - 6.8.2.7(2) Air Space: 12.7mm;
 - 6.8.2.7(3) Interior Lite: Min. 3mm tempered laminated both sides of polyvinyl interlayer; and
 - 6.8.2.7(4) Limiting glazing dimensions to a maximum of 750 x 1525mm pane.
- 6.8.2.8 Exterior secure glazing to secure rooms noted high risk on Room Data Sheets
- 6.8.2.8(1) Exterior lite: Min. 6.0mm, clear heat strengthen, 60 PVB, Min. 6mm clear heat strengthen PVB “low E”#2 of the unit.
 - 6.8.2.8(2) Air Space: 12.7mm
 - 6.8.2.8(3) Interior Lite: Min. 3mm polycarbonate
 - 6.8.2.8(4) Interior Lite: Min. 6mm tempered laminated both sides of polyvinyl interlayer
 - 6.8.2.8(5) Limiting glazing dimensions to a maximum of 750 x 1525mm pane.
- 6.8.2.9 Provide non-climbable, non-breakable, exterior glass guards to allow vision to the outside at securable exterior courtyards of Neighbourhood units, metal mesh fencing is not acceptable.
- 6.8.2.9(1) Exterior glass guards will consist of the following minimum requirements;
 - 6.8.2.9(1)(a) 6mm clear tempered laminated glass;
 - 6.8.2.9(1)(b) 3mm polycarbonate interlayer;
 - 6.8.2.9(1)(c) 6mm clear tempered glass;

- 6.8.2.9(1)(d) glass guard to be minimum 4000mm above finished floor level;
- 6.8.2.9(1)(e) assembly detailed to be anti-ligature, prevent climbing including restrictions at wall junctions and interfaces, and prevent escape and unauthorized entry; and
- 6.8.2.9(1)(f) edges to be ground smooth and polished.

6.8.2.10 Exterior Glazing Performance Requirements:

- 6.8.2.10(1) STC Rating: Refer to Appendix 1D – Acoustics and Noise Control
- 6.8.2.10(2) U-value: 0.25
- 6.8.2.10(3) Shading coefficient: 0.45
- 6.8.2.10(4) Solar Heat Gain Coefficient: 0.39
- 6.8.2.10(5) Visible Light Transmittance: 68%

6.8.2.11 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.

6.8.2.12 Mirrors

- 6.8.2.12(1) Full wall unframed mirrors will be 6 mm thick minimum float glass backed with electrolytically-applied copper plating. All edges will be ground smooth and polished.
- 6.8.2.12(2) Wall mounted posture mirrors will be framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back will be galvanized steel.
- 6.8.2.12(3) Glass mirrors will not be used in rooms which will be accessible by Clients.

6.8.2.13 Finish Hardware

- 6.8.2.13(1) Finish hardware materials and workmanship will conform to quality standards of the Door and Hardware Institute (DHI).
- 6.8.2.13(2) Finish hardware supplier will be an established contract builders hardware firm who will have in its employ one or more AHC (Architectural Hardware Consultant) who are members in good standing of the Door and Hardware Institute (DHI) and who will be responsible for the complete hardware contract.

- 6.8.2.13(3) Finishes will be selected to provide maximum longevity and preservation of the finish.
- 6.8.2.13(4) Hardware, where applicable, will be ULC-listed for fire rating for all functions up to 2-hour doors.
- 6.8.2.13(5) Doors in Client areas will be provided with anti-ligature hardware and tamper resistant fasteners.
- 6.8.2.13(6) Finish hardware will be heavy duty commercial quality hardware.
- 6.8.2.13(7) Locksets and latch sets: minimum requirements – ANSI A156.13, fully mortised grade 1 type, lever handles will be solid material and provide a full return to the door.
- 6.8.2.13(8) Deadbolts: minimum requirements - ANSI A156.13, fully mortised grade 1 type.
- 6.8.2.13(9) Finishes for exterior hardware to be stainless steel with corrosion resistant parts.
- 6.8.2.13(10) All exit doors to be ULC listed for accident hazard and fire exit and to be tested in accordance with ANSI A156.3, Grade 1.
- 6.8.2.13(11) All closers to be ULC listed and certified under ANSI A156.4, Grade 1. Where door closers are required in Client areas, provide concealed closers. Size all closers to suit site conditions and in accordance with barrier free accessibility codes.
- 6.8.2.13(12) Continuous hinges will be geared aluminum type. If power transfers are provided, they will be serviceable.
- 6.8.2.13(13) Door stops will be heavy duty and wall mounted or overhead wherever possible. Floor stops are to be avoided for safety and cleanliness reasons.
- 6.8.2.13(14) Hinges will be ANSI Grade 1, warranted for the life of the building and sized according to manufacturer's recommendations. Locking outswing doors will be provided with non-removable pins.
- 6.8.2.13(15) Request to exit devices will be provided in the hardware wherever possible.
- 6.8.2.13(16) Power transfers for electrified hardware will be concealed in the edge of the door or through the hinge.

6.8.2.13(17) Power supplies for door hardware will be provided by this section and will provide a minimum of 25% room for expansion. Power supplies will be provided with relay boards that completely isolate hardware power from access panels with individual fused outputs for each hardware device. A minimum of 5 Ah battery backup will be provided.

6.8.2.13(18) Automatic door operators will be suitable for heavy duty applications and door weights of up to 350lbs. Operators will be provided with onboard timing sequencers, power close mode and stack pressure compensation.

6.8.2.14 Keying

6.8.2.14(1) The Design-Builder will provide a highly restricted, utility patented keyway that will be assigned to the Facility. A minimum 4-level keying system will be implemented.

6.8.2.14(2) Locking and cylinders will all be keyed to a new grand master key in system and keyed to the Owner's requirements.

6.8.2.14(3) Cylinders will be construction keyed. Construction key system will be removed by the insertion of the Owner's key or by the removal of a split key plug.

6.8.2.14(4) Keys from factory will be given to the Owner.

6.8.2.14(5) Four keys will be supplied for each lock cylinder.

6.8.2.14(6) All electronic locks and hardware associated with ESS and Access Control System to be provided by Division 8 contractor.

6.8.2.15 Typical Hardware Groups

6.8.2.15(1) The Design-Builder will comply with the general door hardware requirements set out in Appendix 1H – Door Hardware, subject to any specific requirements otherwise set out in this Schedule or the Room Data Sheets.

6.9 Finishes (Division 09)

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 cleaning or other procedures, water will be able to collect and exist without causing damage to the finishes or substrate.

- 6.9.1.2 For areas in which wear is a concern, such as areas with pedestrian or wheeled traffic; finish materials will be durable to withstand damage and easily replaceable in sections if damage does occur.
 - 6.9.1.3 Infection prevention and control will be a priority in the selection of finishes for all user areas. Acoustic characteristics of finish materials will be a priority consideration.
 - 6.9.1.4 The appearance of finishes and colours will create and promote a natural healing environment, prevent glare, and minimize artificial lighting requirements.
 - 6.9.1.5 Selection of materials will promote sustainability by, for instance, having low-emissivity or comprising renewable resources.
- 6.9.2 Performance Criteria
- 6.9.2.1 Interior Wall Framing
 - 6.9.2.1(1) Materials and workmanship for interior walls, including steel studs and furring and gypsum board ceiling suspension systems, will conform to the Canadian Sheet Steel Building Institute Standards (CSSB1), and the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition).
 - 6.9.2.1(2) System design and components will meet code seismic restraint requirements.
 - 6.9.2.1(3) Prefabricated steel studs for interior partitions and furring will be non-load bearing, with no axial load other than its own weight, the weight of attached finishes, and lateral loads of interior pressure differences and seismic loads.
 - 6.9.2.1(4) Steel stud framing construction will accommodate electrical, plumbing and other services in the partition cavity, and support fixtures, wall cabinets and other such wall-mounted items with reinforcement and backing.
 - 6.9.2.1(5) Design will consider the differences in air pressure that may result on opposite sides of the wall or partition due to factors such as wind and other lateral pressures, stack effects, or mechanically-induced air pressurization.
 - 6.9.2.1(6) Where studs complying with ASTM C645 are used to receive abuse resistant or impact resistant gypsum panels, they will be not less than 0.0312 in. (0.792 mm) design thickness and will be in accordance with sections 4.3 and 8.1 of Specification C645.

6.9.2.2 Gypsum Board

- 6.9.2.2(1) Materials and workmanship for gypsum board and accessories will conform to the following:
- 6.9.2.2(1)(a) Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition);
 - 6.9.2.2(1)(b) Northwest Walls & Ceilings Bureau (NWCB) - Recommended Levels for Finishing of Gypsum Board standard;
 - 6.9.2.2(1)(c) Applicable requirements of ASTM C754 for installation of steel framing;
 - 6.9.2.2(1)(d) Applicable requirements and recommendations of Gypsum Association GA 216, "Recommended Specifications for the Application and Finishing of Gypsum Board" except for most stringent requirements of manufacturer;
 - 6.9.2.2(1)(e) Finish gypsum panels in accordance with applicable requirements and recommendations of Gypsum Association GA 214, "Recommended Levels of Finish for Gypsum Board, Glass-Mat and Fiber-Reinforced Gypsum Panels" except for most stringent requirements of manufacturer; and
 - 6.9.2.2(1)(f) Apply acoustical sealant in accordance with applicable requirements of ASTM C919.
- 6.9.2.2(2) Glass mat water-resistant gypsum backing panels (tile backer board) will be used behind wall covering in showers, behind sinks, or other wet areas, except reinforced cementitious board or cementitious backer unit (CBU) may be used as an alternative to the glass mat water-resistant gypsum backing panels.
- 6.9.2.2(3) For increased resistance to abrasion, indentation, and penetration of interior walls and ceilings, provide abuse-resistant or impact resistant gypsum board where required by the risk category refer to Appendix 1C – Room Data Sheets.

6.9.2.3 Acceptable products and materials

- 6.9.2.3(1) Gypsum Board and Accessories: Listed products establish standard of quality and are manufactured by CGC Inc. Mississauga, Ontario or United States Gypsum Company (USG), Chicago, IL.
- 6.9.2.3(2) Steel Framing and Furring: Company acceptable to installer.

- 6.9.2.3(3) 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.
- 6.9.2.3(4) Design for each type of gypsum board 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:
- 6.9.2.3(4)(a) Gypsum Wallboard: ASTM C1396/C1396M
 - (a).1 Thickness: 12.7 mm (1/2"), 15.9 mm (5/8")
 - (a).2 Long Edges: Tapered
 - 6.9.2.3(4)(b) Gypsum Board, Type X: ASTM C1396/C1396M
 - (b).1 Thickness: 12.7 mm (1/2") Type C, 15.9 mm (5/8") Type X, 15.9 mm (5/8") Type C
 - (b).2 Long Edges: Tapered
 - 6.9.2.3(4)(c) Gypsum Ceiling Board: ASTM C1396/C1396M
 - (c).1 Thickness: 12.7 mm (1/2")
 - (c).2 Long Edges: Eased or Tapered
 - 6.9.2.3(4)(d) Abuse-Resistant Gypsum Board: ASTM C1629/C1629M. Within ASTM C1629, scores a Level 1 for Hard Body Impact.
 - (d).1 Thickness: 15.9 mm (5/8")
 - (d).2 Long Edges: Tapered
 - (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.
 - 6.9.2.3(4)(e) Impact-Resistant Gypsum Board: ASTM C1629/C1629M. Within ASTM C1629, scores a Level 2 for Hard Body Impact.
 - (e).1 Thickness: 15.9 mm (5/8")
 - (e).2 Long Edges: Tapered
 - (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
 - 6.9.2.3(4)(f) Moisture- and Mould-Resistant Gypsum Board: ASTM C1658/C1658M. With moisture and mould-resistant core and fiberglass facers.
 - (f).1 Thickness: 12.7 mm (1/2"), 15.9 mm (5/8") Type X
 - (f).2 Long Edges: Tapered

- (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.
- 6.9.2.3(4)(g) Shaftwall systems:
- (g).1 Liner boards: ASTM C1658, with fiberglass mat laminated to both sides.
 - (g).2 Thickness: 25.4 mm (1")
 - (g).3 Edges: Double beveled
 - (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
- 6.9.2.3(4)(h) Exterior gypsum board for ceilings and soffits
- (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.
 - (h).2 Thickness: 12.7 mm (1/2"), 15.9 mm (5/8") Type X
 - (h).3 Edges: Square
 - (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
- 6.9.2.3(4)(i) Tile backing panels:
- (i).1 Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
 - (i).2 Thickness: 12.7 mm (1/2"), 15.9 mm (5/8") Type X
 - (i).3 Edges: Tapered
 - (i).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
- 6.9.2.3(4)(j) Cementitious Backer Units: ANSI A118.9 and ASTM C1325, with manufacturer's standard edges.
- (j).1 Thickness: 12.7 mm (1/2").
- 6.9.2.3(5) Edges: Tapered glass mat surfaced gypsum sheathing board will be used wherever exterior gypsum sheathing is required at exterior walls.

6.9.2.3(6) Airborne sound insulation will be provided for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Assemblies will be airtight. Recessed wall fixtures such as cabinets or electrical, telephone and television outlets which perforate the gypsum board surface, will not be located back-to-back. In addition, any opening for fixtures will be carefully cut to the proper size and piping penetrations will be sealed. Conduit/duct/piping penetrations will be sealed with tape and filled at the plenum barrier. The entire perimeter of a sound insulating assembly will be made airtight to prevent sound leakage. An acoustic caulking compound or acoustical sealant will be used to seal between the assembly and all dissimilar surfaces (including at window mullions).

6.9.2.3(7) Airborne sound insulation will be provided for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Assemblies will be airtight. Recessed wall fixtures such as cabinets or electrical, telephone and television outlets which perforate the gypsum board surface, will not be located back-to-back. In addition, any opening for fixtures will be carefully cut to the proper size and piping penetrations will be sealed. Conduit/duct/piping penetrations will be sealed with tape and filled at the plenum barrier. The entire perimeter of a sound insulating assembly will be made airtight to prevent sound flanking. An acoustic caulking compound or acoustical sealant will be used to seal between the assembly and all dissimilar surfaces (including at window mullions).

6.9.2.4 Ceramic Tilework

6.9.2.4(1) Ceramic Tile work, if provided, is to meet the Terrazzo Tile and Marble Association of Canada Standards.

6.9.2.5 Acoustic Ceilings

6.9.2.5(1) Interior sound levels will be controlled to facilitate a safe working environment for Facility staff.

6.9.2.5(2) Acoustic ceiling tiles in a suspension system will be installed to provide a level of sound attenuation to suit the intended function of the room.

6.9.2.5(3) Ceiling tiles in a suspension system will provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.9.2.5(4) Special surface-treated ceiling tiles and panels, such as wood, mylar or metal-faced tiles, may be utilized.

- 6.9.2.5(5) System design and components will meet seismic restraint requirements.
- 6.9.2.5(6) Standard acoustical panels and tiles will be designed for installation within the normal occupancy condition range of 15°C - 29°C and maximum 70% relative humidity (RH). When the service use temperature and RH are expected to exceed these ranges, use of acoustical units specifically designed for such applications will be considered.
- 6.9.2.5(7) In any area where lay-in ceiling panels frequently need to be removed for plenum access, tiles will be provided with scratch-resistant surfaces and sealed edges.

6.9.2.6 Flooring

6.9.2.6(1) Quality Control

- 6.9.2.6(1)(a) MFCSI to be engaged to approved and inspect all flooring installations.

6.9.2.6(2) Flooring Types

6.9.2.6(2)(a) Resilient flooring:

(a).1 Provide slip resistant homogeneous single layered, vinyl flooring to meet the following certification and classifications:

- Type I
- Commercial: 34
- Industrial: 43

(a).2 Vinyl flooring will meet the following minimum technical characteristic:

- Total thickness: 2.0 mm
- Wear layer thickness: 2.0 mm
- Total weight/m²: 2.800 g
- Total VOC emissions: $\geq 10 \mu\text{g}/\text{m}^3$ (after 28 days) Confirm, Platinum, SCS certified
- Underfloor heating: Suitable - max 27°C
- Static electrical charge: $< 2 \text{ kV}$
- Residual indentation: Required value: $\leq 0.10 \text{ mm}$ Average measured value: 0.02 mm
- Abrasion volume loss: Group T: $\leq 2.0 \text{ mm}^3$

(a).3 Use solid sheet flooring for all rooms except wet rooms in the facility or an equivalent product accepted in advance by the Owner.

(a).4 All joins will be hot welded seam.

(a).5 All installs will have a 150 mm coved base.

(a).6 Cove base will not be capped, but will be straight cut, finished with clear pick proof silicone caulking.

6.9.2.6(2)(b) For wet room flooring:

(b).1 Provide slip resistant homogeneous single layered, vinyl flooring to meet the following certification and classifications:

- Type I
- Commercial: 34
- Industrial: 43

(b).2 Vinyl flooring will meet the following minimum technical characteristic:

- Total thickness: 2.0 mm
- Wear layer thickness: 2.0 mm
- Total weight/m²: 2.95 (KG/M²)
- Residual indentation: Required value: ≤ 0.10 mm Average measured value: 0.02 mm
- Slip Resistance ASTM D2047: Dry - 88 and Wet -1.03

(b).3 Use slip-resistant solid sheet flooring for all wet rooms in the facility or an equivalent product approved in advance by the Owner.

(b).4 All joints will be hot welded seam.

(b).5 All installs will have a 150 mm coved base and wall covering to overlap.

(b).6 Wet room flooring for Client ensuite washrooms

(b).7 Provide slip resistant homogeneous single layered, vinyl flooring to meet the following certification and classifications:

- Type I
- Commercial: 34
- Industrial: 43

(b).8 Vinyl flooring will meet the following minimum technical characteristic:

- Total thickness: 2.0mm
- Wear layer thickness: 2.00mm
- Total weight/m²: 3.060 g
- Underfloor heating: Suitable - max 27°C
- Slip Resistance: R10, 0.3 ≤μ

6.9.2.6(2)(c) For sports flooring – gymnasium (enclosed play space) and fitness weight room:

(c).1 Provide sports flooring, polyurethane surfacing over high performance resilient base mat including adhesives, resilient base mat, polyurethane sealer, polyurethane structure layer and court markings.

(c).2 Concrete and concrete finishing

- Concrete Slab Depression: equal to system thickness, as per manufactures specification.
- Surface Finish: steel troweled and finished smooth, as per manufactures specification.
- Concrete Tolerance: 1/8" (3mm) in radius of 10' (3m), as per manufactures specification.

(c).3 Flooring will met the following minimum technical characteristic:

- Total thickness: minimum 9.0 mm
- Character: Point Elastic
- Wear layer thickness: minimum 2.0 mm
- Shock Absorption: minimum 20%
- Vertical Deformation: 1.0mm
- Ball Bounce: minimum 98%
- Resistance to Rolling Load: $\geq 1500N$
- Resistance to Impact: $\geq 800gr @ 10^{\circ}C$, $\geq 1000gr @ 17^{\circ}C$
- V.O.C. Content- Adhesive: Solvent Free
- V.O.C. Finish: 45 gr/ lit
- Elongation at break-Structure: 150%
- Tensile Strength- Structure: 8N/ mm²
- Tear Strength Structure: 25 N/mm
- Total weight/m²: 2.800 g
- Total VOC emissions: $\geq 10 \mu g/m^3$ (after 28 days) Confirm, Platinum, SCS certified
- Underfloor heating: Suitable - max 27°C
- Static electrical charge: < 2 kV
- Residual indentation: Required value: ≤ 0.10 mm Average measured value: 0.02 mm
- Abrasion volume loss: Group T: ≤ 2.0 mm³

(c).4 Quality Assurance:

- Manufacturer's Warranty – provide at minimum a 2 year manufacturer's warranty from the Substantial Completion Date.
- Installer's Warranty – provide at minimum a 2 year manufacturer's warranty from the Substantial Completion Date.

(c).5 Floor system supplier qualifications:

- Supplier will be an established firm experienced in this field in the British Columbia market and have been in business for a minimum of ten (10) years in British Columbia.
- Formulator will be ISO-9001 certified for quality control, and ISO-14001 certified for environmental care, and provide copy of Certification document upon request.

(c).6 Floor contractor/installer qualifications and certifications:

- Floor contracting company and field personnel will be trained by supplier on proper installation and finishing process.
- (c).7 Accessories:
- Wall Base will be black 4" (102mm) high non-vented cove base with pre-moulded corners. Provide a moulded rubber base, anchored to the walls with standard base cement. Mitre all corners carefully.
- (c).8 Submittals:
- Concrete Guidelines: Submit three copies of recommendations for correct preparation, finishing and testing of concrete subfloor surfaces to receive to receive granulated base mat and polyurethane floor system.
- (c).9 Manufacturer's product data:
- Submit three floor system specification sheets.
- (c).10 Samples:
- Submit one floor system sample
 - Submit one topcoat standard color sample
 - Submit one line paint colour sample
- (c).11 Maintenance literature:
- Submit copy of flooring maintenance instructions.
- (c).12 Games lines:
- Mix two-component manufacturer's system line paint accordingly to supplier's instructions.
 - Line painting will be in accordance with supplier's directions.
 - Colour of court markings will be as selected by the Design-Builder from the systems manufacturer's complete range of line paint standard colours.
 - Design-Builder to review proposed colours with the Owner for approval.
 - Location of games lines to be approved by Owner.
- 6.9.2.6(2)(d) For stair covering:
- (d).1 Stair treads will be one piece solid vinyl hospital grade (visually impaired roundel tread riser) with carborundum strip or approved equivalent.
- (d).2 Adhesive to be water soluble, low odour product.
- (d).3 Provide solid vinyl tread riser and stringers.
- 6.9.2.6(2)(e) For other flooring:
- (e).1 There may be floor surfaces that require specialized application such as Stonehard, poured epoxy, painted concrete, rubber, or special vinyl. These applications will be reviewed on a per application basis.

- 6.9.2.6(3) Materials and workmanship for flooring will conform to the National Floor Covering Association (NFCA) (<http://www.nfca.ca/>) Specification Standards Manual. US Federal Specification RR-T-650e.
- 6.9.2.6(4) The selection process for flooring materials will include considerations of cleaning and maintenance, pedestrian and rolling traffic, acoustics, infection control, and aesthetics.
- 6.9.2.6(5) If provided, epoxy flooring in all wet areas will be water and slip-resistant and prevent water or moisture transmission to the substrate. Flooring will terminate at the walls in the form of 150mm high flash coves in these areas.
- 6.9.2.6(6) Flooring on which wheeled or service vehicle traffic is anticipated and wear and damage may result will comprise of suitably heavy-duty materials.
- 6.9.2.6(7) Flooring in areas where cart traffic is expected or where cleaning on a regular or emergency basis is necessary will be of a quality suitable for those purposes, and with barrier free or smooth finishes.
- 6.9.2.6(8) Flooring in washrooms will be impervious to water and have a slip-resistant finish.
- 6.9.2.6(9) Resilient Flooring
 - 6.9.2.6(9)(a) Slip-resistant sheet vinyl will have a static coefficient of friction of 0.6 on level surfaces and 0.8 on ramps.
 - 6.9.2.6(9)(b) Exposed surface will provide anti-bacterial activity against gram-positive and gram-negative micro-organisms. All seams will be welded. Areas surfaced in sheet flooring will have integral cove bases.
 - 6.9.2.6(9)(c) Linoleum flooring is not an acceptable product.
 - 6.9.2.6(9)(d) Tactile warning strips and stair nosings will be provided to assist the visually impaired.
 - 6.9.2.6(9)(e) Adhesive for resilient flooring will meet or exceed EPA Standards for acceptable VOC concentration and emission rates.
- 6.9.2.6(10) Seamless Quartz Epoxy Flooring
 - 6.9.2.6(10)(a) Seamless epoxy flooring will be a 100% solids, zero VOC, solvent-free system 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. Bases will be integral cove bases.

6.9.2.6(11) Carpet Tile

6.9.2.6(11)(a) Provide carpet tile: CAN/CGSB-4-129, free-lay carpet tile will be used with the following characteristics:

- (a).1 Pile fibre: solution dyed nylon
- (a).2 Maximum electrostatic charge: less than 3.5 [Kv@20%R.H.](#)
- (a).3 Pile weight 1,085 g/sq/m (32 oz/sq.yd)_
- (a).4 Size: 610 x 610 mm (24 " x 24" inches)
- (a).5 Backing material: Synthetic
- (a).6 Protective treatment: Antimicrobial protection against bacteria, mold and mildew

6.9.2.6(11)(b) Suggested products include: Shaw alterNature Collection Ingrain Tile and Earth Tone Tile or equivalent.

6.9.2.6(11)(c) Provide carpet tile backing such as EcoWorx tile treated with FlorSept or equivalent.

6.9.2.6(11)(d) Carpet tile to be certified to meet or exceed the volatile organic compounds (VOCs) emission limits of the CCI/CRI Indoor Air Quality Green Label Plus Testing Program.

6.9.2.6(11)(e) For adhesive:

- (e).1 Carpet tile adhesive: use type recommended by carpet tile manufacture.
- (e).2 Use pressure sensitive releasable type, low VOC.

6.9.2.7 Acoustic Treatment

6.9.2.7(1) Acoustic treatment will be provided where sound attenuation, soundproofing or other sound control measures are necessary to create a safe and comfortable environment for staff and where confidentiality is paramount.

6.9.2.7(2) For STC, NC and RT60 ratings, refer to Appendix 1D – Acoustics and Noise Control and Appendix 1C – Room Data Sheets

6.9.2.7(3) Sound control will include:

6.9.2.7(3)(a) attenuation of sound throughout the building;

6.9.2.7(3)(b) sound isolation between the exterior and interior spaces;

- 6.9.2.7(3)(c) sound isolation between interior spaces within the building at both horizontal and vertical separations; and
- 6.9.2.7(3)(d) sound and vibration isolation of building service noises and sound isolation of building service rooms.
- 6.9.2.7(4) Partition and ceiling construction will provide approximately the same degree of sound control through each assembly. When a partition is used for sound isolation, the sound control construction will extend from slab to slab.
- 6.9.2.7(5) the integrity of gypsum board partitions and ceilings (mass) will not be violated by vent or grille cut-outs or by recessed cabinets, light fixtures, etc.
- 6.9.2.7(6) Mineral fibre insulation will be used to seal joints around all cut-outs such as TV, data, plumbing, recessed cabinets and bathtub cavities.
- 6.9.2.7(7) Constructions such as ducts, rigid conduits, or corridors that act as speaking tubes to transmit sound from one area to another will be minimized. Common supply and return ducts will have sound attenuation liners at the diffuser and/or grill to maintain assemblies' STC. Conduits will be sealed.
- 6.9.2.7(8) To isolate structure-borne vibrations and sound, vibrating equipment will have resilient mountings to minimize sound transfer to structural materials. Ducts, pipes, and conduits will have resilient, non-rigid boots or flexible couplings where they leave vibrating equipment; and they will be isolated from the structure with resilient gaskets and sealant where they pass through walls, floors, or other building surfaces.
- 6.9.2.7(9) Acoustic screens, vibration isolators, and carefully selected exterior equipment will be used to prevent exterior noise that neighbours may find offensive.
- 6.9.2.8 Painting and Protective Coatings
 - 6.9.2.8(1) Paints
 - 6.9.2.8(1)(a) Walls, doors and shelving
 - (a).1 Eggshell or semi-gloss.
 - (a).2 Application: brush, roller or spray
 - (a).3 Clean up: warm water
 - (a).4 Thinner if needed: water
 - (a).5 Colour selection / patterning will be at the discretion of the Owner

- (a).6 bottoms and tops of doors will be painted for ease of cleaning.
- 6.9.2.8(1)(b) Door frames and metal doors
 - (b).1 Semi-gloss.
 - (b).2 Application: brush, roller or spray
 - (b).3 Clean up: warm water
 - (b).4 Thinner: water
 - (b).5 Colour selection / patterning will be at the discretion of the Owner
- 6.9.2.8(1)(c) Wood finish doors
 - (c).1 Clear coat interior varnish
 - (c).2 Application: brush, roller or spray
 - (c).3 Clean up: mineral spirits
 - (c).4 Thinner: mineral spirits
- 6.9.2.8(1)(d) Paint Grade Doors
 - (d).1 Semi-gloss.
 - (d).2 Application: brush, roller or spray
 - (d).3 Clean up: warm water
 - (d).4 Thinner if needed: water
 - (d).5 Colour selection / patterning will be at the discretion of the Owner
- 6.9.2.8(1)(e) Ceilings
 - (e).1 Flat.
 - (e).2 Application: brush, roller or spray
 - (e).3 Clean up: warm water
 - (e).4 Thinner: water
 - (e).5 unless otherwise approved by Owner, all painted ceilings will be white
- 6.9.2.8(2) Materials and workmanship will conform to Master Painters Institute (MPI) Architectural Painting Specification Manual (latest edition).
- 6.9.2.8(3) Exterior paints and painting will be of a quality to protect the substrate materials from weather and climate conditions.
- 6.9.2.8(4) A visually harmonious and aesthetically coordinated appearance will be achieved across all areas of the Facility.
- 6.9.2.8(5) Exterior and interior finish materials will have surface finishes either as manufactured and integral to the finish material or as applied to the surface of the finish material by paint or special coating.

- 6.9.2.8(6) Exterior and interior materials subject to corrosion from exposure to moisture or other corrosive agents and where painting is deemed to be insufficient protection will receive a special protective coating. Such materials include exterior and interior structural, galvanized, and miscellaneous steel.
 - 6.9.2.8(7) In interior areas, indoor air quality will be a priority, and paints and paint materials will have a minimal volatile organic compound level.
 - 6.9.2.8(8) Interior paint materials will be of a quality to withstand regular or repeated cleaning as the function of the area dictates.
 - 6.9.2.8(9) Metal handrails, doors, and frames will be painted a contrasting colour from walls in consideration of the visually impaired.
 - 6.9.2.8(10) Parking area, stair well walls and ceilings will be painted white.
 - 6.9.2.8(11) Materials used will be lead and mercury-free.
 - 6.9.2.8(12) Seamless epoxy wall coatings will be a two-component, high solids, zero or low VOC, solvent-free, epoxy glaze wall coating, and will be seamless and abrasion, chemical, and UV-resistant.
 - 6.9.2.8(13) Paint materials will be rated under Environmental Notation System (ENS) with acceptable VOC ranges as listed in the MPI Approved Product List under "E" ranges.
 - 6.9.2.8(14) Only materials having a minimum MPI "Environmentally Friendly" E2 rating based on VOC (EPA Method 24) content levels will be used.
 - 6.9.2.8(15) External mild steel will be hot dipped galvanised, primed and painted with appropriate painting systems.
 - 6.9.2.8(16) Surfaces to be suitably prepared and primed prior to application of all paints, as per manufacturer's recommendations.
- 6.9.2.9 Special Wall Coverings
- 6.9.2.9(1) Materials and workmanship will conform to the Master Painters Institute (MPI) Architectural Painting Specification Manual (latest edition).
 - 6.9.2.9(2) Wall coverings may be required on interior walls to satisfy aesthetic considerations beyond the application of paint and create a comfortable working environment in staff work areas, and a safe and inviting environment in public areas.

- 6.9.2.9(3) Wall coverings will not be used in areas that may have excessive moisture present or require high and frequent maintenance.
- 6.9.2.9(4) Sealers and adhesives will be non-toxic, water-based type and meet requirements of Canadian "Eco Logo" program or equivalent. TVOC emissive content will not be more than 20 grams per litre.

6.9.2.10 Wet Room Wall Coverings

- 6.9.2.10(1) High impact, heat formable wall (HIHF referenced on the Room Data Sheet) panelling system to be the full height of the room.
- 6.9.2.10(2) Provide semi-rigid vinyl wall panels for hygienic wall covering to meet the following certification and classifications:
 - 6.9.2.10(2)(a) ASTM F793-10a - Classification of Wallcovering by Durability Characteristics.
 - 6.9.2.10(2)(b) CAN/ULC-S102-10 - Standard Method of Test for Surface Burning Characteristics of Building
 - 6.9.2.10(2)(c) Conform to flammability requirements in accordance with CAN/ULC-S102.
 - 6.9.2.10(2)(d) Semi-rigid vinyl wall panels will meet the following minimum technical characteristic:
 - (d).1 Total thickness: 2.5 mm (0.1 inch) thick
 - (d).2 Composition: 100 percent pure vinyl, extruded, homogenous, semi-rigid PVCu sheet
 - (d).3 Total weight/m²: 3.4 kg/sq m (0.75 lbs/sq ft).
 - 6.9.2.10(2)(e) Accessories
 - (e).1 Adhesive, Caulking and Mastic: Type recommended by wall covering manufacturer to suit application to substrate.
 - (e).2 Joint Strips, Start and Edge Trims: In accordance with approved shop drawings.
 - (e).3 Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
 - (e).4 Substrate Primer and Sealer: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
 - (e).5 Vinyl Welding Rod: Weldrod to match field.
- 6.9.2.10(3) Quality Assurance

- 6.9.2.10(3)(a) Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- 6.9.2.10(3)(b) Installer Qualifications: Company specializing in performing the work of this Section with minimum three years documented experience and approved by the manufacturer.
- 6.9.2.10(3)(c) Supervisor Qualifications: Trained by product manufacturer.
- 6.9.2.10(3)(d) Warranty
 - (d).1 Manufacturer's Warranty: Provide a ten (10) year manufacturer's warranty to include coverage for failure to meet specified requirements.
- 6.9.2.10(3)(e) Installation
 - (e).1 Install semi-rigid vinyl panels to manufacturer's written instructions.
 - (e).2 Install termination trims.
 - (e).3 Install with an overlap on the coved base flooring material.

6.10 Specialties (Division 10)

6.10.1 Basic Requirements

- 6.10.1.1 Specialty products will be manufactured for the specific purposes intended and installed in strict accordance with the manufacturer's directions.

6.10.2 Performance Criteria

6.10.2.1 Tackboards and Whiteboards

- 6.10.2.1(1) Tackboard surfaces will be of a type and quality to allow pin penetration of the surface materials and have reasonable resistance to deterioration. Whiteboard surfaces will be of a type to allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort.
- 6.10.2.1(2) Tackboards and whiteboards will be complete with manufactured frames and accessory trays.
- 6.10.2.1(3) Whiteboard writing surfaces will be porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant and have maximum contrast, glare control, and reflectivity.

- 6.10.2.1(4) Lamination adhesive used for tackboards and whiteboards will be non-toxic, water-based adhesive.

6.10.2.2 Compartments and Cubicles

- 6.10.2.2(1) Compartments and cubicles will include toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.
- 6.10.2.2(2) Exposed surfaces will be permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.
- 6.10.2.2(3) Partitions and standards will be secured to the floor or ceiling structure, and resistant to lateral loading and impact.
- 6.10.2.2(4) Compartment/cubicle doors will be of material matching the partitions and include permanent, purpose-made hardware. Doors and hardware will provide privacy and security and be handicap accessible where required.

- 6.10.2.2(5) Change compartments will be complete with a mirror.

6.10.2.2(6) Toilet Partitions

- 6.10.2.2(6)(a) Sheet metal will be galvanized steel conforming to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish for steel surfaces will be polyester, baked enamel;
- 6.10.2.2(6)(b) Stainless steel will be Type 304 conforming to ASTM A240 with No. 4 finish; and
- 6.10.2.2(6)(c) Fibre-reinforced plastic (fibreglass) will be moisture resistant.

6.10.2.2(7) Change Cubicle Partitions

- 6.10.2.2(7)(a) Where not adjacent to showers, partitions will conform to quality assurance requirements specified for toilet partitions.

6.10.2.2(8) Shower Partitions

- 6.10.2.2(8)(a) Partitions will be solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or CSA LD3.

6.10.2.3 Wall Guards and Corner Guards, Wall Protection, Door Edge and Door Frame Protection

- 6.10.2.3(1) Wall and corner guards

- 6.10.2.3(1)(a) Protection of walls and exposed wall corners at service areas and other areas will be provided as required by the Owner to prevent damage due to impact from traffic such as equipment and service carts.
 - 6.10.2.3(1)(b) Materials selected will be determined by the amount and degree of impact anticipated. Corner guards will be Acrovyn Corner Guards with extruded aluminum base angle and end caps or equal. Stainless steel will be used as indicated in the Room Data Sheets.
 - 6.10.2.3(1)(c) Wall and corner guards will be secured to reinforcing and backing in the walls, which will be sufficient to withstand expected impact loads.
- 6.10.2.3(2) Wall protection
- 6.10.2.3(2)(a) Sheet wall protection will be applied to wall areas where the impact damage anticipated is of a larger area of wall than would be protected by bumper guards. Sheet wall protection to be provide with backing, which at a minimum, is impact resistant gypsum board.
 - 6.10.2.3(2)(b) Sheet wall protection and faces of doors will be applied where required and where impact damage is anticipated and may complement the installation of door edge and frame protection.
 - 6.10.2.3(2)(c) Wall protection will be secured to reinforcing and backing in the walls, which will be sufficient to withstand expected impact loads.
 - 6.10.2.3(2)(d) Wall protection products will be high impact and stain-resistant to pen marks, paint, and graffiti, will withstand commercial cleaners without fading or staining, and will contain anti-microbial additives to retard mildew and bacterial growth.
 - 6.10.2.3(2)(e) Wall protection to be provided behind all sinks.
 - 6.10.2.3(2)(f) Minimum wall protection height will be 1220mm above the floor bases except for the following:
 - (f).1 clean supply and soiled utility rooms, housekeeping rooms, equipment rooms and alcoves, where the minimum wall protection height will be 1600 mm above finish floor;
 - (f).2 food cart alcove, storage, furniture and equipment storage, kitchen storage, freezer room, storage for individual effects, file storage, storage for assessment tools, food reheat areas, and general equipment and supply areas, where the minimum wall protection height will be 2440mm above flash cove.

6.10.2.3(2)(g) Install sheet wall protection without capping and divider strips. Edges to be cut straight and joints to be caulked.

6.10.2.3(3) Door Edge and Door Frame Protection

6.10.2.3(3)(a) Door edges and door frames in Client, user and service areas will be protected from damage such as impact caused by the regular movement of carts and other wheeled vehicles.

6.10.2.4 Building Signage

6.10.2.4(1) Refer to Sections 4.3.4 and 5.5.

6.10.2.5 Metal Lockers

6.10.2.5(1) Individual and shared storage facilities will be provided in designated staff areas for Facility staff and in accessible secure areas suitable for staff to secure personal effects. Refer to Room Data Sheets for quantity.

6.10.2.5(2) Such storage facilities may be metal lockers and metal locker systems of appropriate sizes, quantities, and groupings.

6.10.2.5(3) Sheet metal will be galvanized steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.10.2.5(4) Finish for steel surfaces will be polyester baked enamel.

6.10.2.5(5) Single, double, or multiple-tier metal lockers for staff use will be complete with provision for locking with padlock, number plates, and hanging hooks.

6.10.2.6 Storage Shelving Systems

6.10.2.6(1) Storage systems for materials will be provided in designated storage areas.

6.10.2.6(2) Adjustable shelving systems may be specifically manufactured for storage purposes, such as plywood or steel-slotted angle industrial shelving for bulk materials or plastic laminate-faced plywood for clean storage.

6.10.2.6(3) Mobile storage systems for files will be a high-density system designed to make maximum use of available space by eliminating need for access aisle for each run of shelving. System must be installed and braced to resist seismic loads.

6.10.2.7 Washroom, Shower and Hand Wash Sink Accessories

- 6.10.2.7(1) Refer to Room Data Sheets and Appendix 1G – Equipment and Responsibility for requirements. Accessories in washrooms, showers and at hand wash sinks will be supplied and installed by the Design-Builder unless otherwise noted. Type and size of accessories will be determined by the numbers and categories of users.
- 6.10.2.7(2) The Design-Builder will provide washroom accessories, including:
- 6.10.2.7(2)(a) Soap dispensers
 - 6.10.2.7(2)(b) Toilet paper dispensers
 - 6.10.2.7(2)(c) Paper towel dispensers
 - 6.10.2.7(2)(d) Paper towel waste bin
 - 6.10.2.7(2)(e) Mirrors
 - 6.10.2.7(2)(f) Handicap grab bars (with integral tactile grip finish)
 - 6.10.2.7(2)(g) Coat hooks
 - 6.10.2.7(2)(h) Sanitary napkin disposal receptacles
 - 6.10.2.7(2)(i) Baby change tables in both male and female public use washrooms
 - 6.10.2.7(2)(j) 'In-Use' indicators for public and staff washrooms.
- 6.10.2.7(3) Shower rooms or showers in washrooms will include but are not limited to the following accessories:
- 6.10.2.7(3)(a) Shower curtain track and curtains
 - 6.10.2.7(3)(b) Handicap grab bars
 - 6.10.2.7(3)(c) Coat hooks
- 6.10.2.7(4) Hand wash sink accessories will include but are not limited to the following:
- 6.10.2.7(4)(a) Soap dispensers
 - 6.10.2.7(4)(b) Paper towel dispensers
 - 6.10.2.7(4)(c) Paper towel disposals (Owner provided, Design-Builder installed)

- 6.10.2.7(5) Accessories with anti-ligature and safety features will be selected for areas where there is high risk of Client injury, and be in accordance with British Columbia Ministry of Health Standards.
- 6.10.2.7(6) Recessed dispensers (such as those for paper towels, soap, and waste receptacles) will not be used.
- 6.10.2.7(7) Accessories will be commercial grade and free from imperfections in manufacture and finish.
- 6.10.2.7(8) Washroom accessory and installation will allow cleaning and maintenance of the accessory and surrounding wall area.
- 6.10.2.7(9) All fittings, fixtures and accessories in Client areas will have concealed fastening for security, anti-ligature design and be tamper proof.

6.11 Equipment (Division 11)

6.11.1 Appendix 1G – Equipment and Responsibility List

6.11.1.1 In this Agreement:

- 6.11.1.1(1) “Commissioned” or “Commissioning” mean testing and commissioning the equipment or Facility system in accordance with any commissioning requirements set out in this Agreement, all applicable standards and good industry practice, including to ensure that the equipment is operating in accordance with the manufacturer’s requirements and specifications;
- 6.11.1.1(2) “Contractor”, when used in Appendix 1G – Equipment and Responsibility List, means the Design-Builder;
- 6.11.1.1(3) “Delivery” means delivery to the Facility;
- 6.11.1.1(4) “Installation” or “Installed” means connection to necessary building services, including plumbing, heating, cooling, ventilation and electricity, connection to necessary communication or network interfaces or devices and affixing to building structure, including ceiling and walls;
- 6.11.1.1(5) “Setup” includes:
 - 6.11.1.1(5)(a) transportation and movement within the Facility from the delivery location to the final installation location;
 - 6.11.1.1(5)(b) placement in the final location within the Facility; and

- 6.11.1.1(5)(c) any necessary unwrapping, unpacking, assembly and removal of packing materials;
- 6.11.1.1(6) "Storage" means the provision of secure space with appropriate environment to allow received equipment to be set, placed, loaded, unloaded or otherwise warehoused without damage while awaiting Setup; and
- 6.11.1.1(7) the acronyms "CPCI", "NEPO", "OPCI", "OPOI", "REEO" and "REIO" have the meanings set out in Appendix 1G – Equipment and Responsibility List.
- 6.11.1.2 Any items of equipment or systems referred to in this Schedule or that are needed to provide a fully functional Facility and that are not specifically listed in Appendix 1G – Equipment and Responsibility List as being the responsibility of the Owner are the sole responsibility of the Design-Builder to be supplied and included as part of the Facility.
- 6.11.1.3 The Design-Builder will be responsible for the procurement, Delivery, Storage, Setup, Installation and Commissioning of all "CPCI" equipment.
- 6.11.1.4 The Owner will be responsible for the procurement, delivery, installation and commissioning of any "OPCI" equipment. The Design-Builder will be responsible for the Storage and Setup of all "OPCI" equipment.
- 6.11.1.5 The Owner will be responsible for the procurement, delivery, storage, setup, installation and commissioning of any "OPOI", "NEPO", "REEO" and "REIO" equipment.
- 6.11.1.6 The Design-Builder will:
- 6.11.1.6(1) as early as practicable in accordance with good industry practice and without limiting any of the Design-Builder's other obligations under this Section, identify to the Owner:
- 6.11.1.6(1)(a) each item of "OPOI", "OPCI" and "REOI" equipment, if any, that must be installed in the Facility for the Design-Builder to achieve Substantial Completion;
- 6.11.1.6(1)(b) for each item of "OPOI", "OPCI" or "REOI" equipment, the earliest date when the Facility will be available to the Owner to install such item; and
- 6.11.1.6(1)(c) for each item of "OPOI", "OPCI" and "REOI" equipment identified by Project Co under Section 6.11.1.6(1)(a) above, if any, a reasonable date by which such item must be installed so as not to

delay the Design, the Construction, Substantial Completion or the Owner's use and occupation of the Facility; and

6.11.1.6(2) as required from time to time until Substantial Completion, but no less than once per calendar month, update the information in Section 6.11.1.6(1) above so that at all times it is an accurate, reasonable and realistic representation of the Design-Builder's plans for the completion of the Design and Construction of the Facility and the availability of the Facility to the Owner for the installation of "OPOI", "OPCI" and "REOI" equipment.

6.11.1.7 The Owner will cause each item of "OPOI", "OPCI" and "REOI" equipment identified by the Design-Builder under Section 6.11.1.6(1)(a) above to be installed by the date specified by the Design-Builder under Section 6.11.1.6(1)(c).

6.11.1.8 The Owner intends to procure, but is not obligated to procure, the items of "OPOI", "OPCI" and "REOI" equipment shown in Appendix 1G – Equipment and Responsibility List.

6.11.2 Fall Protection and Window Washing

6.11.2.1 Provide a complete system with safety tie-back, life line anchors, horizontal life line system and associated equipment for safe building maintenance operations including window-washing.

6.11.2.2 Provide easy access for window cleaning.

6.12 Furnishings (Division 12)

6.12.1 Basic Requirements

6.12.1.1 Window coverings will allow control of exterior light entering the room during daylight hours and provide privacy during daylight and non-daylight hours.

6.12.1.2 Window coverings will be designed to minimize light spillage into residential areas.

6.12.1.3 Window coverings in Client units will be required to provide black-out functions. Materials, tracks, seals, and operation will be suited to the purpose.

6.12.1.4 Window coverings will be designed and manufactured using materials and mechanisms that requires minimal cleaning and maintenance operations and maximize infection control.

6.12.1.5 Window coverings in Client areas will be anti-ligature and anti-vandalism.

6.12.1.6 Provide window coverings as indicated in the Room Data Sheets.

6.12.2 Performance Criteria

6.12.2.1 Window Shade Systems

- 6.12.2.1(1) Will be waterproof, washable, rot-proof, flame-resistant, fungal and bacteria-resistant, colourfast to light, glare-reducing, and able to control heat gain and provide external visibility.
- 6.12.2.1(2) Will pass small scale vertical burn requirements in accordance with CAN/ULC-S109 or NFPA-701.
- 6.12.2.1(3) Will be tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.
- 6.12.2.1(4) Will meet infection control requirements for window shade systems.
- 6.12.2.1(5) In Client accessible areas window shade systems to be anti-ligature and components not be able to be used as a weapon.

6.12.3 Casework and Countertops

- 6.12.3.1 Grade plastic laminate casework and countertops: Chemical-resistant plastic laminate, CSA LD-3, with backing sheet over 19mm marine plywood will have no added urea formaldehyde. Provide with 3 mm PVC edge band at countertops and casework edges; color to match plastic laminate. Minimum thickness at countertops: 25 mm. Minimum core thickness at typical casework: 19 mm except provide 6 mm thick hardboard at fully-concealed unit backs. Core at toe space will be marine grade plywood. Ensure joints in countertop are located so as not to impede workspaces.
- 6.12.3.2 Sinks in typical casework to be minimum type 304 stainless steel inset into waterproof grade plastic laminate countertop, as thicknesses above. Provide back splashes to min. 1100mm FFL for entire length of benches with sinks, including return ends.
- 6.12.3.3 Countertop Brackets: Where no base cabinets are indicated, provide countertop brackets similar to Rakks EH-1818 or EH-1824 brackets by Rangine spaced at maximum 1200 mm or approved equivalent.

6.13 Special Construction (Division 13)

6.13.1 Performance Criteria

6.13.1.1 Kitchen Equipment

- 6.13.1.1(1) The Design-Builder will design the kitchen to accommodate the foodservice equipment described in the Room Data Sheets and Appendix 1G – Equipment and Responsibility List in accordance with the BC Building Code and all other standards and codes applicable to commercial kitchen design and installation for healthcare facilities. The Design-Builder will be responsible for the design, supply and installation in accordance with the Room Data Sheets and Appendix 1G – Equipment and Responsibility List.

6.14 Conveying Equipment (Division 14)

6.14.1 Basic Requirements

- 6.14.1.1 The Design-Builder will retain the services of a professional engineering firm specializing in vertical transportation to provide design and construction services. This will include, but is not limited to, a comprehensive vertical transportation analysis for the purposes of determining the number, size and speed of the vertical transportation equipment to suit the requirements of the Facility.
- 6.14.1.2 The elevator and systems will be designed to accommodate the requirements and needs of the Facility in a manner which contributes to the overall efficiency and effectiveness of Facility operations.
- 6.14.1.3 Elevator systems will be designed to ensure there is sufficient capacity to accommodate the wide range of user and functionality requirements, in a manner which satisfies expectations for safety, reliability, responsiveness, accessibility and operational efficiency.
- 6.14.1.4 Provisions will be made for persons with special mobility needs and other forms of disabilities, such as learning difficulties or mental disorders.
- 6.14.1.5 Elevator access to all Facility levels, including the underground parking, will be provided.
- 6.14.1.6 Equipment provided will have a proven track record of at least five years field operation in Canada in similar environments and of similar configuration.
- 6.14.1.7 Durable elevator cab finishes (including stainless steel fronts, impervious plastic laminate wall panels, and stainless steel hand and bumper rails) will be provided.
- 6.14.1.8 Elevators used for support services will be configured with platforms to accommodate easy movement of material carts. Requirements for transport of heavy equipment will be considered and accommodated.

6.14.2 Performance Criteria for Elevators

6.14.2.1 Scope of Work

- 6.14.2.1(1) Supply and install at a minimum a group of two elevators and one simplex elevator (or as required to service the Facility), with equipment and performance characteristics as described in this specification. Submit to the Owner for review a traffic analysis report to support the number of elevators proposed. Provide all necessary components to make elevator systems fully operational and functional, whether or not specifically referenced in this outline specification.
- 6.14.2.1(2) Handling Capacity: Elevators will have a handling capacity of at least 12% of the total population for a peak 5 minute period. (Handling capacity refers to the number of passengers that are transported by the elevator for a certain period of time).
- 6.14.2.1(3) Interval: The average interval required is 30 to 50 seconds. The interval is defined as the average time between elevator departures from the ground floor in a peak period.
- 6.14.2.1(4) Load Factor: Passenger elevators will provide adequate service with a load factor below 40%. 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 the Safety Code for Elevators and Escalators (CSA B44).
- 6.14.2.1(5) Provide all permits, labour, materials, products, equipment, services and all else necessary for the design, manufacture, delivery and installation of a complete and fully functioning elevator system.
- 6.14.2.1(6) Obtain and pay for governmental design submission, registration, inspection and permits, as required (except for ownership and operation license), and make such tests as required by the British Columbia Safety Authority prior to licensing.

6.14.2.2 Codes, By-laws, and Regulations

- 6.14.2.2(1) Provide equipment and perform work in accordance with all local, provincial and federal codes, by-laws, and regulations.
- 6.14.2.2(2) Provide equipment and perform work in accordance with the latest adopted edition of the B44 Safety Code for Elevators and any other code which may govern the installation.
- 6.14.2.2(3) Provide written notification during the Term of any proposed changes in codes, by-laws, or regulations which may affect the Work.

6.14.2.3 Training

6.14.2.3(1) Provide a training session for the Owner consisting of a review of the documentation and operation of the equipment and features.

6.14.2.4 Trademarks

6.14.2.4(1) Ensure that no equipment visible to the public has any trademark, company name, or logo.

6.14.2.5 Barrier-Free Access

6.14.2.5(1) Arrange the controls and fixtures to meet barrier-free access requirements of the B44 Safety Code for Elevators (latest edition) and any other code which may govern the installation.

6.14.2.6 Fixtures

6.14.2.6(1) Unless indicated otherwise in this Schedule 1, provide a choice from the elevator manufacturer's standard products for the Owner to select.

6.14.2.6(2) Provide buttons with LED illumination and stainless steel targets.

6.14.2.7 Operating Conditions

6.14.2.7(1) Provide equipment that will operate normally when the machine room and hoistway temperature is between 10 and 30 degrees Celsius.

6.14.2.7(2) Provide equipment that will operate normally when the power supply is within 10 percent of its rated voltage.

6.14.2.8 Seismic requirements

6.14.2.8(1) Comply with Section 8.4 (Elevator Safety Requirements For local Seismic Risk Zone) of the B44 Safety Code for Elevators and any other code which may govern the installation.

6.14.2.9 Maintainability

6.14.2.9(1) Arrange the equipment such that there are no times, dates, trips, or other counters that would shut down the equipment or change its operation.

6.14.2.9(2) Elevator equipment provided under this specification will not contain proprietary features which limit the Owner's ability to engage a registered elevator maintenance contractor, other than the original manufacturer / installer, to provide routine maintenance services.

6.14.2.9(3) In the event specialized tools or software are required to perform routine maintenance services, such tools will be either provided as "on board"

equipment, or as separate devices. Such tools or software will be provided with the equipment and will become the property of the Owner.

6.14.2.10 Equipment Summary

6.14.2.10(1) Elevator equipment will meet the following minimum performance and dimensional requirements unless the Design Builder's comprehensive traffic analysis report demonstrates that the performance requirements of Section 6.14.2.1 can be met at reduced elevator capacity and/or speed. Final requirements to be adjusted to suit specific design:

6.14.2.10(1)(a) Machine-room-less traction equipment.

6.14.2.10(1)(b) Minimum Contract speed of 1.00 m/s.

6.14.2.10(1)(c) Minimum Capacity of 2275 kg.

6.14.2.10(1)(d) Two-speed side-opening entrances with a width of 1220 mm and a height of 2134 mm.

6.14.2.10(1)(e) Floors served: As per final design.

6.14.2.10(1)(f) Stops / Openings: As per final design.

6.14.2.10(1)(g) Approximate Travel: As per final design.

6.14.2.10(1)(h) Minimum clear inside cab dimensions of 1730 mm wide by 2740 mm deep.

6.14.2.10(1)(i) Minimum Clear cab height to suspended ceiling of 2745 mm.

6.14.2.10(1)(j) Hoistway, pit, overhead dimensions as per manufacturer's specifications.

6.14.2.10(1)(k) Car Loading Classification: Class A

6.14.2.10(1)(l) Core Configuration: 1 beside 1.

6.14.2.10(1)(m) Operation: Duplex, full selective collective.

6.14.2.10(1)(n) Control: Variable Voltage, Variable Frequency with Regenerative Drive.

6.14.2.11 Elevator Car Machine Room Equipment – Machine-Room-Less Traction Elevators

6.14.2.11(1) Provide a gearless traction hoisting machine located within the hoistway.

- 6.14.2.11(2) Provide a spring applied electric brake, held open by an electro-magnet actuated by the controller. Design the brake to automatically apply in event of interruption of power supply from any cause.
 - 6.14.2.11(3) Provide an automatic reset governor located in the hoistway that can be maintained from the car top. When the governor has tripped, arrange that it will be reset when the car is moved in the up direction.
 - 6.14.2.11(4) Provide sound and vibration isolation pads such that there is no direct contact between the machine and the Facility structure.
 - 6.14.2.11(5) Provide an emergency brake to stop the elevator if it over speeds or if it moves more than 500 mm away from the floor with the doors open.
 - 6.14.2.11(6) Provide a solid state drive complete with isolation transformers, filters (to meet IEEE Standard 519-1992 for Special Applications), and isolation pads.
 - 6.14.2.11(7) Provide a digital velocity encoder on the motor, giving feedback to the controller on motor speed and position.
 - 6.14.2.11(8) 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.
 - 6.14.2.11(9) Provide an electrically released brake system, to permit momentary nudging of elevator within the hoistway under test or emergency conditions.
 - 6.14.2.11(10) Locate controller room remotely at roof level, immediately above, or in rear proximity to elevator core.
- 6.14.2.12 Hoistway Equipment
- 6.14.2.12(1) Provide entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibs, and all other equipment required for a complete installation. Provide entrance doors and frames finished in brushed stainless steel.
 - 6.14.2.12(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.

- 6.14.2.12(3) Provide hoist ropes/belts of sufficient size and number to lift the load and ensure proper wearing qualities. Provide either steel ropes consisting of at least six strands wound around a hemp core centre or polyurethane coated belts with high-tensile-grade zinc-plated steel cords. Ensure that all the ropes for a particular elevator are from the same manufacturing run.
- 6.14.2.12(4) 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.
- 6.14.2.12(5) Provide for the car (and counterweight) spring mounted roller guides located at the top and the bottom of the car (and counterweight frame).
- 6.14.2.12(6) Provide fascia from each hall sill to the entrance header below. Include express zones. Extend the fascia into the pit and the overhead.
- 6.14.2.12(7) Provide a car frame constructed of steel channels and a platform constructed of steel channels with a wood or metal sub-floor. Isolate the frame and platform from one another so that there is no metal to metal contact in order to prevent the transmission of noise and vibration. Mount the elevator cab shell on the platform in alignment with the hoistway entrances. Isolate the cab from the car frame and platform.

6.14.2.13 Cab Equipment

- 6.14.2.13(1) Provide robust elevator cab finishes (including stainless steel fronts, hand and bumper rails, and indirect lighting) to suit the Facility's function and design. Cab design and finishes, such as stainless steel, to be reviewed with and approved by the Owner.
- 6.14.2.13(2) Provide elevator cab interior finishes which, while being robust in finish which do not convey an institutional look. Final design of cab interior finishes will be subject to Owner's input and approval.
- 6.14.2.13(3) Provide car doors, jambs, headers, hangers, tracks, door closers, gibs, electrical contacts, and all other equipment required for a complete installation.
- 6.14.2.13(4) Provide swing return car stations incorporating floor push buttons, door open and close buttons, an alarm button, and other fixtures required for normal operation. Provide for each floor button a call registered light and momentary audible tone. Provide a firefighters' emergency operation panel. Provide below the car station a locked service cabinet containing devices other than those used for normal operation. Engrave the car

station with the elevator capacity, identification number, government installation number, and other markings required by applicable elevator Standards.

- 6.14.2.13(5) For each elevator with front and rear doors provide 2 car stations. Otherwise, provide one car station per elevator.
 - 6.14.2.13(6) Provide a digital (dot matrix or segmented) car position indicator located above each car station with a minimum 50 mm (2") high display.
 - 6.14.2.13(7) Do not install any certificates or licenses in the cab. Arrange and pay for a variance from the authority having jurisdiction for this if required.
 - 6.14.2.13(8) Provide a voice synthesizer for each elevator with automatic verbal announcement of each floor at which the elevator stops. Provide a system that will handle a variety of other messages and indications as may be required by the Owner at a later date.
 - 6.14.2.13(9) Provide an infra-red multiple beam door protective device that protects the full width and up to 1830 mm from the floor of the door opening. Locate the device 25 mm behind the leading edge of the door.
 - 6.14.2.13(10) Provide battery operated emergency cab lighting.
 - 6.14.2.13(11) Provide a two speed exhaust fan mounted in the cab top.
 - 6.14.2.13(12) Provide one set of cab protective pads that cover all walls and the cab front return panel along with pad hooks. Provide pad hooks in each elevator.
 - 6.14.2.13(13) Provide a heavy duty closed loop door operator to open and close the car and hoistway doors simultaneously.
 - 6.14.2.13(14) Provide a hands-free two-way voice intercommunication / telephone system with a lobby rescue station and remote handset. Provide communication from each car enclosure to designated security station located in the Facility.
 - 6.14.2.13(15) Provide mounting allowance for an access control card reader in proximity to floor-selection push buttons as well as a surveillance camera on the ceiling at the entrance side of the cab facing occupants.
- 6.14.2.14 Hall Equipment
- 6.14.2.14(1) Where required, provide hoistway access switches located in the entrance frame or in the hall door sight guard.

- 6.14.2.14(2) Provide hoistway door unlocking devices (by lunar key) on the hall doors at all floors.
- 6.14.2.14(3) Provide one riser of hall stations for each elevator. Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button) located with their centreline 1070 mm \pm 25 mm above the floor.
- 6.14.2.14(4) Provide a digital (dot matrix or segmented) hall position indicator located above the main floor entrance with a minimum 50 mm high display.
- 6.14.2.14(5) Provide hall lanterns with electronic tones at each entrance.
- 6.14.2.14(6) Provide a remote fire recall switch for each group of elevators.
- 6.14.2.14(7) Provide a lobby panel for the elevators that includes car position indicators, in service pilot lights, parking switches, emergency power switches and indicators, firefighter's emergency operation keyswitch and indicators, voice communication and other elements as required by this Schedule 1 – Statement of Requirements.
- 6.14.2.14(8) Provide cabling for access control card reader to be run to panel location in elevator machine room.

6.14.2.15 Electric Wiring

- 6.14.2.15(1) Provide copper conductors to connect the equipment.
- 6.14.2.15(2) Run the conductors in metal conduit, duct or electrical metallic tubing.
- 6.14.2.15(3) Provide travelling cable between car stations and the controller in the machine room.
- 6.14.2.15(4) Provide at least six pair spare shielded wires and a spare coaxial conductor in the travelling cable. This is in addition to the wiring identified elsewhere in this specification.
- 6.14.2.15(5) Provide at least ten percent spare wires in each travelling cable.
- 6.14.2.15(6) Provide on one controller a separate junction box for non-elevator devices such as telephones, cameras, and security systems.

6.14.2.16 Operational Features

- 6.14.2.16(1) Provide electronic card access to all elevators (card reader provided by security contractor). Allow for special service to capture an elevator to move persons that are to be kept separated from other passengers.

Final design of this operation will be carried out in consultation with the Owner.

- 6.14.2.16(2) Provide for installation of security cameras in the elevators (cameras provided by security contractor). Provide the required wiring in the travelling cable run between the car top and the controller as well as power to the car top for the camera.
- 6.14.2.16(3) Provide equipment and labour to integrate the control of the elevators with the electronic card access control system. Notwithstanding other operational requirements required herein, access control system integrated operation will include, but not limited to, elevator car call and floor by floor control. Provide the required wiring between the card reader and the elevator security box in the machine room along elevator controller connections and circuits for the security system (including floor tracking).
- 6.14.2.16(4) Elevator cars will support the duress system operation in each car through the entire travel of each cab. Provide required wiring in the travelling cable run between the car top and the controller as well as power to the car top to support duress system device(s).
- 6.14.2.16(5) Provide independent service.
- 6.14.2.16(6) Provide Firefighters' Emergency Operation (Phase 1) for all elevators.
- 6.14.2.16(7) Arrange that at least one elevator in each group can operate at the same time on emergency power.

6.14.2.17 Operating Performance

- 6.14.2.17(1) Levelling - Ensure that the car stops within 3 mm of the floor level.
- 6.14.2.17(2) Operating time - Adjust the equipment so that the operating time is 17.0 seconds or less (based on 1220 mm wide two speed side opening doors and a speed of 150 fpm and travel of 4.5m). Measure the operating time from the time that the doors begin to close until they are 3/4 open at the next floor.
- 6.14.2.17(3) Ride quality - Ensure that the lateral acceleration (front to rear and side to side) measured during express runs is less than 150 mm/s/s peak to peak.
- 6.14.2.17(4) Adjust the door equipment so that the noise level is less than 60 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.

- 6.14.2.17(5) Ensure the machine room equipment is such that the noise level with the elevator running is less than 70 decibels. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

6.14.3 Dock Leveler Basic Requirements

- 6.14.3.1 The dock leveler system will be designed to accommodate the requirements / needs of the Facility in a manner which contributes to the overall efficiency and effectiveness of operations.
- 6.14.3.2 The dock leveler system will be designed to ensure there is sufficient capacity to accommodate the wide range of user and functionality requirements, in a manner which satisfies expectations for safety, reliability, responsiveness, accessibility and operational efficiency.
- 6.14.3.3 Equipment provided will have a proven track record of at least five years field operation in Canada in similar environments and of similar configuration.
- 6.14.3.4 Durable equipment finishes will be provided.
- 6.14.3.5 Emergency power operation of dock leveler will be provided.
- 6.14.3.6 Dock leveler will be configured and positioned on site to accommodate easy movement of delivery pallets and/or material carts. Requirements for transport of heavy equipment will be considered and accommodated.

6.14.4 Performance Criteria for Dock Leveler

6.14.4.1 Scope of Work

- 6.14.4.1(1) Supply and install a group of one pre-formed pit-type dock leveler, with equipment and performance characteristics as generally described in this specification. Provide all necessary components to make dock leveler systems fully operational and functional, whether or not specifically referenced in this outline specification. Components included will include but not be limited to the following: electrical power to power unit, hydraulic hoses linking power unit and leveler, dock pit sized to accommodate pit-type leveler (cast-in-place box type not acceptable), two site bollards of concrete filled steel, sloped bottom of pit base to drain water, and any other equipment, fittings or systems required for a fully functioning dock leveler.
- 6.14.4.1(2) Install dock leveler at receiving bay door in paved receiving area. Exact positioning to be agreed upon with Owner and indicated on shop drawings.

6.14.4.1(3) Provide all permits, labour, materials, products, equipment, services and all else necessary for the design, manufacture, delivery, installation and services required for a complete and fully functioning dock leveler system.

6.14.4.2 Codes, By-laws and Regulations

6.14.4.2(1) Provide equipment and perform work in accordance with all local, provincial and federal codes, by-laws, and regulations.

6.14.4.2(2) Provide equipment and perform work in accordance with the latest edition of any safety code for dock levelers and any other code which may govern the installation.

6.14.4.2(3) Provide written notification of any proposed changes in codes, by-laws, or regulations which may affect the work.

7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Fire Suppression (Division 21)

7.1.1 Fire Protection

7.1.1.1 Basic Requirements

- 7.1.1.1(1) The sprinkler system and equipment will be designed to the occupancy classification and risk level that it protects.
- 7.1.1.1(2) Future flexibility will be in the form of larger capacity through pipe main sizing, fire pump sizing etc. This is to provide a system that can be adjusted, redistributed and added to without requirement of replacing mains or equipment. Refer also to Section 3.11.1.9.
- 7.1.1.1(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.
- 7.1.1.1(4) Locate zone shut-off valves in maximum security tamper-proof cabinets with no glass or plastic viewing panel. Cabinets will be constructed with minimum 10 gauge steel, adjustable front, reinforced door, complete with heavy duty security concealed hinges, and with security mechanical deadbolt locks. Cabinets will be located so they are visible and accessible from the floor in corridor with key lock. Do not conceal from view. Do not locate in janitor rooms, storage rooms, or stairwells. All valves controlling water flow will be monitored.
- 7.1.1.1(5) The fire pump, if required, will be provided by the Design-Builder and will require 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. Fire pump will have 20% future capacity at design flow.
- 7.1.1.1(6) Sprinklers subject to freezing temperatures will be supplied by a dry system. This will include all relevant components related to a dry system such as, but not limited to, an air compressor, automatic air maintenance device, and control power.
- 7.1.1.1(7) Quick response concealed type sprinklers will be provided throughout, with temperature ratings to suit the specific hazard area.
- 7.1.1.1(8) Provide a double interlocked, cross zoned pre-action supplied sprinkler system to all rooms with sensitive equipment such as main telecommunications rooms and records storage rooms.

- 7.1.1.1(9) Each fire extinguisher will be located per relevant codes and to the satisfaction of the Owner and the inspection department of any authority having jurisdiction and each fire extinguisher will be approved for the hazard and classification of the space it serves.
- 7.1.1.1(10) Future capacities will be proven through submission of design documents clearly showing design flows and sizing as well as the design + 20% flows and sizing.
- 7.1.1.1(11) Fire department connection to be located within 45m of fire hydrant.

7.1.1.2 Performance Criteria

- 7.1.1.2(1) All fire protection systems will be hydraulically sized to NFPA standards. Including NFPA 31 and 45 where applicable.
- 7.1.1.2(2) All equipment and installation will be in accordance with manufacturers' requirements.
- 7.1.1.2(3) All equipment will be ULC approved.
- 7.1.1.2(4) A qualified contractor licensed and regularly engaged in such installations will install all fire protection systems and equipment.
- 7.1.1.2(5) Provide backflow protection on all fire protection systems in accordance with local jurisdiction and CSA requirements.
- 7.1.1.2(6) Locate manually operated zone shut-off valves so they are visible and accessible from the floor in corridor with key lock. Do not conceal from view and do not locate in janitor rooms, storage rooms, or stairwells. All valves controlling water flow will be monitored.
- 7.1.1.2(7) Fire department connection will be installed at a location approved by the local authorities having jurisdiction.
- 7.1.1.2(8) Install fire extinguishers in a fully recessed cabinet. Cabinets will be of sufficient security and suitable for the risk level of the area it services.
- 7.1.1.2(9) Provide institutional sprinkler heads in all Client living/sleeping units, secured spaces/areas, and seclusion rooms.
- 7.1.1.2(10) Provide concealed sprinkler heads in areas requiring regular cleaning and sanitization; and in areas where the ceiling height is less than 2,286mm.

7.2 Plumbing (Division 22)

7.2.1 Building Water Services and Domestic Water System

- 7.2.1.1 All materials will be in accordance with CSA standards.
- 7.2.1.2 Provide individual water, fire protection, gas, sanitary, and storm services as required and sized to suit the usage needs of the Facility.
- 7.2.1.3 Provide one domestic water service connection. The supply into the Site will have a water meter, reduced pressure backflow preventer, 25 micron filtration, and independent shut-off valve. Submit the projected domestic water supply load. Connection point will be from main located on street adjacent to the Site.
- 7.2.1.4 Basic Requirements
 - 7.2.1.4(1) Domestic water systems will be to CSA Z317.1 and the local and provincial plumbing standards. To protect equipment and fixtures, water filtration of the domestic water supply is required.
 - 7.2.1.4(2) Provide utilities-commission approved meters for domestic water. Meters will be connected to BMS and used to measure water consumption.
 - 7.2.1.4(3) The plumbing systems will be designed for the occupancy classification and risk level that they serve. These systems will also be designed to avoid disruption to the operation of the Facility during maintenance or repairs. The systems must be designed so high risk areas, seclusion rooms and administration/client areas do not need to be entered when performing these functions. All isolation/shut-off, maintenance, balancing, and other service valves will be located in the corridor walls and/or ceiling spaces and will be accessible with keyed heavy-duty, tamper proof access doors from standing or when using a maximum 2440 mm tall ladder. For each Client room, provide shut-off valves in the corridor wall for domestic water supply. Locate room shut-off valves in maximum security, tamper proof cabinets with no glass or plastic viewing panel; one cabinet for a maximum of two Client rooms. Cabinets will be constructed with minimum 10 gauge steel plate, adjustable front, reinforced door, complete with heavy duty security hinges, and with security mechanical deadbolt locks. Cabinets will be located so they are visible and accessible from the floor in corridor with key lock.
 - 7.2.1.4(4) The design will incorporate flexibility for future alterations or changes in technology standards. Include capacity for future flexibility within each

system. This will include extra capacity in mains and risers. As well major equipment will have spare capacity for future alterations or changes in technology standards. Refer also to Section 3.11.1.9.

- 7.2.1.4(5) All systems will be clearly labelled. Labelling will include, but not be limited to, painting and labelling of all pipes, ceiling identification dots, valve tagging, emergency valve identification signage and flow direction. Each system will be labelled or identified at least once in each room and at maximum 15 m intervals. Identify systems where they pass through walls, partitions and floors.
- 7.2.1.4(6) All fixtures and equipment will be designed and installed to manufacturer's specifications and standards.
- 7.2.1.4(7) All fixtures and equipment will be provided by manufacturers with supply and service forces capable of maintenance response within 24 hours.
- 7.2.1.4(8) All plumbing fixtures and fittings will meet requirements of CSA B45 series and B125 series. Barrier-free plumbing fixtures and fittings will meet requirements of CSA B651. No plumbing fixtures will have an overflow unless requested by BCSS.
- 7.2.1.4(9) Stainless steel vandal proof and anti-ligature plumbing fixtures will be provided in secured spaces and seclusion rooms. The water systems will ensure delivery of water supplies at the required pressures to all water outlets.
- 7.2.1.4(10) Provide durable materials to allow for 24 hour a day operation with minimal downtime.
- 7.2.1.4(11) To the greatest extent possible, design and install fixtures and equipment to provide for easy access and serviceability and to avoid interference with other services.
- 7.2.1.4(12) Provide floor drains with trap primers on all mechanical floors and where required for equipment drainage except for Client residential area Toilet/Shower rooms.
- 7.2.1.4(13) Floor drains located in chemical storage areas will not be connected to the drainage system.
- 7.2.1.4(14) Floor drains with sediment bucket will be provided in kitchens, garbage rooms, and mechanical rooms. No floor drain, other than showers, will be provided in Client rooms.
- 7.2.1.4(15) Equipment drains may require hub drains or elevated hubs complete with air gaps as required.

- 7.2.1.4(16) Provide backflow preventers on the incoming water service as well as at equipment source connections where required by code.
- 7.2.1.4(17) Provide interceptors as required by the authority having jurisdiction to intercept oil, grease, dirt, and solids. Provide acid neutralization tanks at drains where acid neutralization is required such as fume hood and lab sinks.
- 7.2.1.4(18) Provide point of use filters and water softening for humidification systems.
- 7.2.1.4(19) If a water booster pump is required, ensure it is designed with 100% redundancy and emergency power capability to provide uninterrupted water service and pressure in the event of malfunction, maintenance, or power loss.
- 7.2.1.4(20) Provide stainless steel institutional plumbing fixtures in all secure Client living/ sleeping units.
- 7.2.1.4(21) Institutional water closets will be concealed, non-hold-open, push button flush valve with hydraulic activation. Water closets will have adjustable meter valve timing and pinned cleanout plug.
- 7.2.1.4(22) For proposed plumbing fixture count, refer to the Room Data Sheets.
- 7.2.1.4(23) All eyewash stations will be accessible within 10 seconds from work applicable work areas. Provide any accessory items to allow monthly testing of fixtures.
- 7.2.1.4(24) All hand wash sinks will be vitreous china and meet all infection control standards referenced in this Schedule.
- 7.2.1.4(25) Water and drainage lines servicing the Facility will not be designed and installed above, below, or adjacent to electrical rooms, telecommunications rooms, server rooms, and records storage rooms.

7.2.1.5 Performance Criteria

- 7.2.1.5(1) All drainage systems will be designed such that the system connects to the Site services. Designs will utilize gravity drainage where possible.
- 7.2.1.5(2) In the case where pile foundations are used to support the structure, all under slab piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and installed at intervals sufficient to carry the pipe and load, at the required slope. Hangers and rods will be stainless steel. Install light-weight fill above all piping that is supported (hung) from the concrete slab above. Dissimilar metals will

be separated by a di-electrical coupling or membrane (tape). Hanger spacing will comply with the requirements of the BC Building Code.

- 7.2.1.5(3) If a pumping system is required for subsurface, storm, or sanitary drainage, then the design will include 100% redundancy with equipment on emergency power such that the system does not flood the space it is housed in. The sump will have twin compartments: a settling and a pumping compartment, and will be sized to prevent short cycling of the pump. Provide local and BMS alarm points for high water and pump failure.
- 7.2.1.5(4) Insulate interior storm drainage, domestic water piping, and exposed p-traps throughout as per BCICA quality standards. Where piping and / or piping components are subject to freezing, provide insulation and heat tracing on life-safety systems. The heat trace system will be monitored and alarmed for malfunction or service disruption. Ensure that heat trace systems on life-safety systems will be on emergency power.
- 7.2.1.5(5) All plumbing drainage designated as requiring acid waste system will be 'acid' or equivalent to a point such that dilution renders discharge ineffective or upstream of 'acid neutralizer tanks'. Acid neutralizer tanks will be located and installed such that removal, maintenance and servicing are reasonably achieved.
- 7.2.1.5(6) Consideration will be given to reclaiming waste heat.
- 7.2.1.5(7) Provide flushing and disinfection of domestic water systems. Provide independent testing of piping systems once flushing and cleaning has been completed.
- 7.2.1.5(8) Provide automatic trap primers in floor drains. Trap primers will be connected to a control valve and set to run every 24 hours by the DDC system. Trap primers that rely on fixture use are not acceptable. Provide adequate backflow prevention.

7.2.2 Plumbing Fixtures

7.2.2.1 Basic Requirements

- 7.2.2.1(1) All plumbing fixtures to be barrier free and suitable for a healthcare facility.
- 7.2.2.1(2) Provide anti-splash fittings (i.e. Laminar flow) that do not entrain air in all care areas, and at all handwash sinks.

- 7.2.2.1(3) Public toilets will be floor mounted, elongated and low-consumption. They will have an open front seat with no lid, and electronic hands-free flush valve operation. Fixtures to have built in overflow drain.
- 7.2.2.1(4) Urinals will be wall-hung and low-consumption. They will have electronic hands-free flush valve operation.
- 7.2.2.1(5) Public washroom lavatory fixtures will be made of an impervious, durable material. They will have electronic hands-free type faucets with single temperature supply.
- 7.2.2.1(6) Staff handwash sinks will be porcelain. They will have electronic hands-free type faucets with single temperature supply and gooseneck spouts.
- 7.2.2.1(7) Sinks will be stainless steel, self-rimming, counter mounted, or wall hung with concealed arm carrier complete with gooseneck sprout.
- 7.2.2.1(8) Spouts will be free of aerators\modulators\hose sprays and will not swivel.
- 7.2.2.1(9) Traps will be minimum 40mm diameter and be metal construction with plastic or neoprene gaskets.
- 7.2.2.1(10) All fixtures and/or equipment receiving domestic hot water will have a domestic hot water recirculation connection sufficiently close to ensure the delivery/discharge/supply of domestic hot water with a reasonable amount of time (i.e. less than 10 seconds).
- 7.2.2.1(11) Stainless steel vandal proof and anti-ligature plumbing fixtures will be provided in secured spaces and seclusion rooms.
- 7.2.2.1(12) Showers and bathtubs will have slip resistant flooring and pressure compensated thermostatically controlled valves.
- 7.2.2.1(13) Provide suitable quantities of janitors' sinks, hose bibbs, and eye wash stations to provide sufficient service to the Facility and in accordance with ANSI Z358.1.
- 7.2.2.1(14) Water faucets with goosenecks for hazardous or laboratory use must be protected by vacuum breakers and as required by CSA B64.10.
- 7.2.2.1(15) Fixture and faucet combinations for sinks and handwash basins will be selected to ensure the faucet water stream does not fall directly into fixture drain opening to prevent contaminated trap water splashing out.

7.2.2.2 Performance Criteria

- 7.2.2.2(1) Provide isolation valves for all floors and at individual Client rooms for all plumbing services. Clearly identify all valves. Locate valves in corridors walls to be accessible from the corridor.
- 7.2.2.2(2) Provide accessible clean-outs for all sinks and lavatories (and future sinks and lavatories) minimum 150 mm above the flood-level rim of the sink.
- 7.2.2.2(3) Toilets will be selected with special attention to reducing spread of infection as well as for Client safety. Provide stainless steel institutional fixtures that are anti ligature type as noted in the risk levels of the Room Data Sheets. Flush valves will be suitably sized 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.
- 7.2.2.2(4) All electronic sensor-activated fixtures will be battery powered.
- 7.2.2.2(5) Provide pressure reducing valves in accessible locations if system pressure exceeds acceptable delivery pressure.
- 7.2.2.2(6) Provide anti-ligature type shower heads as noted in the risk levels of the Room Data Sheets.

7.2.3 Domestic Hot Water Systems

7.2.3.1 Basic Requirements

- 7.2.3.1(1) Domestic hot water demand will be calculated in accordance with ASPE Plumbing Engineering Design Handbook and the National and Provincial Plumbing Codes.
- 7.2.3.1(2) Domestic hot water will be stored at adequate temperature to serve the needs of the Facility at not less than 70°C. Provide thermostatic mixing valves with thermal safety (fail safe) shut-off valves where temperatures are required to be less than 60°C at point of use. Generally piping distribution is 60°C and Client/public outlets will be 43°C (CSA Z317.1)
- 7.2.3.1(3) Domestic hot water system will be designed with sufficient capacity and recovery rate for the Facility's hot water requirements.
- 7.2.3.1(4) Domestic hot water system will be designed with a recirculation system to ensure delivery of hot water within 10 seconds to all fixtures.
- 7.2.3.1(5) Domestic hot water system will be designed to prevent growth and spread of Legionella bacteria within the tanks, piping, fixtures, or any other component. Design methods to use include, but are not limited to,

eliminating dead-leg piping, and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

7.2.3.1(6) Domestic hot water storage will have the capability of maintaining 80°C for sanitation purposes.

7.2.3.1(7) Hands free fixture thermostatic mixing valves will have hot water recirculation connection within 50 mm of thermal mixing device.

7.2.3.2 Performance Criteria

7.2.3.2(1) Hot water generating equipment and /or storage will be designed to meet the redundancy requirement outlined in CSA Standard for Health Care Facilities, latest edition.

7.2.3.2(2) Generate and store domestic hot water at 70°C to minimize Legionella.

7.2.3.2(3) Distribute domestic hot water at 60°C.

7.2.3.2(4) Recirculate domestic hot water from the distribution system(s) back to the generating and/or storage equipment.

7.2.3.2(5) Provide separate booster heaters, with adequate capacity, to serve equipment requiring water above 60°C.

7.2.3.2(6) Monitor hot water supply temperatures via the BMS and provide alarm outputs when the temperature exceeds the design setpoint. Provide fail safe devices on distribution.

7.2.3.2(7) The domestic hot water generating equipment will meet the energy efficiency requirements of ASHRAE Standard 90.1 or NECB.

7.2.4 Natural Gas System

7.2.4.1 Basic Requirements

7.2.4.1(1) Before any work on the installation of the natural gas system commences, submit drawings, applicable sections of specifications and detailed drawings to the authority having jurisdiction as required to obtain approval. Approvals must be received prior to installation work commencing.

7.2.4.1(2) Provide natural gas distribution piping to equipment and appliances as required.

7.2.4.1(3) Provide flow and pressure regulation and lockable shut-off in a secure location, away from public access, before entry into the Facility.

- 7.2.4.1(4) Below ground exterior piping will be polyethylene pipe, CSA certified.
- 7.2.4.1(5) Provide tracer wire alongside buried pipe work. Provide warning tape above buried pipe work. Survey and record as-built buried pipe routing and alignment.
- 7.2.4.1(6) Above ground piping will be Schedule 40 seamless Carbon Steel to ASTM A53 and CSA B-63.
- 7.2.4.1(7) Fittings will comply with the following criteria:
 - 7.2.4.1(7)(a) screwed fittings will be malleable iron with beaded ends. Dielectric type will be used where a buried service enters and connects to building piping;
 - 7.2.4.1(7)(b) welded will be forged steel of the same weight as the connecting pipe; and
 - 7.2.4.1(7)(c) unions will be malleable iron with ground joints.
- 7.2.4.1(8) Joint Materials
 - 7.2.4.1(8)(a) Screwed: Thread lubricant.
 - 7.2.4.1(8)(b) Flanged: Full faced gasket materials, flanged steel weld neck, raised face type, carbon steel (ASTM A307) square headed bolts with hexagon nuts, bolts bull diameter of bolt holes.
- 7.2.4.1(9) Pipe materials and joint methods will conform with the Canadian Standards Association, CSA B149.1, Natural Gas and Propane Installation Code.
- 7.2.4.1(10) Valves will satisfy the following:
 - 7.2.4.1(10)(a) BC Safety Authority approved and suitable for temperature to which they are exposed.
 - 7.2.4.1(10)(b) Provide a seismic actuated automatic shut-off valve, 20 to 150 mm: C.G.A., UL and State of California certified seismic gas shut-off check valve with acceleration trigger mechanism, soft seat construction, visual open/close indicator and a manual reset capable of operating between -23°C and 66°C . The valve will actuate the shut off within 5 seconds when subjected to a horizontal sinusoidal oscillation having a peak acceleration of 0.3 G (2.94 m/s^2) and a period of 0.4 seconds;

- 7.2.4.1(11) Gas pressure reducing valves will be: corrosion resistant; high performance reducing pounds to inches.
- 7.2.4.1(12) Interior gas service - screw or weld up to 50 mm, weld 65 mm and larger.
- 7.2.4.1(13) Interior gas service in unvented space, in supply or return air ceiling plenum, or operating at 35 kPa pressure - weld all sizes.
- 7.2.4.1(14) Exterior gas service - weld all sizes except for polyethylene pipe which will have no joints other than those allowed in NSC CAN/CGA-B149.1.
- 7.2.4.1(15) All branch connections except those less than half the diameter of the main will be made with welding tees.
- 7.2.4.1(16) Branch connections less than half the diameter of the main may be made with weldolets or thredolets.
- 7.2.4.1(17) Dielectric isolating couplings are not to be painted.
- 7.2.4.1(18) Heat shrink factory extruded polyethylene sleeves to be used over bare metallic pipe at welds.
- 7.2.4.1(19) Employ an independent testing agency to test the continuity of the polyethylene jacket, when metallic piping is buried, using a 12,000 volt Holiday Detector. Repair any breaks in polyethylene jacket with two layers of polyken tape. Submit report from testing agency certifying continuity of polyethylene jacket.
- 7.2.4.1(20) Install unions or flanges in connections to all equipment and specialty components.
- 7.2.4.1(21) Arrange piping connections to allow ease of access and removal of equipment.
- 7.2.4.1(22) Align and independently support piping connections to prevent piping stresses being transferred to equipment.
- 7.2.4.1(23) Install gas shut-off valves complete with handle at the following locations:
 - 7.2.4.1(23)(a) at the service entry point to the building immediately prior to entry;
and
 - 7.2.4.1(23)(b) at each branch to an individual item of equipment or appliance.

- 7.2.4.1(24) All Facility isolation valves will possess locking lugs. Provide seismic valve at Facility main.
- 7.2.4.1(25) Terminate vent outlets to atmosphere at the following minimum lateral distances:
 - 7.2.4.1(25)(a) 3.0 m from any door, operable window or building opening.
 - 7.2.4.1(25)(b) 4.6 m from any air intake.
- 7.2.4.1(26) Allow for expansion with suitable anchors, guides and expansion loops to prevent undue stress on any part of the system. All piping will be welded with approved flexible connectors at point of connection to equipment.
- 7.2.4.1(27) Apply one coat of Rust-Oleum damp proof red primer, one coat of Rust-Oleum zinc chromate and one finish coat of Rust-Oleum yellow to piping.
- 7.2.4.1(28) Installation and testing will be in accordance with the Canadian Standards Association, CSA B149.1/2, Natural Gas and Propane Installation Code/Propane Storage and Handling Code.

7.3 Heating, Ventilating and Air Conditioning (Division 23)

7.3.1 Heating

7.3.1.1 Basic Requirements

- 7.3.1.1(1) The HVAC systems will be designed for the occupancy classification and risk level that they serve. These systems will also be designed to avoid disruption to the operation of the Facility during maintenance or repairs. The systems must be designed so high risk, secure rooms and administration/Client areas do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves located in the corridor walls and/or ceiling spaces will be accessible with keyed access panels from standing or when using a maximum 2440 mm tall ladder. Special keying will be required for areas accessible by Clients to prevent tampering.
- 7.3.1.1(2) The design will incorporate flexibility for future alterations or changes in technology standards. Include capacity for future expansion within each system. This will include extra capacity in mains and risers. As well major equipment will have spare capacity for future alterations or changes in technology standards. Refer also to 3.9.10.

- 7.3.1.1(3) Space heating capacity will be sufficient to meet the required indoor design temperatures outlined in CSA Standards while using the January 1 outside design temperature outlined in the BC Building Code.
- 7.3.1.1(4) The heating equipment will be sized sufficiently to meet the maximum simultaneous Facility demand for all systems served by the heating plant. It also must be capable of controlling and responding to periods of low usage. Modular or multiple units will be employed within the heating plant. There is no requirement for a secondary fuel source for the heating plant.
- 7.3.1.1(5) Apply energy recovery systems to offset plant heating requirements. These will use glycol heat exchanger loops or similar means to prevent cross contamination or mixing of exhaust flows.
- 7.3.1.1(6) Perimeter heating system will be utilized for all client residential areas. All other areas of the Facility may be heated by other forms of heating.
- 7.3.1.1(7) Workshop areas will require separate dust collection systems for woodworking and metalworking. Provide complete system with independent controls and ducting to workshop equipment. Dust collection system will have filtration rated to 1-micron and be canister type. Dust collectors to be located in separate room or service enclosure. Refer to Appendix 1G – Equipment and Responsibility List.
- 7.3.1.1(8) A compressed air system will be required for general use for hand tools and cleaning at work tables and along walls in the room. Air compressor will be complete with receiver, starter switch, and belt guard, oil & water separator. A total of four outlets at each workbench and one outlet spaced at approximately 5m along walls will be provided. Each outlet will be complete with shut off valve, dirt leg, quick connect outlet and pressure regulator.
- 7.3.1.1(9) Each large air system will be divided into individually controlled thermal zones. The maximum size for a perimeter zone will be 75 m² and for an interior zone 190 m². Corner rooms with two or more outside wall exposures will have separate thermal zones. Spaces with same solar exposure and same function may be grouped into a maximum of 4 spaces per zone. Grouped spaces that form a zone will be provided with averaging temperature sensors with +/- 2 deg C (user adjustable) for each space to influence to the overall average zone temperature. Each room with high and variable occupancy such as meeting rooms, classrooms, work rooms etc. will have separate thermal zone. "Room temperature and humidity setpoints are allowed to vary from CSA stated ranges when operable windows are opened. BMS temperature and

humidity alarms will still be identified for rooms and zones that vary from setpoint. Where the HVAC system is serving 2 to 4 rooms per control zone, shut off the ventilation and heating to all of the spaces only when all windows are open in that zone. Utilize averaging thermostats to ensure that set points can vary which will account for some spaces having open windows. Heating will be turned on to any zone, regardless of all of the windows being open, when minimum temperature for the zone (user adjustable) is exceeded to prevent freezing of rooms.

- 7.3.1.1(10) Air outlets and inlets for Client accessible areas will be purpose built and be suitable for the risk level associated space. Refer to the Room Data Sheets.

7.3.1.2 Performance Criteria

- 7.3.1.2(1) Boilers will operate at a minimum AFUE efficiency of 90% at all firing rates when using natural gas as the primary fuel source. The heating system will be designed with condensing boilers.
- 7.3.1.2(2) Provide adequate expansion compensation for heating piping throughout. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices will be based upon a thorough review of piping layout, and piping stress analysis.
- 7.3.1.2(3) All high points in piping will be equipped with automatic air removal devices such as air collection chambers and air vents. Air vents will be piped to drain.
- 7.3.1.2(4) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment from Facility for servicing or replacement.
- 7.3.1.2(5) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting system operation or major drain down.
- 7.3.1.2(6) Balancing valves, flow-measuring devices, temperature and pressure sensors will be provided throughout the system to facilitate system balancing.
- 7.3.1.2(7) Pumps will be selected to operate at the system fluid temperature without vapour binding and cavitation, will be non-overloading in parallel or individual operation, and will operate within 25% of the mid-point of published maximum efficiency curve.

- 7.3.1.2(8) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.
- 7.3.1.2(9) Boilers will be natural gas as the primary fuel. Complete boiler plant will be sized such that low load and shoulder season loads can be achieved at high efficiency.
- 7.3.1.2(10) Locate services that require regular maintenance access above non-critical spaces such that there is minimal disruption to the spaces and user areas.
- 7.3.1.2(11) Insulate all heating water piping, equipment and accessories to BCICA and ASHRAE standards.
- 7.3.1.2(12) Utilize screw fittings for 50mm piping and smaller and welded fittings for 65mm piping and larger.

7.3.2 Air Conditioning

7.3.2.1 Design Principles

- 7.3.2.1(1) The cooling plant will be provided with adequate back up capacity and equipment redundancy to ensure continuous Facility operation at all times, with no noticeable reduction in service outcomes.
- 7.3.2.1(2) Cooling will be available continuously, particularly where continuous internal heat gains exist such as in electrical rooms, telecommunications rooms and server rooms. The systems serving these areas will be on emergency power. Each telecommunications room and server room will have its own mechanical cooling system with a thermostat with room control setting. Main telecommunication rooms will have N+1 redundancy for air conditioning systems and remain operational in the event of a power failure. Design-Builder will allow for 5kw of heat dissipation for each server cabinet, and 3kw of heat dissipation for each switch cabinet or rack. Sub Telecommunication rooms will each have a back-up exhaust fan sized appropriately for the space to continue to operate during a power failure or in the event the air conditioning system fails.
- 7.3.2.1(3) Space cooling capacity must be sufficient to meet the required indoor design temperatures outlined in CSA Standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code.
- 7.3.2.1(4) Utilize outdoor air for free cooling as the first means of space cooling in compliance with ASHRAE Standard 90.1.

- 7.3.2.1(5) Utilize heat recovery chillers where there is demand for cooling all year round to offset plant heating requirements.
- 7.3.2.1(6) Investigate and utilize, if possible, alternate source of cooling such as ground source heat pump systems.

7.3.2.2 Performance Criteria

- 7.3.2.2(1) Ensure no air within the air conditioning system, outside of the central air handling equipment, drops below its dew point temperature.
- 7.3.2.2(2) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.
- 7.3.2.2(3) Piping will be installed in an orderly manner. Slope piping to permit complete drainage of the system.
- 7.3.2.2(4) All high points in the closed loop piping will be equipped with automatic air removal devices, such as air collection chambers and air vents. Pipe vents to drain.
- 7.3.2.2(5) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement.
- 7.3.2.2(6) 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.
- 7.3.2.2(7) Pumps will be selected to operate without vapour binding or cavitation, will be non-overloading in parallel or individual operation, and will operate within 25% of the mid-point of published maximum efficiency curve.
- 7.3.2.2(8) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.
- 7.3.2.2(9) Locate services that require regular maintenance access above non-critical spaces such that there is minimal to no disruption to the delivery of mental health care services.
- 7.3.2.2(10) Insulate all chilled water and condenser water piping, equipment and accessories to BCICA and ASHRAE Standards.
- 7.3.2.2(11) Utilize screw fittings or welded fittings for all heating water piping systems. Utilize screw, welded, or mechanical coupling fittings for all chilled water systems

7.3.3 Ventilation

7.3.3.1 Design Principles

- 7.3.3.1(1) Heating, ventilation and air conditioning (HVAC) system will provide a comfortable internal environment as dictated in CSA requirements but generally ± 22 degrees Celsius for Clients and staff and will meet the required environmental conditions for the equipment, as per the manufacturer's recommendations.
- 7.3.3.1(2) The HVAC system will maintain required pressure relationships between various areas of the Facility and will provide necessary air filtration, cleansing and exhaust to mitigate transmission of infection and / or contamination.
- 7.3.3.1(3) The Facility heating plant and ventilation system will be on emergency power.
- 7.3.3.1(4) Air handling units will be provided with sectional heating and cooling coils with manual isolation valves, enabling isolation of the damaged sections of the coils. Air handling units or ventilation design will have redundancy to ensure at least 60% minimum ventilation airflow delivery can be maintained for all areas excluding the gymnasium and kitchen. Redundancy for specialized exhaust systems such as fume hood exhaust will not be required.
- 7.3.3.1(5) Design the ventilation system and all components in accordance with ASHRAE standard 62.1 and CSA Z317.2.
- 7.3.3.1(6) The residential zone of the Facility will meet ventilation design requirements prescribed in CSA. All other areas of the Facility will meet the ventilation design requirements of ASHRAE. At a minimum, ventilation rates for all spaces will meet the design requirements described in CSA or ASHRAE standards. If a space is not listed, ventilation rates will comply with the applicable standards and codes.
- 7.3.3.1(7) Provide the minimum air filtration levels as described in CSA and all other applicable Standards.
- 7.3.3.1(8) Spaces will maintain pressurization requirements described in CSA standards.
- 7.3.3.1(9) Air handling equipment will be factory fabricated to ensure the highest construction standard. No Site built-up units will be allowed.
- 7.3.3.1(10) Fans over 1 HP will be designed with VFDs for energy savings under part-load conditions.

- 7.3.3.1(11) Provide an indirect and/or direct heat recovery system on the general exhaust air systems.
- 7.3.3.1(12) Provide supply and exhaust filtration as recommended or required by the specific equipment / hoods.
- 7.3.3.1(13) The Design will incorporate a strategy to install and remove major Facility equipment such as fans, chillers, boilers, generator and air terminal units.

7.3.3.2 Performance Criteria

- 7.3.3.2(1) Locate fans, common filters (e.g. HEPA), and other equipment in the central mechanical rooms. Allow for adequate clearance for service access as outlined in the BC Building Code.
- 7.3.3.2(2) Make allowances in duct sizing and equipment selections to accommodate flexibility for future horizontal expansion. Allow for a future 20% increase in capacity in duct mains, branch lines and air handling unit sizing for the administration and teaching portion of the Facility. This will include the following:
 - 7.3.3.2(2)(a) duct mains, branch lines and air handling units serving all areas except for the residential zone of the Facility and the gymnasium; and
 - 7.3.3.2(2)(b) all pumps, fans, AHU's chillers, boilers, mechanical and plumbing pipework, and ductwork serving all areas exception for the residential zone of the Facility and the gymnasium.
- 7.3.3.2(3) Design the 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. Utilize double sloped drain pans to eliminate standing water. Provide sufficient access panels to allow for inspection and cleaning.
- 7.3.3.2(4) Fresh air intakes will be located so that they do not entrain contaminants from outdoor sources. All intakes will be located in areas not accessible by the public.
- 7.3.3.2(5) All supply, return, and exhaust air will be fully ducted to the space being served for Client Residential areas.
- 7.3.3.2(6) Locate services that require regular maintenance access above or in non-critical and non-Client room spaces such that there is minimal disruption to the delivery of health care services.

- 7.3.3.2(7) All area ventilation will utilize laminar or non-aspirating air diffusion to minimize disturbances at fume hoods.
- 7.3.3.2(8) The HVAC system will ensure that air generally flows from clean to dirty areas.

7.3.4 Sound Attenuation and Vibration Isolation

7.3.4.1 Design Principles

- 7.3.4.1(1) Design all mechanical systems to minimize sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces and maintain sound to levels as per design standards.
- 7.3.4.1(2) Design mechanical systems located at or near the Facility exterior to minimize sound transmission to neighbouring areas. Sound levels at the Construction Site property line will not exceed 50 dBA above ambient noise levels.
- 7.3.4.1(3) Provide vibration isolation devices on all equipment with rotating components.
- 7.3.4.1(4) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.
- 7.3.4.1(5) Provide flexible connectors on all pump, duct, and wiring connections to isolated equipment.

7.3.4.2 Performance Criteria

- 7.3.4.2(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.
- 7.3.4.2(2) Utilize fibre free internal insulation and packless attenuators.
- 7.3.4.2(3) Duct silencers will be manufactured, engineered devices not fabricated built-up devices.

7.3.5 Testing, Adjusting, Balancing and Commissioning

- 7.3.5.1 Demonstrate to the Owner that the mechanical and electrical systems are substantially operational by testing, adjusting, balancing, and commissioning the systems in accordance with good industry practice.

- 7.3.5.2 Provide system testing, adjustment and balancing of systems usage required by the Owner from time to time until the expiry of the Warranty Period to ensure such systems are in accordance with this Agreement.
- 7.3.5.3 Retain complete records of all testing, adjusting and balancing and commissioning data; and provide the Owner with a copy of the final documents for review.

7.4 Major Equipment – Performance Specification

- 7.4.1 Units will be produced by a recognized manufacturer who maintains a local service agency and parts stock.
- 7.4.2 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 in the Lower Mainland for not less than 10 years.
- 7.4.3 Fans will conform to AMCA bulletins regarding testing and construction.
- 7.4.4 Coils will be ARI certified.
- 7.4.5 Filter media will be ULC listed.
- 7.4.6 Units with factory wiring will be factory approved and labelled. Failure to comply with this requirement will necessitate the manufacturer, at his expense, to have a certified representative inspect the equipment prior to affixing a label.
- 7.4.7 Operating and Maintenance Data:
 - 7.4.7.1 The Design-Builder will ensure that the manufacturer:
 - 7.4.7.1(1) submits maintenance manuals and operating instructions.
 - 7.4.7.1(2) includes instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.
- 7.4.8 Environmental Requirements
 - 7.4.8.1 Units will not be operated for any purpose without approval from the Owner for temporary or permanent purposes except for testing, balancing, and commissioning of the Facility. If units are allowed to be operated, ductwork and piping must be clean, filters are in place, bearings lubricated, isolators adjusted, belt tension checked, sheaves aligned and the fan has been test run under observation.
- 7.4.9 General

- 7.4.9.1 The Design-Builder will provide a 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. The unit will include dual spring-isolated fans (with motorized intake and discharge isolation dampers), integral fan silencers (if required), pre-filters, final filters, pre-heat coil for 100% outdoor air units, cooling coil, heating coil, and factory mounted and wired VFD's. One independent VFD for each fan.
- 7.4.9.2 Units too large to be legally shipped by truck may be shipped to the Site in sections. The Design-Builder will then arrange for Site assembly of the factory supplied unit sections. This includes mounting of all accessories shipped loose, wiring across splits, touch up painting, etc. Otherwise units will be shipped in one piece.
- 7.4.9.3 All panels will be joined on 200 mm centers using cadmium plated TEK screws.
- 7.4.9.4 All insulation edges will be protected with metal lagging. Insulation systems using stickpins or adhesives are not acceptable.
- 7.4.9.5 Stiffeners of angle steel will be supplied as required to maintain casing deflection criteria of 1/200 at 1.5 times the working pressure. If panels cannot meet this deflection, an additional internal reinforcing will be added.
- 7.4.9.6 Acoustical Performance
- 7.4.9.6(1) The housing will have been tested for acoustical performance by an accredited independent laboratory.
- 7.4.9.6(2) Test methods and facilities used to establish sound transmission loss values will conform explicitly with the ASTM designation E90-85 and E413-73.
- 7.4.9.7 Base Construction
- 7.4.9.7(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 150 mm channel.
- 7.4.9.7(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 and 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 per unit section. The base will be insulated with 50mm fiberglass insulation and sheeted with a 22

gauge galvanized steel liner. Floors that “oil can” are not acceptable and will be remedied at the Design-Builder's expense.

- 7.4.9.7(3) There will be a 40mm 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 of water.
- 7.4.9.7(4) The Design-Builder will provide auxiliary drains in fan sections downstream of cooling coils and in mixing sections.
- 7.4.9.7(5) All drain connections on floor mounted air handling units will terminate at the side of the unit.
- 7.4.9.7(6) Maximum base deflection will be 6 mm on 600cm in unsupported span.
- 7.4.9.7(7) Units will be constructed to sit on a concrete housekeeping pad for indoor and on factory supplied roof curbs for outdoor units. Provide fall protection as required to Worksafe BC standards.

7.4.9.8 Access Doors

- 7.4.9.8(1) Provide access door(s) for each section. All access doors must swing against the air pressure. Positive pressure plenum doors must swing in. Access doors that do not comply must be remedied at the Site.

7.4.9.9 Non-Scrolled Fans – Plenum Type

- 7.4.9.9(1) Fans will be airfoil or centrifugal plenum (plug) type, designed without a scroll type housing. Fans will incorporate a wheel, heavy gauge reinforced steel inlet plate with removable spun inlet cone, structural steel frame, and shaft and bearings in AMCA Arrangement 3 configuration as an entire assembly.
- 7.4.9.9(2) All fan wheels will have tapered spun wheel cones or shrouds providing stable flow and high rigidity. The wheels will be non-overloading type.
- 7.4.9.9(3) The blades will be continuously-welded, die-formed aluminum airfoil type, designed for maximum efficiency and quiet operation. Partial welding will not be used on airfoil blades.
- 7.4.9.9(4) Impellers will be statically and dynamically balanced and the complete fan assembly will be test balanced at the operating speed prior to shipment.
- 7.4.9.9(5) Shafts will be of AISI C-1018, 1040 or 1045 hot rolled steel accurately turned, ground, polished, and ring gauged for accuracy.

- 7.4.9.9(6) Shafts will be sized for first critical speed of at least 1.43 times the maximum speed for the class. Bearings will be heavy duty, grease lubricated, anti-friction ball or roller, self-aligning, pillow block type and selected for minimum average bearing life AFBMA L-50 in excess of 200,000 hours at the maximum class RPM.
- 7.4.9.9(7) The Design-Builder will provide WorksafeBC / OSHA approved fully enclosed metal belt guard sides of galvanized steel and an expanded metal face. The belt guard will be sized to allow either sheave to be increased by two sizes.
- 7.4.9.9(8) The plenum fan assembly MUST have an enclosed safety screen as per WorksafeBC / OSHA standards. Safety screen will completely encase the fan and assembly per OSHA requirements. No exceptions. Fans that are provided without a safety screen that covers the complete fan, motor and belt assembly will have the screen field-provided at the Design-Builder's expense.
- 7.4.9.9(9) Fans will have inlet WorksafeBC / OSHA approved inlet screens.
- 7.4.9.9(10) Each isolation damper will be aluminum airfoil damper – no exceptions.
- 7.4.9.9(11) VFD's will be factory set – with fan sheaves properly sized – to operate at 55 Hz. This allows for 15% increase in speed for redundancy of airflow.

7.4.9.10 Vibration Isolation

- 7.4.9.10(1) An integral all welded steel vibration isolation base will be provided for the fan and motor.
- 7.4.9.10(2) Isolators will be free standing with sound deadening pads and levelling bolts.
- 7.4.9.10(3) The spring diameter to compressed operating height ratio will be 1 to 1.
- 7.4.9.10(4) Isolators will have earthquake restraints.

7.4.9.11 Motors, Drives and Variable Frequency Drives

- 7.4.9.11(1) Fan motors will be mounted and isolated on the same integral base as the fan.
- 7.4.9.11(2) Fan motors will be heavy duty, premium efficiency open drip-proof, operable at scheduled electrical duty. Motors will meet NEMA MG-1 and USA EPACT OF 1992.

- 7.4.9.11(3) The V-belt drive will have a constant pitch sheave rated at 1.5 times the motor nameplate.
- 7.4.9.11(4) Air handling units will have factory mounted, factory wired variable frequency drives with bypass to allow fan operation while frequency drive is removed. VFD will accept 0-10 V or 4-20 mA signal provided by controls contractor. VFD's will be mounted on the exterior wall of the AHU. All power wiring from VFD's to motors will be factory supplied. All control wiring will be performed by an experience controls contractor. The Design-Builder will ensure that the control wiring is as per unit manufacturer's requirements and direction.
- 7.4.9.11(5) Div 26 will provide power and connect 575 Volt / 3 phase power to each SF VFD and each RF VFD. VFDs will include a disconnect switch, internal link reactors and CSA 3R Enclosure for outdoor applications. Keypad functions will include hand/off/auto feature.
- 7.4.9.11(6) VFD's will automatically adjust the voltage to the motor to optimize energy savings under changing load and speed conditions.
- 7.4.9.11(7) Fan motors and speed drives will be warranted for a period of 3 years by VFD manufacturer. VFD manufacturer will include required internal components (LRC filter, line and load reactors as required).
- 7.4.9.11(8) VFD startup will be by factory trained representative. Provide start-up report.

7.4.9.12 Airflow Measuring Probes

- 7.4.9.12(1) Provide on each fan, air flow measuring probes capable of continuously monitoring the air handling capacity of the fan.
- 7.4.9.12(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 must be located outside the inlet throat as to not obstruct airflow.
- 7.4.9.12(3) The probes will be capable of producing a 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 $\pm 3\%$ of actual fan airflow.

7.4.9.13 Airflow Display

- 7.4.9.13(1) Provide for each fan a method of displaying digitally locally, in real time, the fans current air flow.

- 7.4.9.13(2) Integrate all air flow displays and sensors with the BMS.
- 7.4.9.13(3) The output signal will be accurate to $\pm 0.5\%$ of natural span, including non-linearity, hysteresis and non-repeatability.
- 7.4.9.13(4) The display must be water tight allowing for use in outdoor locations. If the display is not water tight it will be enclosed in a weatherproof housing.

7.4.9.14 Coils

- 7.4.9.14(1) Coils fins will have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion of the tubes. No soldering or tinning will be used in the bonding process. Coils will be mounted in the unit casing to be accessible for service. Capacities, pressure drops and selection procedure will be certified in accordance with ARI Standard 410.
- 7.4.9.14(2) Coils will be fully enclosed within the casing. Cooling coils will be on mounted 304 stainless steel angle racks manufactured to allow coils to slide out individually. Heating coils will be mounted on galvanized angle racks manufactured to allow coils to slide out individually.
- 7.4.9.14(3) Removable coil access panels will be provided for removal of coils through the casing wall. Coils will be individually removable towards the access side. Coils must be individually racked, removable through the side access panels.
- 7.4.9.14(4) All pipe connections will be on the same unit end, extended through the casing for ease of connection.
- 7.4.9.14(5) Water coils handling recently mixed air, or direct outside air, will be fully drainable by removing a single threaded plug for each coil row.
- 7.4.9.14(6) The primary surface will be round seamless 16 mm dia. x 0.508 mm wall thickness copper tube on 38 mm centers. All joints will be brazed.
- 7.4.9.14(7) The secondary surface will consist of rippled plate fins for higher capacity and structural strength. Fins will have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Bare copper tube will not be visible between fins and the fins will have no openings or holes which might accumulate lint and dirt. Tubes will be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.

- 7.4.9.14(8) The casings will be constructed of continuous 16-gauge galvanized steel casings for heating coils and 304 stainless steel for cooling coils, and heat extraction coils. Coil side plates will be of reinforced flange type.
- 7.4.9.14(9) The coil connection locations will permit universal mounting of the coil for right or left hand airflow and have equal pressure drop through all circuits. Coils will be circuited for counterflow heat transfer to provide the maximum mean effective temperature difference for maximum heat transfer rates.
- 7.4.9.14(10) The complete coil core will be tested with 300 lbs. air pressure under warm water and be suitable for operation at 200 psig working pressures. Individual tube and core tests before installation of headers is not considered satisfactory. Hydrostatic tests alone will not be acceptable.
- 7.4.9.14(11) All cooling coils will have stainless steel drain pans pitched in 2 directions to ensure complete drainage. Drain pans found to have "standing water" will be remedied by the Design-Builder at the Site. Drain pans must be recessed below AHU floor level.
- 7.4.9.14(12) Heating and cooling coils will have capacities as scheduled.
- 7.4.9.14(13) Heat recovery coils will be provided. Heat extraction coils will comply with cooling coil and drain pan specification.

7.4.9.15 Filters

- 7.4.9.15(1) Merv 8 pre-filters will be utilized in exhaust air streams for protection of heat extraction units. Provide 3 sets of spare media for all pre-filters.
- 7.4.9.15(2) Air filtration must meet the requirements of CSA 317.2.
- 7.4.9.15(3) Provide 3 spare sets of filter media.

7.4.9.16 Filter Gauges

- 7.4.9.16(1) The Design-Builder will provide Dwyer 2000 magnehelic gauges.
- 7.4.9.16(2) Magnehelic gauges will be accurate to +/- 2% of full range.
- 7.4.9.16(3) One gauge will be provided for each filter bank.
- 7.4.9.16(4) Gauges will be recessed into the exterior cabinet casing to provide a "flush" finish.

7.4.9.17 Lights

7.4.9.17(1) Provide 1220 mm vapour proof fluorescent marine lights 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 26.

7.4.9.18 Finish

7.4.9.18(1) The unit will be factory finish painted for indoor or outdoor application. Unit colour to be approved by the owner and architect.

7.4.9.19 Unit Mounted Silencers

7.4.9.19(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.

7.4.9.19(2) Acoustic media will be compressed and supported to minimize dusting and erosion. Mineral wool is not acceptable.

7.4.9.19(3) Silencer pods will be full height and full width of the plenum.

7.4.9.19(4) Stacked duct type silencers will not be used.

7.4.9.19(5) Sound Power Levels: Sound data will be submitted as part of the Review Procedure to confirm these numbers will be met.

7.4.9.20 Aluminum Airfoil Dampers

7.4.9.20(1) Aluminum airfoil frames and blades will be a minimum of 12 gauge extruded aluminum. Blades will be of a single unit airfoil design 152 mm wide.

7.4.9.20(2) Frames will be extruded aluminum channel with grooved inserts for vinyl seals.

7.4.9.20(3) Pivot rods will be 22.4 mm in hexagon extruded aluminum interlocking into the blade section. Bearings will be of a double sealed type with a Celcon inner bearing on a rod within a polycarbonate outer bearing inserted into the frame to prevent the outer bearing from rotating.

7.4.9.20(4) The bearing will be designed so there are no metal-to-metal or metal-to-bearing riding surfaces. The interconnecting linkage will have a separate Celcon bearing to eliminate friction inside the linkage.

- 7.4.9.20(5) Blade linkage hardware will be installed in a frame outside the airstream. All hardware will be of non-corrosive, reinforced cadmium plated steel.
- 7.4.9.20(6) Damper seals will be designed for minimum air leakage by means of overlapping seals.
- 7.4.9.20(7) Actuators will be provided, installed and wired by a qualified controls contractor.
- 7.4.9.20(8) Jack-shaft assemblies will be provided for multiple damper installations.

7.4.9.21 Humidifiers – Gas-Fired Steam Humidification System

- 7.4.9.21(1) Humidifiers will comply with the following standards:

- 7.4.9.21(1)(a) CSA;
- 7.4.9.21(1)(b) AGA;
- 7.4.9.21(1)(c) CGA; and
- 7.4.9.21(1)(d) CE

- 7.4.9.21(2) Submittals:

- 7.4.9.21(2)(a) Submit product data (manufacturer's specifications, and technical data including performance, construction and fabrication) for each manufactured component.

7.4.9.22 Gas-Fired Steam Humidification System Products

- 7.4.9.22(1) Fabrication requirements:

- 7.4.9.22(1)(a) Tank: 14-gauge 304-stainless steel with heli-arc welded seams.
- 7.4.9.22(1)(b) Stainless steel round flue outlet to vent products of combustion. Humidifier will be certified to use Class B flue materials.
- 7.4.9.22(1)(c) Painted aluminum enclosure to protect all humidifier components. Enclosure will have integral base with openings designed for moving with a fork lift or pallet jack.
- 7.4.9.22(1)(d) Enclosure with integral base and openings designed for moving with a forklift or pallet jack.
- 7.4.9.22(1)(e) Stainless steel heat exchanger with welded joints.

- 7.4.9.22(1)(f) Factory insulation: Humidifier will be covered with 25 mm thick, rigid, foil-faced fiberglass insulation. All surfaces except front face panel will have insulation.
- 7.4.9.22(1)(g) Size: Units with capacities of 136 kg/hr. or less will be capable of fitting through 915 mm door.
- 7.4.9.22(1)(h) Water Requirements: The humidifier will be capable of generating steam from tap, softened or DI/RO water.
- 7.4.9.22(1)(i) Drain: An electric drain valve will be mounted on humidifier assembly to allow tank to drain automatically at the end of a humidification season.

7.4.9.22(2) Burner Assembly

- 7.4.9.22(2)(a) Humidifier and burner assembly will be CSA/AGA/CGA certified and tested to support natural gas.
- 7.4.9.22(2)(b) Gas train assembly will be complete with burner/mixing tube assembly, igniter, sight glass, flame rod electrode, gas manifold integral gas valve and venture.
- 7.4.9.22(2)(c) Each burner will freely modulate or time proportion with a gas input turndown ratio of up to 4:1, and will time-proportion below that threshold.

7.4.9.22(3) Integral water tempering device: A factory-installed thermostatically controlled water valve will meter an amount of cold water into a stainless steel mixing chamber to temper 100°C water with a 0.38 l/s in-flow rate to a 60°C discharge temperature to sanitary system.

7.4.9.23 Humidifier Options: Tank and heat exchanger will be type 316 stainless steel with heli-arc welded seams.

7.4.9.24 Humidifier Controls

- 7.4.9.24(1) Control subpanel: Control subpanel will be factory -attached to humidifier with all wiring between subpanel and humidifier completed at factory. A wiring diagram will be included.
- 7.4.9.24(2) Microprocessor controller with the following features or functions:
 - 7.4.9.24(2)(a) Web interface and server, included standard on all models.
 - 7.4.9.24(2)(b) Web interface will allow remotely located users to simultaneously view system operation and/or change system parameters.

- 7.4.9.24(2)(c) Web interface will have password-protected secure access.
- 7.4.9.24(2)(d) Web interface will be compatible with standard internet browsers.
- 7.4.9.24(2)(e) Interoperable with any Modbus® network.
- 7.4.9.24(2)(f) Redundant low water safety control.
- 7.4.9.24(2)(g) Fully modulating (0% to 100%) control of humidifier outputs.
- 7.4.9.24(2)(h) PID control capability with field-adjustable settings.
- 7.4.9.24(2)(i) Water level control for softened or hard water.
- 7.4.9.24(2)(j) Automatic refill, low water cut-off field adjustable skimmer bleed off functions and automatic drain-down of humidifier. System will consist of:
 - (j).1 a water level sensing unit comprised of three metallic probes screwed into a threaded probe head. Probe head will incorporate probe isolation chamber to eliminate short-circuiting between probes caused by mineral coating of probe head. Probe head will be mounted on the humidifier assembly;
 - (j).2 a solenoid operated fill valve factory mounted on the humidifier assembly; and
 - (j).3 end-of-season drain automatically drains humidifier tank after a user-defined period of system inactivity.
- 7.4.9.24(2)(k) Temperature sensor: A factory mounted sensor, with a temperature range of -40° C to 120° C mounted on the humidifier to enable the following functions:
 - (k).1 maintain the evaporating chamber water temperature above freezing;
 - (k).2 maintain a user-defined preset evaporating chamber water temperature; and
 - (k).3 allow rapid warm-up of water in evaporating chamber after a call for humidity, providing 100% operation until steam production occurs.
- 7.4.9.24(3) USB port on the control board for software updates, data backups, and data restoration.
- 7.4.9.24(4) Real-time clock to allow time-stamped alarm/message tracking, and scheduled events.
- 7.4.9.24(5) Factory commissioning of humidifier and control board, including system configuration as-ordered, factory unit testing, and operation with water before shipping.

- 7.4.9.24(6) Unit-mounted keypad/display operable within a temperature range of 0° C to 70 °C, and that provides backlighting for viewing in low light.
- 7.4.9.24(7) Alarms, unit configuration, and usage timer values will remain in non-volatile memory indefinitely during a power outage.
- 7.4.9.24(8) The capability to monitor, control, and/or adjust the following parameters:
 - 7.4.9.24(8)(a) Relative humidity (RH) set point, actual conditions in the space (from humidity transmitter), RH offset;
 - 7.4.9.24(8)(b) Dew point set point, actual conditions in the space (from dewpoint transmitter) dew point offset;
 - 7.4.9.24(8)(c) Relative humidity (RH) duct high limit set point (switch) and actual conditions;
 - 7.4.9.24(8)(d) Relative humidity (RH) duct high limit set point, actual conditions (from transmitter), high limit span, and high limit offset;
 - 7.4.9.24(8)(e) Total system demand in % of humidifier capacity;
 - 7.4.9.24(8)(f) Total system output in lbs./hour (kg/h);
 - 7.4.9.24(8)(g) Drain/flush duration, allowed days, and frequency based on usage;
 - 7.4.9.24(8)(h) End-of-season drain status (on standard water systems and if ordered as a DI water option) and hours humidifier is idle before end of season draining occurs;
 - 7.4.9.24(8)(i) Window glass surface temperature (in % RH offset application using sensor ordered as an option) with programmable offset;
 - 7.4.9.24(8)(j) Air temperature or other auxiliary temperature monitoring with programmable offset (using sensor ordered as an option);
 - 7.4.9.24(8)(k) System alarms and system messages, current and previous;
 - 7.4.9.24(8)(l) Adjustable water skim duration;
 - 7.4.9.24(8)(m) Programmable outputs for remote signaling of alarms and/or messages, device activation (such as a fan), or for signaling tank heating and/or steam production;
 - 7.4.9.24(8)(n) System diagnostics that include:
 - (n).1 Test outputs function to verify component operation;

(n).2 Test humidifier function, by simulating demand to validate performance;

(n).3 Data collection of RH, air temperature, water use, energy use, alarms, and service messages for viewing from the keypad/display or Web interface.

7.4.9.24(8)(o) Service notification scheduling;

7.4.9.24(8)(p) Password-protected system parameters;

7.4.9.24(8)(q) Keypad/display or Web interface displays in English;

7.4.9.24(8)(r) Numerical units displayed in imperial or SI units.

7.4.9.25 Humidifier Control Options

7.4.9.25(1) Integrate all air flow displays and sensors with the BMS.

7.4.9.25(2) Multiple humidifier tank controls will be programmed and configured at the factory to control multiple humidifier tanks. Controller functions will include all functions listed above plus:

7.4.9.25(2)(a) Automatic run-time balancing. The controller will assign duty to all humidifier tanks in the multi- tank group such that each humidifier accrues approximately the same hours of duty, thereby ensuring equal wear across all humidifiers in the multi-tank group.

7.4.9.25(2)(b) One humidifier tank will be capable of being controlled as a redundant tank.

7.4.9.25(2)(c) One keypad/display will be included with each multi-tank group.

7.4.9.25(3) Control input accessory options:

7.4.9.25(3)(a) Humidity transmitter, room: Humidity transmitter will be a room-mounted device that measures from 0% to 100% of RH range and provides a linear output (10% RH to 90% RH) from 4 mA to 20 mA. Accuracy $\pm 2\%$ RH. Supply voltage 21 VDC. Operating temperature range: -20° C to 60° C.

7.4.9.25(3)(b) Humidistat, on-off, high limit: Electric humidistat control will be an off-on style, duct mounted with a control range of 15% to 95% RH. Compatible with 24, 120, 240 VAC. Operating temperature range 4° C to 52° C.

7.4.9.25(3)(c) Modulating high limit control: The modulating high limit control system will include two modulating electronic humidity transmitters

(one space-mounted, the other duct-mounted downstream of the humidifier). Both will transmit to the microprocessor controller to modulate humidifier output and maintain the highest desired space humidity possible, at all airflow volumes, without saturation of the airstream. (For this application, it is recommended to use a sail type airflow-proving switch).

- 7.4.9.25(3)(d) Airflow proving switch, pressure type: Airflow proving switch will be diaphragm-operated with picot tube for field installation. Switch will have an adjustable control point range of 0.05" wc to 12" wc (12.5 Pa to 2988 Pa) Operating temperature range -40 °C to 82°C. Compatible with 24, 120 and 240 VAC.

7.4.9.26 Humidifier Dispersion Options

7.4.9.26(1) Steam dispersion panel:

- 7.4.9.26(1)(a) Air pressure loss across the humidifier assembly will not exceed 4 Pa water column at a duct air velocity of 2 m/s.
- 7.4.9.26(1)(b) Each packaged humidifier panel assembly of tubes and headers will be contained within a galvanized metal casing to allow convenient duct mounting, or to facilitate the stacking of and/or the end-to-end mounting of multiple humidifier panels in ducts or air handler casings. The Design-Builder will determine whether to order any humidifier panel to be shipped unassembled based on the location where the Design-Builder will install the humidifier panel.
- 7.4.9.26(1)(c) Tubes will be joined to headers with slip-fit couplings.
- 7.4.9.26(1)(d) Tubes and headers will be 316 stainless steel and be heli-arc welded.
- 7.4.9.26(1)(e) Dispersion tubes will be insulated with a plenum-approved insulating material for in-duct installation and have an R-value not less than 0.5 at a thickness not more than 3.2 mm, for minimal increase in dispersion tube diameter.
- (e).1 Airstream heat gain will not exceed the values as scheduled; the values will be supported by the manufacturer's published data.
- (e).2 Insulating material will meet the following criteria at 3.2 mm thickness.
- (e).3 Fire/smoke index will be 0/0 per any of the following test procedures: - UL 723 fire/smoke index (Test for Surface Burning Characteristics of Building Materials) – NFPA 255 (Standard

Method of Test of Surface Burning Characteristics of Building Materials) - ASTM E84 (Surface Burning Characteristics for Materials Used in Plenums).

(e).4 Stable up to 148 °C continuous - to prevent material degradation, hardening, or crumbling at high temperatures.

(e).5 Closed-cell construction does not absorb water or support microbial growth - to negate the need for vapour barriers and jackets.

(e).6 Non-toxic and pure as documented in manufacturer's data - to prevent off-gassing and to facilitate use in clean rooms, pharmaceutical applications, and food industries.

(e).7 Will not degrade when exposed to UVC light - to negate the need for UV wraps.

(e).8 Continuous, seam-welded, and held in place without bands or clamps – to minimize surfaces for the accumulation of particulate matter.

7.4.9.26(1)(f) Dispersion tubes that are not insulated will not be used.

7.4.9.26(1)(g) Dispersion tubes are to be factory installed in air handling units.

7.4.10 Cooling Towers

7.4.10.1 If used, provide cooling towers that meet the following requirements:

7.4.10.1(1) stainless steel cold water basin

7.4.10.1(2) factory mutual approved

7.4.10.1(3) air inlet screens

7.4.10.1(4) motor outside airstream

7.4.10.1(5) equalizer flume weir

7.4.10.1(6) basin equalizers

7.4.10.1(7) basin heaters

7.4.10.1(8) ladder and guardrail

7.4.10.1(9) ladder safety cage

7.4.10.1(10) vibration switch

7.4.10.1(11) variable speed drive

7.4.10.1(12) premium efficiency motor

- 7.4.10.2 Base: Provide an induced draft, cross-flow type, factory assembled, film fill, industrial duty, galvanized steel cooling tower.
- 7.4.10.3 Thermal Performance
- 7.4.10.3(1) The tower will be capable of a minimum efficiency per ASHRAE Standard.
- 7.4.10.4 Performance Warranty
- 7.4.10.4(1) CTI certification notwithstanding, the cooling tower manufacturer will guarantee that the tower supplied will meet the specified performance conditions when the tower is installed according to design.
- 7.4.10.4(2) If, because of a suspected thermal performance deficiency, the Owner chooses to conduct an on-site thermal performance test under the supervision of a qualified, independent third party in accordance with CTI or ASME standards during the first year of operation, and the tower fails to perform within the limits of test tolerance, then the Design-Builder will pay for the cost of the test and will make such corrections as are agreeable to the Owner to compensate for the performance deficiency. The above warranty does not limit the overall two year warranty provided by the Design-Builder in the Agreement.
- 7.4.10.5 Construction
- 7.4.10.5(1) Except where otherwise specified, all components of the cooling tower will be fabricated of heavy-gauge steel, protected against corrosion by G-235 galvanizing. The tower will be capable of withstanding water having a pH of 6.5 to 8.0; a chloride content (NaCl) up to 300 ppm; a sulfate content (SO₄) up to 250 ppm; a calcium content (CaCO₃) up to 500 ppm; silica (SiO₂) up to 150 ppm; and design hot water temperatures up to 51.7°C. The circulating water will contain no oil, grease, fatty acids or organic solvents.
- 7.4.10.5(2) These requirements are intended to indicate those materials that will be capable of withstanding the above water quality in continuing service. They are to be regarded as minimum requirements. Where component materials particular to individual tower designs are not specified, the Design-Builder will select materials that are capable of performing in accordance with the above water quality and load carrying capabilities.
- 7.4.10.5(3) The tower will include all design and material modifications necessary to meet the fire rating requirements of Factory Mutual. The product proposed will be listed in the Factory Mutual Approval Guide, latest edition.

7.4.10.6 Mechanical Equipment

- 7.4.10.6(1) Fan(s) will be propeller-type, incorporating wide-chord aluminum alloy airfoil blades and galvanized hubs. Blades will be individually adjustable. Maximum fan tip speed will be 3962 m/min. Fan(s) will be driven through a right angle, industrial duty, oil lubricated, geared speed reducer that requires no oil changes for the first five years of operation. The gearbox bearings will be rated at an L10A service life of 100,000 hours or greater.
- 7.4.10.6(1)(a) The motor will be mounted outside the casing of the tower, and will be connected to the gear reducer by a dynamically-balanced, stainless steel tube and flange driveshaft.
- 7.4.10.6(2) Motor(s) will be TEFC, 1.15 service factor, variable torque, and specially insulated for cooling tower duty. Speed and electrical characteristics will be 1800 rpm, single-winding, 3 phase, 60 Hz, 575 volts. Motor will operate in the shaft-horizontal position, and nameplate horsepower will not be exceeded at design operation.
- 7.4.10.6(3) The complete mechanical equipment assembly for each cell will be supported by a rigid steel structural support that resists misalignment between the motor and the gear reducer. The mechanical equipment assembly will be warranted against any failure caused by defects in materials and workmanship for no less than five years following the date of tower shipment. This warranty will cover the fan, speed reducer, drive shaft and couplings, and the mechanical equipment support. The electric motor will carry a manufacturer's warranty of at least two years from the Substantial Completion Date.
- 7.4.10.6(4) A complete ULC listed Variable Speed Drive system in a CSA 1 indoor, CSA 12 indoor or CSA 3R outdoor enclosure will be provided. The VFD will use PWM technology with IGBT switching and integrated bypass design. Provide harmonic filters on the line side of variable-frequency drives and UPS system to limit the input current harmonic distortion (iTHD) to less than 5% of the full-load fundamental current. Bypass should have sort-start system. VFD output switching will not cause mechanical issues with gearbox teeth or drive shafts. The VFD will catch a fan spinning in the reverse direction without tripping. The panel will include a main disconnect with short circuit protection and external operating handle, lockable in the off position for safety. The VFD system will receive a speed reference signal from the Building Management System monitoring the tower cold-water temperature. As an option to receiving the speed reference signal from a building management system, the drive must have the capability to receive a 4-20 ma

temperature signal from an RTD transmitter. The VFD will have an internal proportional-integral derivative regulator to modulate fan speed maintaining set point temperature. The drive's panel display will be able to display the set-point temperature and cold-water temperature on two separate lines. The bypass will include a complete magnetic bypass circuit and with capability to isolate the VFD when in the bypass mode. Transfer to the bypass mode will be manual in the event of VFD failure. Once the motor is transferred to the by-pass circuit the fan motor will run at constant full speed. The bypass circuit will not modulate ON and OFF based on cold-water temperature. The application must be able to handle very cold water while VFD is in a by-pass mode. Operator controls will be mounted on the front of the enclosure and will consist of start and stop control, bypass/VFD selection, Auto/Manual selections, manual speed control. To prevent heating problems in the cooling tower fan motor the VFD system will de-energize the motor once 25% motor speed is reached and cooling is no longer required. The cooling tower manufacturer will supply VFD start-up assistance. Tower vibration testing throughout the speed range is required to identify and lockout any natural frequency vibration levels which may exceed CTI guidelines.

- 7.4.10.6(5) A vibration limit switch will be installed on the mechanical equipment support assembly and wired into the control panel. The purpose of this switch will be to interrupt power to the motor in the event of excessive vibration. It will be adjustable for sensitivity, and will require manual reset.
- 7.4.10.6(6) An externally mounted and wired terminal box will be provided for each cell providing a single access location to the internal wiring. Terminate wiring for fan motor and options such as vibration switch, oil level switch and water level probes to the terminal box. The terminal box will be built to UL508 standards and all terminal points marked for ease of connection in the field. The enclosure will be CSA 4X fiberglass. Entry points will be into and out of the bottom of the enclosure preventing water collection in the enclosure.

7.4.10.7 Louvers and Drift Eliminators

- 7.4.10.7(1) Fill will be film type, thermoformed of 15 mil thick PVC, with louvers formed as part of each fill sheet. Fill will be suspended from hot dip galvanized structural tubing supported from the tower structure, and will be elevated above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower will be free of water splash-out. Fill will be capable of withstanding a hot water temperature of 125°F.

- 7.4.10.7(2) Drift eliminators will be PVC, triple-pass, and will limit drift losses to 0.005% or less of the design water flow rate.

7.4.10.8 Hot Water Distribution System

- 7.4.10.8(1) Two open basins (one above each bank of fill) will receive hot water piped to each cell of the tower. These basins will be installed and sealed at the factory, and will be equipped with removable, galvanized steel covers capable of withstanding the loads described in Section 4.1. The water distribution system will be accessible and maintainable during tower fan and water operation.
- 7.4.10.8(2) Each basin will include an inlet hole and bolt circle to accept a 125# flange connection per ANSI B16.1. Removable, interchangeable polypropylene nozzles installed in the floor of these basins will provide full coverage of the fill by gravity flow.
- 7.4.10.8(3) The water distribution system will be accessible and maintainable while tower is operating.

7.4.10.9 Casing, Fan Deck and Fan Guard

- 7.4.10.9(1) The casing and fan deck will be heavy-gauge galvanized steel. The top of the fan cylinder will be equipped with a conical, non-sagging, removable fan guard, fabricated of welded 8 mm and 7 gauge rods, and hot dip galvanized after fabrication.
- 7.4.10.9(2) The air inlet faces of the tower will be covered by 25 mm mesh hot-dipped galvanized welded wire screens. Screens will be secured to removable galvanized U-edge frames. Screens will be designed so bottom half can be removed for easy access to the cold water basin.

7.4.10.10 Access

- 7.4.10.10(1) A large galvanized, rectangular access door will be located on both end panels for entry into the cold water basin. Doors will provide access to the fan plenum area to facilitate inspection and allow maintenance to the fan drive system.
- 7.4.10.10(2) The top of the tower will be equipped with a sturdy guardrail, complete with knee rail and toe board, designed according to OSHA and/or WorkSafe BC guidelines and factory welded into subassemblies for ease of field installation. The guardrail assembly will be hot dipped galvanized after welding and capable of withstanding a 75 kg concentrated live load in any direction. Posts will be spaced on centers of 2440 mm or less. A 457 mm wide aluminum ladder with 75 mm I-

beam side rails and 32 mm diameter rungs will be permanently attached to the end wall casing of the tower, rising from the base of the tower to the top of the guardrail.

- 7.4.10.10(3) Ladder Safety: A heavy gauge aluminum safety cage will surround the ladder, extending from a point approximately 2135 mm above the foot of the ladder to the top of the guardrail.

7.4.10.11 Cold Water Collection Basin

- 7.4.10.11(1) The collection basin will be heavy-gauge S300 stainless steel, and will include the number and type of suction connections required to accommodate the outflow piping system. Suction connections will be equipped with stainless steel debris screens. A factory-installed, float-operated, mechanical make-up valve will be included. An overflow and drain connection will be provided in each cell of the cooling tower. The basin floor will slope toward the drain to allow complete flush out of debris and silt which may accumulate. Towers of more than one cell will include stainless steel flumes for flow and equalization between cells. The basin will be accessible and maintainable while water is circulating. All steel items which project into the basin (columns, diagonals, anchor clips, etc.) will also be made of stainless steel.

- 7.4.10.11(1)(a) A hole and bolt circle will be provided in the depressed section of the basin for equalizer piping between cells. A full-face, 6.4 mm thick, 50 durometer gasket will be provided at each equalizer location.

- 7.4.10.11(2) Provide a system of electric immersion heaters and controls for each cell of the tower to prevent freezing of water in the collection basin during periods of shutdown. The system will consist of one or more stainless steel electric immersion heaters installed in threaded couplings provided in the side of the basin. A CSA 4 enclosure will house a magnetic contactor to energize heaters; a transformer to provide 24-volt control circuit power; and a solid-state circuit board for temperature and low water cut-off. A control probe will be located in the basin to monitor water level and temperature. The system will be capable of maintaining 4.44°C water temperature at a City of Coquitlam winter design temperature.

- 7.4.10.11(3) The interconnecting flume between cells will be equipped with a removable cover plate to permit the shutdown of one cell for maintenance purposes, or to permit independent cell operation.

7.4.10.12 Quality Assurance

7.4.10.12(1) Chiller must be run test at manufacturer's facility to job specific requirements, prior to shipment. Report will be made available upon request.

7.4.10.13 Delivery and Handling

7.4.10.13(1) Chillers will be delivered to the Site completely assembled and charged with complete refrigerant charge.

7.4.10.14 Warranty

7.4.10.14(1) The manufacturer's equipment warranty will be for a period of at least two years from the Substantial Completion Date.

7.4.10.14(2) The warranty will include parts and labour costs for the repair and or replacement of defects in components or workmanship.

7.4.10.15 Product Description

7.4.10.15(1) The dedicated heat recovery chiller will be designed to operate using R-410a refrigerant.

7.4.10.15(2) The dedicated heat recovery chiller will be designed for parallel evaporator water flow.

7.4.10.15(3) The liquid to be heated/chilled will be water containing corrosion inhibitors.

7.4.10.15(4) The dedicated heat recovery chiller will incorporate scroll-type compressors and can consist of modules. Each refrigerant circuit will consist of an individual compressor, common dual circuit condenser, dual circuit evaporator, thermal expansion valves, and control system. Each circuit will be constructed to be independent of other circuits from a refrigeration and electrical stand-point. The multi-circuit dedicated heat recovery chiller must be able to produce hot water even in the event of a failure of one or more refrigerant circuits.

7.4.10.15(5) The dedicated heat recovery chiller modules will be ETL listed in accordance with UL Standard 1995, CSA certified per standard C22.2#236.

7.4.10.15(6) Chiller modules will be AHRI certified. (R-410a only)

7.4.10.15(7) Modules will be shipped wired and charged with refrigerant. All modules will be factory run tested prior to shipment on an AHRI certified or 3rd party verified test stand.

- 7.4.10.15(8) Compressors, heat exchangers, piping and controls will be mounted on a heavy gauge, powder coated steel frame. Electrical controls, contactors, and relays for each module will be mounted within that module.
- 7.4.10.15(9) Chilled and Hot Water Mains: Each module will include supply and return mains for both chilled and hot water. Cut grooved end connections to piping with grooved type couplings. Rolled grooved will not be used. Water mains will be installed such that they are beneath any power or control wiring so as to insure safe operation in the event of condensation or minor piping leaks.
- 7.4.10.15(10) Evaporators and condensers: Each evaporator and condenser will be brazed plate heat exchangers constructed of 316 stainless steel; designed, tested, and stamped in accordance with UL 1995 code for 650 psig working pressure on the evaporator and 650 psig working pressure on the condenser. Both the condenser and evaporator heat exchanger will be mounted below the compressor, to eliminate the effect of migration of refrigerant to the cold evaporator with consequent liquid slugging on start-up.
- 7.4.10.15(11) Compressor: Each module will contain two hermetic scroll compressors independently circuited and with internal spring isolation mounted to the module with rubber-in-shear isolators. Each system will also include high discharge pressure and low suction pressure manual reset safety cut-outs.
- 7.4.10.15(12) Central Control System: The dedicated heat recovery chiller (DHRC) will be equipped with a microprocessor based return water controller. The dedicated heat recovery chiller will have the capability to operate in response to either heating water or cooling water set points. The selection of these two modes of operation will be made automatically by the dedicated heat recovery chiller's master controller or alternatively, this mode may be set manually or through a binary input to the controller.
- 7.4.10.15(13) Scheduling of the various compressors will be performed by a microprocessor based control system (master controller). A new lead compressor will be selected every 24 hours to assure even distribution of compressor run time.
- 7.4.10.15(14) The master controller will monitor and report the following on each refrigeration system:
- 7.4.10.15(14)(a) discharge pressure fault

- 7.4.10.15(14)(b) suction pressure fault
 - 7.4.10.15(14)(c) compressor winding temperature
 - 7.4.10.15(14)(d) suction temperature
 - 7.4.10.15(14)(e) evaporator leaving chilled water temp.
- 7.4.10.15(15) The master controller will be powered by the chillers single point power connection and will monitor and report the following system parameters:
- 7.4.10.15(15)(a) chilled water entering and leaving temperature
 - 7.4.10.15(15)(b) hot water entering and leaving temperature
 - 7.4.10.15(15)(c) chilled water and hot water flow
- 7.4.10.15(16) An out of tolerance indication from these controls or sensors will cause a “fault” indication at the master controller and shutdown of that compressor with the transfer of load requirements to the next available compressor. In the case of a system fault the entire dedicated heat recovery chiller will be shut down. When a fault occurs, the master controller will record conditions at the time of the fault and store the data for recall. This information will be capable of being recalled through the keypad of the master controller and displayed on the master controller’s 2 line by 40 character back-lit LCD. A history of faults will be maintained including date and time of day of each fault (up to the last 20 occurrences).
- 7.4.10.15(17) Individual monitoring of leaving chilled water temperatures from each refrigeration system will be programmed to protect against freeze-up.
- 7.4.10.15(18) The control system will monitor entering and leaving hot and/or chilled water temperatures to determine system load and select the number of compressor circuits required to operate. Response times and set points will be adjustable. The system will provide for variable time between compressor sequencing and temperature sensing, so as to optimize the dedicated heat recovery chiller performance to different building loads.
- 7.4.10.15(19) Dedicated heat recovery chiller will have a single point power connection and external inputs and outputs to be compatible with the BMS. Inputs/outputs include:
- 7.4.10.15(19)(a) remote start/stop
 - 7.4.10.15(19)(b) heating/cooling alarm relay

- 7.4.10.15(19)(c) customer chilled/load limit reset signal
 - 7.4.10.15(19)(d) ECW to mechanical cooling module
 - 7.4.10.15(19)(e) LCW from mechanical cooling module
 - 7.4.10.15(19)(f) ECHW to mechanical cooling module
 - 7.4.10.15(19)(g) LCHW from mechanical cooling module
 - 7.4.10.15(19)(h) chilled water flow switch Input
 - 7.4.10.15(19)(i) condenser water flow switch input
 - 7.4.10.15(19)(j) full load indicator relay
 - 7.4.10.15(19)(k) condenser pump relay
 - 7.4.10.15(19)(l) chilled water pump relay
- 7.4.10.15(20) Each inlet water header will incorporate a built in 30-mesh (maximum) in-line strainer system to prevent heat exchanger fouling and accommodate 100% flow filtration with a minimum surface area of 475 sq. inches per module.
- 7.4.10.15(21) Single Point Power: Each chiller will be equipped with a pre-engineered genuine buss bar electrical system for single point power. Where the equipment size exceeds the amp rating of the buss bar, multiple power connections may be applied. Pre-engineered system will also incorporate individual module isolation circuit breakers for full redundancy and ability of a module to be taken off-line for repair while the rest of the modules continue to operate. Individual power feeds to each module will be unacceptable.
- 7.4.10.15(22) Dedicated heat recovery chiller safety controls system will be provided with the unit (minimum) as follows:
- 7.4.10.15(22)(a) low evaporator refrigerant pressure
 - 7.4.10.15(22)(b) loss of flow through the evaporator
 - 7.4.10.15(22)(c) loss of flow through the condenser
 - 7.4.10.15(22)(d) high condenser refrigerant pressure
 - 7.4.10.15(22)(e) high compressor motor temperature
 - 7.4.10.15(22)(f) Low suction gas temperature

7.4.10.15(22)(g) low leaving evaporator water temperature

7.4.10.15(23) Failure of dedicated heat recovery chiller to start or dedicated heat recovery chiller shutdown due to any of the above safety cutouts will be annunciated by display of the appropriate diagnostic description at the unit control panel. This annunciation will be in plain English. Alphanumeric codes will be unacceptable.

7.4.10.15(24) The dedicated heat recovery chiller will be furnished with a master controller as an integral portion of the dedicated heat recovery chiller control circuitry to provide the following functions:

7.4.10.15(25) Provide automatic dedicated heat recovery chiller shutdown during periods when the load level decreases below the normal operating requirements of the dedicated heat recovery chiller. Upon an increase in load, the dedicated heat recovery chiller will automatically restart.

7.4.10.15(26) Provisions for connection to automatically enable the dedicated heat recovery chiller from a remote energy management system.

7.4.10.15(27) The control panel will provide alphanumeric display showing all system parameters in the English language with numeric data in English units.

7.4.10.15(28) Each module will contain a slave controller that will allow any module to run in the event of a master controller failure or loss of communication with the master controller via an on/off/manual toggle switch.

7.4.10.15(29) Provide normal dedicated heat recovery chiller operation.

7.4.10.15(30) When dedicated heat recovery chiller is enabled, the factory supplied master controller stages the dedicated heat recovery chiller capacity from minimum to maximum as required by Facility load.

7.4.10.15(31) The dedicated heat recovery chiller control system will respond to entering water temperature and will have an integral reset based on entering water temperature to provide for efficient operation at part-load conditions.

7.5 Reserved (Division 24) – not used

7.6 Integrated Automation (Division 25)

7.6.1 Controls

7.6.1.1 Design Principles

- 7.6.1.1(1) The controls system will be designed as a building management system (BMS) which allow monitoring and operation of the entire Facility from a single location or through a remote internet connection.
- 7.6.1.1(2) The BMS will perform the following functions:
- 7.6.1.1(2)(a) automatically operate, monitor and manage the Facility mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the user and Client treatment delivery;
 - 7.6.1.1(2)(b) display Facility related alarms locally at the management control centre located in the maintenance supervisor's office;
 - 7.6.1.1(2)(c) provide a form of external monitoring for the Owner including all associated hardware and software;
 - 7.6.1.1(2)(d) meter and trend data related to flow of electrical power, natural gas and domestic water to the Facility and as required to monitor energy performance. All trend data is to be stored locally only. No off site data storage will be allowed;
 - 7.6.1.1(2)(e) interface with the Facility electrical and communication systems including fire alarm, lighting, UPS and emergency power systems for monitoring, control and alarming;
 - 7.6.1.1(2)(f) monitor equipment status and provide alarms for temperature, humidity and alarms for medication refrigerators identified in the Room Data Sheets; and
 - 7.6.1.1(2)(g) monitor critical equipment alarms such as:
 - (g).1 UPS common alarm;
 - (g).2 UPS battery monitor common alarm;
 - (g).3 emergency generator common alarm;
 - (g).4 emergency generator fuel system common alarm;
 - (g).5 transfer switch common alarm; and
 - (g).6 main transformer temperature common alarm.
- 7.6.1.1(3) The BMS will be non-proprietary and designed with open protocol.
- 7.6.1.1(4) The BMS will optimize the system performance under all operating conditions to minimize the Facility's energy usage.
- 7.6.1.1(5) The BMS configuration will accommodate future technological changes and the architecture of the BMS will be capable of expanding in scope and size with future Facility renovations.

- 7.6.1.1(6) The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.
- 7.6.1.1(7) The BMS IP network will reside on the FM Network.
- 7.6.1.1(8) Integrate the BMS with the lighting control system.
- 7.6.1.1(9) Notwithstanding the above, the BMS will be an independent system separate from the Facility fire alarm and other control systems (excepting the lighting control system).
- 7.6.1.1(10) The BMS will be provided as a complete package from one manufacturer, not as a composite system from several manufacturers.
- 7.6.1.1(11) Provide differential pressure sensors between pressure critical areas where required. Provide local audio and visual alarms for these systems in addition to the BMS alarms.
- 7.6.1.1(12) Provide current sensors on all HVAC and exhaust fans, pumps and rotating equipment to provide status of the equipment back to the BMS.
- 7.6.1.1(13) Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and thermostatic room loads.
- 7.6.1.1(14) Failsafe components will be hard-wired to provide reliable operation in all circumstances.
- 7.6.1.1(15) A maximum of four rooms may be connected as one HVAC zone for rooms with the same function and where occupancy is below 4 people and room loads are similar. Rooms will be zoned using averaging thermostats in each room - Each with ability to bias average zone temperature by +/- 2 deg C.
- 7.6.1.1(16) The administration/education and gym portion of the Facility will have the ability to provide night setback capabilities and override for evening activities out of normal operating hours.
- 7.6.1.1(17) Acceptable controls contractors are Delta Controls and Reliable Controls.

7.6.1.2 Performance Criteria

- 7.6.1.2(1) Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and thermostatic room loads.
- 7.6.1.2(2) Failsafe components will be hard-wired to provide reliable operation in all circumstances.

- 7.6.1.2(3) The BMS will meter and trend all data related to the flow of services into and out of the Facility including, but not limited to, domestic water, chilled water, heating water, fuel-oil and electricity. All metering and trending will be in accordance with ASHRAE guidelines.
- 7.6.1.2(4) The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.
- 7.6.1.2(5) The BMS will be connected to emergency power and on a UPS system for no interruption.
- 7.6.1.2(6) The BMS will monitor critical alarms for essential Facility and life safety systems. These alarms will notify the Owner as well as the Facility's master control center. These critical alarms include, but are not limited to:
 - 7.6.1.2(6)(a) fire alarm system for alarm, supervisory and trouble;
 - 7.6.1.2(6)(b) all temperature alarms resulting from set point deviations;
 - 7.6.1.2(6)(c) all alarms relating to the fire protection system; and
 - 7.6.1.2(6)(d) critical pressure relationships and critical equipment including, but not limited to, fume hoods, refrigerators and freezers.
- 7.6.1.2(7) The BMS will control all public area lighting such as parking lots, walkways, roadways, exterior signage, stairs and corridor and lobby lights located in areas not occupied 24 hours per day. Exterior lighting will include an input for photocell over-ride.
- 7.6.1.2(8) The Design-Builder will provide BMS documentation, including a detailed narrative description of the sequence of operation of each system.
- 7.6.1.2(9) User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.
- 7.6.1.2(10) The central BMS contractor will provide training to site personnel in the use and maintenance of the BMS. Training will consist of both hands-on and classroom training at the Site. All training will be recorded (audio and visual) and DVDs of the footage will be included with the O&M manuals.

7.7 Electrical (Division 26)

7.7.1 Electrical General

7.7.1.1 Basic Requirements

- 7.7.1.1(1) All electrical systems, materials, and equipment in the Facility will be of a type and quality intended for use in a permanent health care facility. The electrical systems will provide reliability, proper protection, continuity of service and a safe working environment for Clients, visitors, and staff.
- 7.7.1.1(2) All electrical systems and equipment required for the function of each identified program will be provided and configured with due regard for the details of delivery of the programs.
- 7.7.1.1(3) All electrical systems will be constructed so as to facilitate this change to the systems while minimizing the cost of change and the amount of interruption to the regular activities of the Facility. Electrical rooms, equipment and systems control panels are to have extra space and provisions for future expansion. Spare capacities allowed for in the main equipment (transformers, diesel generator, UPS, and associated switchboards and panelboards) for future flexibility will be separately identified in the equipment sizing calculations.
- 7.7.1.1(4) Systems and equipment will be designed and installed in a coordinated fashion. Systems will synergistically work together where advantageous, take advantage of current best available technology and provide the Facility with reliable electrical systems performance directed to facilitating the various functions of the Facility, now and into the future.
- 7.7.1.1(5) Comply with all applicable Standards, including those standards listed in Section 2.1, and the following:
- 7.7.1.1(5)(a) Standards produced by the Owner;
 - 7.7.1.1(5)(b) CAN/CSA Standard C282-09 Emergency Electric Power Supply for Buildings;
 - 7.7.1.1(5)(c) CSA Z32-15 Electrical Safety and Essential Electrical Systems in Health Care Facilities (excluding sections 5.3, 5.4, 5.5, 5.6.6, 5.9, 5.10, 5.11 and Part 6);
 - 7.7.1.1(5)(d) CSA Standard Z317.5 Illumination Systems in Health Care Facilities;
 - 7.7.1.1(5)(e) CSA Standard Z462-15 Workplace Electrical Safety;
 - 7.7.1.1(5)(f) Illuminating Engineering Society of North America Lighting Handbook – Reference and Application 10th ed.;

- 7.7.1.1(5)(g) ANSI C37.121 Unit Substation Requirements;
- 7.7.1.1(5)(h) CSA C22.1-15 Canadian Electrical Code;
- 7.7.1.1(5)(i) CSA C9, Dry Type Transformers;
- 7.7.1.1(5)(j) IEEE C57.19.91 IEEE Standard Test Code for Dry Type Distribution and Power Transformers;
- 7.7.1.1(5)(k) IEEE Standard 519 – Harmonics;
- 7.7.1.1(5)(l) IEEE Standard 1250 – Voltage Quality;
- 7.7.1.1(5)(m) IEEE Standard 1346 – Recommended Practice for Evaluation Electric Power System;
- 7.7.1.1(5)(n) ANSI/ASHRAE/IES 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings;
- 7.7.1.1(5)(o) Not used; and
- 7.7.1.1(5)(p) NFPA 70E Standard for Electrical Safety in the Workplace, 2015 Edition.

7.7.1.2 Performance Criteria

- 7.7.1.2(1) Every electrical system will be installed in a fixed and permanent manner, seismically restrained to meet BC Building Code requirements as applicable. 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 but not limited to mechanical equipment, Facility systems access ways, and architectural Facility components which may require periodic inspection or maintenance.
- 7.7.1.2(2) The electrical system will meet the design requirements while minimizing operating costs.
- 7.7.1.2(3) All electrical equipment will be by manufacturers with sales and service support resident in the Lower Mainland, and a demonstrable record of success with significant installations in the Lower Mainland for more than five years.
- 7.7.1.2(4) All major floor-mounted electrical equipment will be mounted on concrete housekeeping pads. Examples of such equipment include: unit substation, transfer switches, distribution transformers, distribution panelboards, MCCs, UPS.

- 7.7.1.2(5) The protection, grounding and/or isolation, insulation and control of all circuits and systems will be designed and constructed specifically to address the user and functional requirements of the locations where they are installed.
- 7.7.1.2(6) A primary criterion of all electrical equipment installations in the Facility will be their response to the anti-vandal and anti-harm needs of each area, as identified by the risk rating in the Room Data Sheets. Equipment selections and mounting details must respond to the anti-tamper, anti-vandal, and anti-ligature needs of the area where they are mounted. Where equipment cannot be sourced that meets the need, similar protection must be provided via guards or other inaccessible installation. Anchoring methods and attachments must be as robust and tamperproof as the equipment they are fixing.
- 7.7.1.2(7) Automatic type power factor correction equipment will be provided to correct the Facility power factor to above 0.95 lagging. All components in each automatic power-factor correction cabinet will be designed to accommodate an additional 20% of the initial kVAR capacity in the future. The harmonic profile of the Facility distribution system will be verified and a tuned circuit design will be provided to minimize resonance conditions. The final installation will be tested at the Site during commissioning and within one month of building occupancy to verify harmonic profile, and the system will be re-tuned as necessary.

7.7.2 Wiring Methods and Materials

7.7.2.1 Basic Requirements

- 7.7.2.1(1) Wiring methods and materials will result in safe reliable and flexible electrical power, control, communication, data, and life safety systems in the Facility.
- 7.7.2.1(2) All wiring will be neatly and securely installed in such a way that it is protected from damage, is not in conflict with mechanical or architectural components of the Facility and allows for future changes and additions.
- 7.7.2.1(3) Wiring methods will accommodate additions removals and relocations within the Facility for the projected working life of the Facility.
- 7.7.2.1(4) Emergency power feeders and circuits serving life safety loads will be protected from exposure to fire according to BC Building Code 3.2.7.10 high rise classification.

7.7.2.2 Performance Criteria

- 7.7.2.2(1) All conductors and all conducting components of electrical equipment, which form part of the wiring systems in the Facility will be of non-alloyed copper, except that conductors and conducting components equal to or larger than 150A may be aluminum.
- 7.7.2.2(2) Wiring and wiring support systems will be concealed from view except in service rooms.
- 7.7.2.2(3) All wiring will be protected from mechanical damage throughout each wiring system. Entry or accumulation of moisture into any wire, cable, or wire way will be prevented. Wiring to be in conduit unless otherwise noted. Final connection of branch wiring from ceiling space conduit and junction box systems to electrical devices on dropped ceilings may be in AC90 or flex such that the length of flex connection does not exceed 3050 mm. Final connection to motorized devices to be in liquid tight flex.
- 7.7.2.2(4) Wiring for systems of different voltages and from different sources of supply will be separated and will not be run in common systems such as conduits and cable trays. Interference between wiring of power supply systems and wiring of data and communication systems will be prevented by maintaining separation per TIA-569.
- 7.7.2.2(5) Ease of maintenance and continuous service to the user operations is considered essential such that the wiring systems while being serviced or added to do not cause or require major service disruptions in the Facility.
- 7.7.2.2(6) For conduits serving branch circuits, and which are 41 mm or larger, conduit fill will not exceed 40%.
- 7.7.2.2(7) Back boxes and junction boxes will not exceed 80% of the maximum fill allowable by code. Splitters to have at least 3 spare terminals on each set of lugs.
- 7.7.2.2(8) All conductors and cables will be clearly labelled at both ends.
- 7.7.2.2(9) All pull boxes, junction boxes and conduits will be identified with purpose-manufactured durable and clearly legible marking to identify the function and voltage of the system. Follow the identification systems or methods advised by the Owner.
- 7.7.2.2(10) Approved fire stopping will be installed and maintained at all fire separations and at any locations required by code or by the local inspection authority.

- 7.7.2.2(11) All circuits to be complete with insulated copper ground conductors, or insulated aluminum ground conductors if feeders are aluminum. Grounding conductors will be provided throughout the electrical system, in addition to mechanical bonding.
- 7.7.2.2(12) Branch circuits serving receptacles in Client areas, as well as circuits servicing dedicated loads (i.e. single pieces of equipment), will incorporate separate neutral conductors for each circuit.

7.7.3 Raceways

7.7.3.1 Basic Requirements

- 7.7.3.1(1) For the purpose of this specification, the word “raceway” will have the same meaning as defined in the Canadian Electrical Code, Section 0.
- 7.7.3.1(2) Raceways for wiring and cabling will be provided to support, protect and organize wiring and cabling systems throughout the Facility.
- 7.7.3.1(3) Raceways will be designed and installed in such a way to provide ease of access, capacity for expansion and change, which is consistent with the requirements of the equipment and systems that they serve.

7.7.3.2 Performance Criteria

- 7.7.3.2(1) Separate raceways or barriered raceways will be provided for cables and conductors of different voltages or system types.
- 7.7.3.2(2) Conduits, other than conduits dedicated to a single feeder or branch circuit, will have space for installation of a minimum of 30% additional capacity in future circuits. Cable trays or duct systems will have space for installation of a minimum of 50% additional capacity in future cables. Raceways for high voltage cables will have space provisions for an additional three phase feeder including any necessary neutrals or grounds.
- 7.7.3.2(3) Raceways will be planned to facilitate easy access to other systems and equipment, including but not limited to mechanical equipment, Facility systems access ways, and architectural Facility components which may require periodic inspection or maintenance.
- 7.7.3.2(4) Raceways will be designed and installed without sharp edges or sharp bends, must be a minimum of 10 times the radius, so that cables can be pulled in or laid in and removed without damage to the cables. Manufacturer’s maximum bend radii will be observed.

- 7.7.3.2(5) All metallic cable trays will be continuously bonded with a bonding conductor installed within the raceway. Conduit raceways to be metallic except when underground or in slab they are to be PVC. High voltage cable raceways external to the building are to be buried underground and encased in re-enforced concrete. High voltage cable raceways internal to the building to be rigid metal conduit.
- 7.7.3.2(6) Provide 2x78mm spare raceways/ducts from the main electrical room to all sub-electrical rooms (or set of stacked sub-electrical rooms, with 2x78mm conduit sleeves linking vertically adjacent rooms).
- 7.7.3.2(7) Install conduits or raceways to conserve ceiling heights.
- 7.7.3.2(8) Use rain tight connectors where conduits have top-entry connection to distribution equipment and are exposed to water ingress.
- 7.7.3.2(9) Run two spare 27 mm conduits to ceiling spaces from lighting panels for future use. Terminate in 150 x 150 x 100 mm junction boxes.
- 7.7.3.2(10) Electrical and communication conduits will not be embedded into concrete slabs and toppings, except where necessary to recess devices on in structural slabs (floor boxes, stairwell devices, etc.) or where embedment in concrete is used to provide required fire protection of electrical conductors for life safety services. The Design-Builder will ensure that the Record Drawings show the accurate location and routing (complete with dimensions) of all embedded electrical services.
- 7.7.3.2(11) Plated heavy-gauge wire mesh basket type tray will be utilized for data, telephone and systems cabling.
- 7.7.3.2(12) Provide minimum of two duplex receptacles with different circuits to each workstation including medication rooms and exam rooms. Maximum of three receptacles will be on one circuit. Receptacle with dedicate circuit will be provided to special equipment such as photocopier, printer etc.

7.7.4 Electrical Utilities

7.7.4.1 Basic Requirements

- 7.7.4.1(1) Ensure that the supply of electrical energy from private 12/25kV medium voltage distribution to the Facility will be designed and installed to meet the IEEE Standards listed in Section 7.8.1.
- 7.7.4.1(2) Ensure the arrangement of medium voltage power service to the Facility complies with applicable codes and standards.

7.7.4.2 Performance Criteria

- 7.7.4.2(1) Provide one medium voltage incoming service at 12/25kV (convertible) to the Facility from BC Housing's private medium voltage distribution system, and provision for second radial service in future. Extend two (2) existing 125mm ducts from site boundary to pull pit at unit substation in the Facility. Provide one 25kV load break switch with provision to add second switch in future. Size pull pit to service both current and future incoming switches. Provide service entrance cabling from BC Housing kiosk denoted SWGR 01 on site servicing plans, continuous (no splices) to incoming switch in unit sub. Power cable will be rated 25kV, 3 conductor 3/0 AWG + ground multi-conductor aluminum cable, XLP insulated, shielded and PVC jacketed, wet underground rated, with 133% insulation.
- 7.7.4.2(2) The capacity of the utility connections, cable and incoming switchgear, will, in the initial installation, allow for the initial demand load requirements plus 25% spare capacity.
- 7.7.4.2(3) Vulnerability of the electric service connections will be reduced by the mechanisms of burial, concrete encasement and location marking and other available means to guard against accidental disruption by on-site or near-site activities. Concrete encased duct bank for incoming services from private electrical distribution network to have a minimum of one spare 103mm duct for future. Concrete ductbanks will be reinforced with full cage reinforcing steel, supported above excavation trench during installation to permit full encasement of reinforcing steel.
- 7.7.4.2(4) The location of the switches, metering cabinets, and underground concrete duct banks will not interfere with any known future flexibility of the Facility.

7.7.5 Emergency Power

7.7.5.1 Basic Requirements

- 7.7.5.1(1) Provide diesel generator as a source of power to all essential areas and systems within the Facility, as well as discretionary areas and systems noted in Room Data Sheets.
- 7.7.5.1(2) Fuel system will comply with CSA B139 and ULC CAN4-S601.
- 7.7.5.1(3) Diesel generator supplied will comply with local noise by laws.

7.7.5.2 Performance Criteria

- 7.7.5.2(1) Emergency power system will provide automatic transfer between normal and emergency sources.
- 7.7.5.2(2) Generator will be fueled with commercial grades of diesel fuel oil readily available locally to ensure a continuous fuel supply as in the case of an extended power outage.
- 7.7.5.2(3) Fuel supply stored on Construction Site is to be in permanent double-wall storage tanks (possibly supplemented with day tanks) and will provide for continuous operation of the emergency power system at 80% rated load for a period of at least 36 hours. Buried or below-grade storage tanks will not be used.
- 7.7.5.2(4) Generator will be installed outdoors. The generator enclosure will be designed to NEMA 3R standards as a weather protective walk-in enclosure with an integral base and appropriately sized to accommodate the genset, fuel day tank, switchgear and associated equipment. Generator will be vibration isolated and muffled, and the enclosure will be fully insulated to provide adequate sound attenuation. The sound pressure level will average 65 dBA at 7m in a free field condition.
- 7.7.5.2(5) The generator enclosure will be robust, vandal-resistant, anti-climb, complete with two lockable metal access doors with panic release, drip edge and sloped top to prevent ponding.
- 7.7.5.2(6) The generator package will include:
 - 7.7.5.2(6)(a) engine-driven generator
 - 7.7.5.2(6)(b) cooling system
 - 7.7.5.2(6)(c) fuel supply and day tank storage system with Level 1 leak detection system
 - 7.7.5.2(6)(d) space heater, block heater, jacket water heater, anti-condensation heater
 - 7.7.5.2(6)(e) output breaker(s), monitored and alarmed
 - 7.7.5.2(6)(f) generator control and monitoring station
 - 7.7.5.2(6)(g) battery bank and charger
 - 7.7.5.2(6)(h) facility for load bank connection
 - 7.7.5.2(6)(i) station service panelboard

- 7.7.5.2(6)(j) lights and service receptacles
- 7.7.5.2(6)(k) manual pull stations and heat detector connected to Facility fire alarm system
- 7.7.5.2(6)(l) seismic restraint of items above.
- 7.7.5.2(7) Generator exhaust will be arranged to avoid exhaust gas re-entrainment to the Facility, through HVAC intakes, operable windows or doors. Exhaust piping and discharge will be located to prevent hazard to persons in or around the Facility.
- 7.7.5.2(8) Generator sets will undergo testing as per Tables 2 to 6 of CSA C282.
- 7.7.5.2(9) The automatic transfer switches will be closed-transition-transfer type to allow monthly testing under Facility load without disruption to electrical services. Closed transition transferring scheme will be approved by BC Hydro, and will perform in accordance with the local BC Hydro requirements. The automatic transfer switches will have dual-source bypass and isolation features to permit servicing the automatic transfer switch without interruption to the emergency loads.
- 7.7.5.2(10) The generator loads and alarms will be annunciated and recorded on an engine-mounted digital control system panel which will also be interfaced to the BMS.
- 7.7.5.2(11) A remote generator annunciator and start/stop control panel will be provided inside the Facility, located near transfer switches.
- 7.7.5.2(12) The generator will be sized for a minimum 100% of the total initial peak power demand of the emergency loads plus 25% spare capacity.
- 7.7.5.2(13) In addition to code requirements and provisions on Room Data Sheets, the following areas will be supplied with emergency power:
 - 7.7.5.2(13)(a) all telecommunication and server rooms including equipment in the telecommunications and server rooms;
 - 7.7.5.2(13)(b) HVAC supporting the telecommunications and server rooms;
 - 7.7.5.2(13)(c) fire alarm systems;
 - 7.7.5.2(13)(d) Uninterruptible Power Supply (UPS) systems;
 - 7.7.5.2(13)(e) emergency communications devices;
 - 7.7.5.2(13)(f) security / access control systems;

- 7.7.5.2(13)(g) egress lighting;
- 7.7.5.2(13)(h) staff stations in Client areas;
- 7.7.5.2(13)(i) security stations;
- 7.7.5.2(13)(j) alarmed freezers and coolers;
- 7.7.5.2(13)(k) DDC/BMS control systems;
- 7.7.5.2(13)(l) all elevators to be connected to emergency power. Generator to be sized to allow for the simultaneous operation of at least one elevator in each group; and
- 7.7.5.2(13)(m) mechanical equipment designated to be provided with generator backup. In addition to requirements noted elsewhere, this will include the complete heating system, ventilation system, domestic water systems (including hot water and recirc), heat tracing, sump pumps, telecommunications rooms cooling, elevator machine room cooling, any hardwired hand-free plumbing fixtures.
- 7.7.5.2(14) Where emergency power is needed to meet Program Requirements or to protect equipment from damage, it will be provided.
- 7.7.5.2(15) Uninterruptible Power Supplies (UPS) will be provided for all equipment that requires a continuous and uninterrupted source of power in accordance with the equipment list. All UPS units will automatically transfer the load to and from the emergency power supply without any interruption or disturbance of supply to the load.
- 7.7.5.2(16) A centralized 3-phase UPS system will be provided to serve all required equipment located in service rooms. This UPS will be double-conversion type with integral static bypass, sized for the connected load plus minimum 25% for future and configured with multiple modules to provide N+1 redundancy. The multi-module UPS system will be provided with an external 'wrap-around' maintenance bypass path to permit concurrent maintenance of the UPS modules or static bypass without interrupting power to the critical loads. Provide battery string monitoring. Centralized UPS system will be provided with the Ethernet communications port and UPS management software that will connect to Facility LAN. System will be monitored from remote location using LAN and web browser. Provide connection also to Facility DDC system for alarm monitoring.
- 7.7.5.2(17) The central UPS will feed local UPS panelboards in the areas that they serve. Provide 'A' and 'B' UPS panelboards (on separate feeders) to

supply two sources to all required equipment having dual power supplies. This arrangement is intended to permit service shut-downs of either 'A' or 'B' panelboards without necessary shut down of associated technology.

- 7.7.5.2(18) The central UPS will be located in a dedicated room or main electrical room, with manufacturer recommended clearances and level access to loading facilities (elevator travel acceptable) for battery and hardware replacements.
- 7.7.5.2(19) UPS units will be fed by circuits supported by an emergency generator and will be rated for a minimum of 30 minutes at full rated load.
- 7.7.5.2(20) Areas or equipment requiring UPS power will include but not be limited to:
 - 7.7.5.2(20)(a) server rooms;
 - 7.7.5.2(20)(b) computer network equipment;
 - 7.7.5.2(20)(c) telecommunication rooms;
 - 7.7.5.2(20)(d) Building Management System;
 - 7.7.5.2(20)(e) all communications systems such as intercom, duress, etc. and all parts thereof;
 - 7.7.5.2(20)(f) all security systems; and
 - 7.7.5.2(20)(g) lighting in secure room ante-rooms.

7.7.6 Transmission and Distribution

7.7.6.1 Basic Requirements

- 7.7.6.1(1) Electrical power of the voltage, current, and phase(s) required will be provided, from the main sources of supply, to each load requiring supply of power, and to convenience and special purpose outlets designed to meet all requirements of Facility operation and user and administrative functions.
- 7.7.6.1(2) Distribution equipment and feeder systems form the backbone of all electrical operation of the Facility. They will be robust, reliable, easily operated and maintained and will be designed with 25% extra capacity to accommodate load growth and equipment additions. The spare capacity for each distribution equipment and feeder will be proven through sizing calculations submitted during the design stage.

- 7.7.6.1(3) The Facility will include a customer-owned, dry-type indoor unit substation. The substation will include fused load-break switches on the primary and main LSIG breaker on the secondary. Entire substation installation (including equipment, room, access, pull-pit, etc.) will be designed to BC Hydro standards for primary services (even though BC Hydro does not provide service to this Facility).
- 7.7.6.1(4) The transmission and distribution systems will allow for future changes and additions.
- 7.7.6.1(5) Transmission and distribution equipment will be of a “specification grade” and “institutional” or “industrial” quality and not of a “light duty” or “commercial” quality.

7.7.6.2 Performance Criteria

- 7.7.6.2(1) Major electrical equipment, which includes but is not limited to transformers, main distribution centres, transfer switches, motor control centres, and power factor correction equipment will be grouped together in a configuration that allows for addition or expansion of each type of equipment, logical arrangement in terms of the interconnection, operation and maintenance of the equipment. The 600V main distribution will consist of fixed mounted type power-circuit breakers or draw-out type breakers.
- 7.7.6.2(2) Major electrical equipment (including panelboards) will be located in rooms dedicated to electrical equipment so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.
- 7.7.6.2(3) All components of transmission and distribution systems will be selected, configured, located, and installed so as to minimize the transmission of noise, vibration or unwanted heat into other parts of the Facility.
- 7.7.6.2(4) Protection and coordination of protection equipment will be designed and installed so that the initial electrical installation, and future additions and modifications to the installation will be protected and fully coordinated, meaning that in the event of a fault or overload, protective devices will act to isolate only the faulty portion of the system and areas downstream, leaving all other portions of the system fully operational. Protection equipment will adequately protect against injury to persons and damage to property. The 600V main switchgear will consist of breakers not fuses. All electrical power protection systems and fault withstand capacities will be fully rated, not series rated.

- 7.7.6.2(5) The Design-Builder will provide those engineering studies required by this Schedule 1 to the Owner for review prior to starting the installation.
- 7.7.6.2(6) Where required by system characteristics or operational requirements, special shielding, isolation, grounding, bonding, harmonic filtration or other treatment will be provided to prevent interference between systems or degradation of performance of an individual system. Provide harmonic filters on the line side to UPS system to limit the input current harmonic distortion (THD) to less than 5% of the full load fundamental current.
- 7.7.6.2(7) Provide minimum 20% extra space in distribution centres fully equipped to permit addition of circuit breakers in the future.
- 7.7.6.2(8) Components of the transmission and distribution systems which are in any public, user, administrative or staff area will be of a type which gives both long life expectancy without perceptible deterioration, and good appearance, and will be designed, selected and installed so as to permit cleaning. These components include but are not limited to light switches, receptacles, wire ways, equipment grounding points, and status displays.
- 7.7.6.2(9) Single phase 120VAC grounding receptacles conforming to CEC and specifically to CSA Configuration 5-15R are to be provided at each location where electrical equipment requiring a supply of normal or emergency power will be plug connected.
- 7.7.6.2(10) Housekeeping receptacles in corridors, and receptacles for multi-function copiers/printers, will be provided with CSA 5-20R device and fed from 20A circuit.
- 7.7.6.2(11) Locations of receptacles will comply with all applicable codes and standards. See Appendix 1C – Room Data Sheets for the minimum required for each functional area.
- 7.7.6.2(12) Receptacles in Client care areas will be extra heavy duty hospital grade and tamper-proof. Receptacles in all other areas will be specification grade. Residential grade and commercial grade (including commercial specification grade) receptacles will not be used. All receptacles will have stainless steel cover plates. Grouped receptacles will have a single cover plate covering the whole group. Receptacles on normal power circuits will be white, receptacles on emergency power circuits will be red, and receptacles on UPS circuits will be yellow with engraving to denote UPS source.

- 7.7.6.2(13) All receptacles in Client bedrooms will be fed with combination-type AFCI breakers located in the panelboard. Client rooms will have dedicated circuits for receptacles, not to be shared between rooms.
- 7.7.6.2(14) All receptacles will be permanently marked with lamicaid, or approved equivalent, labels identifying the circuit and panel number.
- 7.7.6.2(15) A complete enlarged as-built single line schematic diagram of the electrical distribution will be framed and wall mounted in the main electrical room.
- 7.7.6.2(16) Except for distribution equipment rated 240V or less which is fed from transformers less than 125kVa, all electrical distribution centres will bear arc flash hazard labels to NFPA 70E.

7.7.7 Metering

7.7.7.1 Basic Requirements

- 7.7.7.1(1) Digital pulse metering will be supplied to provide detailed information about power quality and power consumption at the following key points in the Facility:
 - 7.7.7.1(1)(a) incoming main secondary service;
 - 7.7.7.1(1)(b) input mains of each motor control centre, or distribution panel feeding mechanical equipment;
 - 7.7.7.1(1)(c) input of main 600V emergency switchboards;
 - 7.7.7.1(1)(d) output of each transfer switch; and
 - 7.7.7.1(1)(e) output of 3-phase UPS;
- 7.7.7.1(2) Metering at incoming secondary service mains will be “revenue grade” and certified by Measurement Canada.
- 7.7.7.1(3) The metering system will be a networked system, with terminals for maintenance and plant administration, and data transfer to the BMS.
- 7.7.7.1(4) Provide cubicle in unit substation to BC Hydro standards for secondary service metering (for possible future transfer of site distribution to BC Hydro).

7.7.7.2 Performance Criteria

- 7.7.7.2(1) The metering system will provide easily read locally displayed information for all distribution at primary voltage (if any) and for each secondary distribution switchboard.
- 7.7.7.2(2) Historical data from the metering system network will be stored and will be capable of generating user configurable electronic and printed reports on demand.
- 7.7.7.2(3) The metering system will not be dependent on power from the metered circuit for its operation, and will be supported by a backup power source or sources, which ensure operation when the metered circuit is de-energized.
- 7.7.7.2(4) 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 Current (all phases and neutral), KW, KVA, Power Factor, KWH, VAR hours.
- 7.7.7.2(5) The meters will be power quality type able to monitor harmonics and surges / sags.
- 7.7.7.2(6) The digital metering system will provide trend recording to allow staff to monitor peak demand periods, troubleshoot power disruption events and investigate power quality issues. Metering system will be set up to provide time stamped alarm and event logs which will be stored in non-volatile memory. Meter will have internal memory capable of minimum 30 days recording time.

7.7.8 Grounding and Bonding

7.7.8.1 Basic Requirements

- 7.7.8.1(1) All electrical equipment and systems in the Facility will be bonded and grounded to meet code requirements (including CSA Z32), IEEE guidelines.
- 7.7.8.1(2) Grounding and bonding will provide for safety of personnel and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems.
- 7.7.8.1(3) Client reference grounding will be provided in all Client areas classified as intermediate care.

7.7.8.2 Performance Criteria

- 7.7.8.2(1) All conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the Facility will be of non-alloyed copper or aluminum.
- 7.7.8.2(2) CSA listed irreversible grounding connections will be provided for permanent interconnections between building ground system, main ground bus and main distribution system.
- 7.7.8.2(3) Ground buses will be provided in all electrical rooms.
- 7.7.8.2(4) Telecom ground buses will be provided in all telecommunications rooms and closets. Size conductors and buses as per TIA and BICSI Telecommunications Distributions Methods Manual standards.
- 7.7.8.2(5) The electrical system will be a solidly grounded system.
- 7.7.8.2(6) Independent agency will provide Facility grounding system testing to confirm touch and step voltages comply with CEC table 52 minimum requirements.
- 7.7.8.2(7) Provide lightning protection study based on CAN/CSA B72. Where risk value is greater than 4, provide lightning protection system as required.

7.7.9 Seismic Requirements for Electrical Systems

7.7.9.1 Basic Requirements

- 7.7.9.1(1) Seismic restraint for all electrical equipment and components of electrical systems which are part of the Facility electrical systems in all parts of the Facility will be seismically restrained to prevent injury or hazard to persons and equipment, and to retain equipment in a safe position in the event of a seismic disaster.
- 7.7.9.1(2) Seismic restraint systems and methods will be selected to facilitate ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and Facility components.
- 7.7.9.1(3) Seismic restraint systems and methods will coordinate with the Facility architecture and finishes. Components of seismic restraints will be concealed from public view.
- 7.7.9.1(4) Seismic restraints will meet or exceed the requirements of the current edition of the BC Building Code.
- 7.7.9.1(5) Seismic restraint design will follow the recommended practices published in the Seismic Restrain Standards Manual (AIBC) as adopted

by the Electrical Contractors Association of BC and CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components.

7.7.9.2 Performance Criteria

- 7.7.9.2(1) Seismic restraint systems will be designed by a professional engineer registered in British Columbia.

7.7.10 Power Quality

7.7.10.1 Basic Requirements

- 7.7.10.1(1) An overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the Facility will be established.
- 7.7.10.1(2) A wide variety of electrical and electronic equipment types will be in use in the Facility. Equipment and systems which assure that the Design-Builder has used best practice to design electrical equipment and systems that 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 building are to be provided.
- 7.7.10.1(3) Power quality will meet or exceed the IEEE established standards for power quality, including but not limited to harmonic mitigating transformers, harmonic filters, surge protective devices (SPD's), etc., provided where deemed necessary by the Design-Builder and the following publications:
 - 7.7.10.1(3)(a) IEEE Standard 519 - Harmonics
 - 7.7.10.1(3)(b) IEEE Standard 1250 - Voltage Quality
 - 7.7.10.1(3)(c) IEEE Standard 1346 - Recommended Practice for Evaluation Electric Power System Compatibility with Electronic Process Equipment
- 7.7.10.1(4) Methods and equipment consistent with IEEE Standard 1159 - Monitoring Electric Power Quality will be provided by installing a built-in power quality meter at the incoming service. Power quality meters will be provided at all secondary distribution centres per 7.7.7. Prove that power quality meets or exceeds published standards.

7.7.10.2 Performance Criteria

- 7.7.10.2(1) The Facility is to include equipment specifically designed to control and remove all adverse power quality conditions that could damage or impair function of any of the electrical or electronic equipment, which will be in use in the Facility. Adverse power quality conditions to be addressed include but are not limited to voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference.
- 7.7.10.2(2) Demonstrate to the Owner during the commissioning phase that there are no potentially harmful power conditions present and that equipment intended to guard against such conditions is in proper working order.

7.7.11 Lighting

7.7.11.1 Basic Requirements

- 7.7.11.1(1) All luminaires will utilize LED sources, and will conform to IES LM-79 and LM-80 standards, maintain minimum 70% lumen output at 50,000 hours, minimum CRI of 80, R8 value of greater than 80, meet the following efficiency:
 - 7.7.11.1(1)(a) LED night light – less than 1W to have minimum 30 lumens per watt.
 - 7.7.11.1(1)(b) Linear LED luminaire or LED panel light – greater than 10W to have minimum 80 lumens per watt.
 - 7.7.11.1(1)(c) LED recessed downlight – greater than 10W to have minimum 70 lumens per watt.
- 7.7.11.1(2) All interior lighting will be fed from 120V circuits.
- 7.7.11.1(3) Lighting will optimize use of daylight and will be achieved through a combination of natural light and luminaires and controls.
- 7.7.11.1(4) Exterior and interior lighting will create a safe and secure environment for Clients and staff.
- 7.7.11.1(5) Lighting will comply with all characteristics recommended by the CSA Standard Z317.5-98 Illumination Systems in Health Care Facilities.
- 7.7.11.1(6) Lighting energy density will comply with ASHRAE Standard 90.1 and will exceed that standard by as much as possible with a targeted 10% reduction range while still meeting Program Requirements.
- 7.7.11.1(7) Lighting design will comply with the light pollution reduction requirements as outlined in LEED Rating System to eliminate light trespass from the Facility and Construction Site, optimize night sky

access and reduce development impact on nocturnal environment. Fixtures for exterior area lighting will be mounted at a height no more than 10m above the ground surface being illuminated. The light pollution reduction credit will be incorporated into the overall LEED application for this Facility.

7.7.11.2 Performance Criteria

- 7.7.11.2(1) Selection of luminaires and light sources will meet stated energy efficiency and quality and quantity requirements, but will also meet the objective of providing both a comfortable working environment and an environment conducive to healing and recovery.
- 7.7.11.2(2) Special task lighting designed for the types of procedures conducted will be provided for rooms and areas where treatment is provided, and rooms and areas where specialized analytical or diagnostic work is carried out.
- 7.7.11.2(3) Luminaires in all areas will be so constructed as to require minimal cleaning and will permit practical and easy access and disassembly. All lighting components will be institutional grade.
- 7.7.11.2(4) Lighting in areas where computer terminals and similar screens will be used will be specifically designed to eliminate glare and will meet or exceed the IES recommended cut off for visual display terminal luminaires.
- 7.7.11.2(5) Lighting in technology conference rooms and video conferencing facilities will maximize viewing of monitors and screens and will provide suitable illumination of people being viewed.
- 7.7.11.2(6) Exterior luminaires will be vandal resistant.
- 7.7.11.2(7) Use of battery-operated unit emergency lighting will be minimized, however battery-operated emergency lighting or an acceptable alternative will be provided as a second level of emergency lighting in areas such as nurse units, main electrical room, generator/ATS room, mechanical areas, and corridors in Neighbourhoods.
- 7.7.11.2(8) Lighting in main lobbies, waiting areas and the main entrances are features of the Facility and will be designed of aesthetically pleasing high quality products.

7.7.12 Lighting Standards

7.7.12.1 Offices

- 7.7.12.1(1) Recessed LED luminaires: 3500°K CRI 85.
- 7.7.12.1(2) Provide uniformly luminous luminaires.
- 7.7.12.1(3) Minimum of two lighting levels for general illumination with local off override switches.
- 7.7.12.1(4) Ideally, the ceiling luminaires will straddle the work stations to avoid reflected glare.
- 7.7.12.1(5) Controlled by occupancy / vacancy sensors, daylight harvesting and bi-level controls as per required by ASHRAE.

7.7.12.2 Lounges/Reception Areas

- 7.7.12.2(1) LED downlights/wallwash units.
- 7.7.12.2(2) Feature lighting used in combination with the above.
- 7.7.12.2(3) LED sources: 3500°K CRI 85.
- 7.7.12.2(4) Provide dimming or multiple switching to suit various functions (minimum of two).

7.7.12.3 Corridors

- 7.7.12.3(1) In Client, public and office corridors provide recessed linear lighting with feature down lights.
- 7.7.12.3(2) In back of house corridors provide recessed linear lighting / suspended luminaires.
- 7.7.12.3(3) LED source: 3500°K CRI 85.
- 7.7.12.3(4) Provide multiple switching to suit various functions (minimum of two).

7.7.12.4 Exits

- 7.7.12.4(1) All exit lights will utilize LED technology.
- 7.7.12.4(2) Edge lit in finished areas and metal in back of house.

7.7.12.5 Client Rooms – General

- 7.7.12.5(1) Recessed downlights to facilitate reading by Client laying on right or left side and not directly overhead.

- 7.7.12.5(2) Recessed downlights to provide general level of lighting throughout room.
- 7.7.12.5(3) Wall mounted sconce for low level lighting.
- 7.7.12.5(4) Amber night light in Client washroom.
- 7.7.12.5(5) Flush ceiling mounted vanity lighting in Client washroom.
- 7.7.12.5(6) Provide multiple switching to suit various functions.
- 7.7.12.5(7) Nighttime 'inspection light' with low output red source. This fixture is controlled by momentary contact switch located at 1700 AFF on corridor side of suite door. All inspection lights in a Client neighbourhood will be grouped on a dedicated circuit, with timer switch in nurse station. As nurse begins evening rounds, the timeswitch will be activated to permit 5/10/15 minutes use of the inspection lights.

7.7.13 Lighting Control

7.7.13.1 Basic Requirements

- 7.7.13.1(1) Lighting controls will comprise a significant part both of the energy management of the Facility and of the flexibility required to adjust lighting to suit functions and activities.
- 7.7.13.1(2) Lighting control will permit simple and integrated control of lighting. Controls will be easily operated and conveniently located for each area and function.
- 7.7.13.1(3) All of the lighting in a space will be capable of being switched at each entrance to the space unless specific local control from a location other than the door is required.
- 7.7.13.1(4) Integrate the lighting control with the BMS. The IP portion of the lighting control system will reside on the FM Network.
- 7.7.13.1(5) The BMS will control all public area lighting such as parking lots, walkways, roadways, exterior signage, stairs and corridors, lobby and other non-enclosed shared spaces. Exterior lighting will include a facility for photocell over-ride.
- 7.7.13.1(6) Staff will have the ability to control the lighting in their environment. Area lighting control and lighting control interface table (included in this section) will be followed as a minimum standard for control.

7.7.13.1(7) Occupancy sensors and daylight control systems will be utilized to maintain light levels at levels based upon the occupancy of the room and the quantity of daylight.

7.7.13.2 Performance Criteria

7.7.13.2(1) All lighting controls will be compliant with ASHRAE 90.1.

7.7.13.2(2) Corridor lighting controls will be located at the reception desks. Corridor lighting in Client Neighbourhoods will be arranged to permit approximately 10% level during unoccupied night mode (i.e. corridor vacant), approximately 30% occupied night mode, and 100% daytime mode. Provide occupancy sensors in corridor areas to switch between 10% and 30% mode at night. Corridor lights to be arranged to avoid direct light on Client room doors in both setback modes. All other corridors to have night setback to 30% based on time schedule.

7.7.13.2(3) Local controls will be capable of overriding the BMS night setback control.

7.7.13.2(4) All manually operated lighting controls will 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.

7.7.13.2(5) 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.

7.7.13.2(6) Lighting in open areas and common areas will be zoned and subdivided to permit energy management control and variation of light levels.

7.7.13.2(7) In rooms with videoconferencing, unless otherwise specified by the Owner, in the form of video conference specifications, provide multiple switching controls with at least one group of dimmed fixtures to reduce the lighting level throughout the room to less than 100 LUX. As a minimum, lighting in meeting rooms will support audio-visual systems functions, avoiding conflicts between lighting viewing quality of displays or projection screens.

7.7.13.2(8) Controls for all corridors and common use areas will be interfaced to the BMS to provide zone control of lighting. Zoning control to include floor by floor and department by department as a minimum and provide automatic night setback with sweep "off" per programmable time (i.e. 2 hours) throughout the night to turn off lights that may have been

manually turned on by staff via a local light control. Blink warning will be provided before scheduled "off" events, with local defeat feature.

- 7.7.13.2(9) Lighting control system will be interfaced to the BMS to permit controlled areas to override '100% on'. Lighting program will be established by the Owner and Design-Builder to address different conditions such as power outage and fire alarm.
- 7.7.13.2(10) Occupancy sensors will be provided in all housekeeping rooms, locker rooms, storage rooms, waiting areas, and washrooms. Occupancy sensors will be automatic on/off type.
- 7.7.13.2(11) Vacancy sensors, a subset of occupancy sensors, will be provided in all offices, conference rooms, exam rooms, and staff rooms. Vacancy sensors will be manual on/off, automatic off type.
- 7.7.13.2(12) Daylighting controls will be provided for all lighting in areas adjacent to exterior glazing per ASHRAE 90.1 and provide dimming to 10% of fixture output. Provide combination daylight harvesting and occupancy control to the rooms requiring occupancy sensors.
- 7.7.13.2(13) Daylighting will meet the following performance criteria:
 - 7.7.13.2(13)(a) Lighting within 5 meters of the daylight source will be controlled to maintain, at minimum, the IES recommended average illuminance across a representative portion of the task surface for that space type, using a combination of natural and artificial lighting;
 - 7.7.13.2(13)(b) Overhead lights within the space will be dimmed as low as possible (or turned off) while satisfying above criteria (a).
- 7.7.13.2(14) Occupancy sensors and daylighting controls will be integrated into the lighting control system and located on ceilings to avoid interference with furniture. Occupancy sensors will typically be dual technology type with other types to suit application.
- 7.7.13.2(15) Exterior lighting will be controlled via BMS and photocell.
- 7.7.13.2(16) Lighting control schedules will respond to individual departmental requirements and occupancy/use. Design to include a schedule of lighting control and be included in the design specifications.
- 7.7.13.2(17) Except in conference and meeting rooms, provide 10% lamp output dimming within all rooms designated to have dimming capability. In conference and meeting rooms, provide 1% dimming capability.
- 7.7.13.2(18) Multilevel lighting controls will be provided in all exam rooms.

7.7.13.2(19) Each lighting control panel will have programmable switches to allow relays which are 'soft wired' into groups to be controlled while retaining individual relay control. Master switches will be capable 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.

7.7.13.2(20) Area Lighting Control and Lighting Control Interface Table:

Requirements		
Room Type	Control Type	Interface Type
Sally Port	ML, OS	BMS
Bathing/Washroom (shared)	OS	
Client Room	DM, ML	
Client Ensuite washroom	MC	
Comfort Rooms	VS, DM	
Conference / Meeting Rooms	VS, DM, DL, ML	BMS
Dining Areas	VS, DM, DL, ML	BMS
Exam Room	VS, ML	
Exercise Room / Gym	VS, ML	BMS
Exterior Lighting / Courtyard	PC, TS, MC for courtyard at Nurse Station	BMS
Housekeeping / Utility Rooms	OS	
Work Areas / Nurse Station	ML, DL	BMS
Living Room	VS, DM	BMS
Locker Room	OS	
Open/shared Office	VS, DL, ML	BMS

Requirements		
Room Type	Control Type	Interface Type
Corridor	ML, OS in Client neighbourhoods	BMS, FA
Kitchen	MC	BMS
Multipurpose Rooms	VS, DM, ML	BMS
Roof level	PC, TS	BMS
Reception	MC, DL	BMS
Service Room (Elec, Comm, etc.)	MC	
Staff Room/Lounge	VS, DL, DM	
Storage	OS	
Waiting	OS, DL, MC at Reception Desk	BMS
7.7.13.2(21) Garage	ML, OS	BMS, FA

Control Type Legend:

BMS – Building Management System

DM – Dimming

DL – Daylighting (when room is adjacent to exterior glazing, per ASHRAE 90.1)

FA – Fire Alarm

MC – Manual Control

ML – Multilevel Control

OS – Occupancy Sensor

PC – Photocell

TS – Timer Switch

VS – Vacancy Sensor (Occupancy Sensor with Manual ‘On/Off’ switch)

7.7.14 Medical Equipment

7.7.14.1 Basic Requirements

- 7.7.14.1(1) Provide all electrical requirements for connection, operation and monitoring (where applicable) of any medical equipment noted in the Room Data Sheets or the Functional Program, including Owner supplied equipment.

7.7.14.2 Performance Criteria

- 7.7.14.2(1) Each item of equipment will be installed and electrically connected for proper and full operation.
- 7.7.14.2(2) Electrical characteristics of this equipment, including but not limited to voltage, wattage, phase, demand, inrush, frequency, connection method and control and monitoring requirements will be confirmed with the party supplying and provided for.
- 7.7.14.2(3) Space, access and ventilation requirements and other operation critical characteristics of this equipment will be provided for and outlets and connection points will be located correctly for installation and so as to permit proper and safe isolation for servicing and disconnection for removal or replacement.
- 7.7.14.2(4) Any motorized equipment is to be equipped with a local lockable disconnect switch, as required by the 2012 Canadian Electrical Code.

7.7.15 Mechanical Equipment Connections

7.7.15.1 Basic Requirements

- 7.7.15.1(1) Electrical power control and monitoring connections will be provided 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.

7.7.15.2 Performance Criteria

- 7.7.15.2(1) Cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment will be of institutional or industrial quality, and will be so selected and installed as to provide for high levels of reliability, durability and ease of maintenance of the equipment.
- 7.7.15.2(2) Connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration will be of a type specifically designed to accommodate the vibration.
- 7.7.15.2(3) Connections to mechanical equipment will be designed and installed to easily permit removal and replacement of the equipment and will provide for the eventuality that equipment may be replaced in the future with upgraded and dissimilar equipment types.
- 7.7.15.2(4) Motor control centres (MCC's) and mechanical distribution centres (MDC's) will be sized to accommodate the current mechanical equipment plus 50% of that amount in additional spare capacity.

- 7.7.15.2(5) MCC'S will be used when three 3-phase motors that require a starter are located within 50m of each other.
- 7.7.15.2(6) Provide labelling on MCC's and MDC's to match motors.
- 7.7.15.2(7) Provide wiring diagrams of each starter type.
- 7.7.15.2(8) Full size starters to be provided.
- 7.7.15.2(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.
- 7.7.15.2(10) Starters and MCC's to be indoor sprinkler-proof, type 2 enclosures.
- 7.7.15.2(11) Provide individual control transformers for each starter.
- 7.7.15.2(12) Provide power factor correction at each motor 10hp and above and at MCC's.
- 7.7.15.2(13) Starters or MCC's connected to emergency and normal power to be coloured to Owner's requirements.

7.7.16 Building Control Systems Interface

7.7.16.1 Basic Requirements

- 7.7.16.1(1) A fully functional building management system whose primary function will be to control the mechanical systems within the Facility will be provided by the mechanical division. The BMS will interface with building electrical and communication systems. This system is to be utilized to annunciate security alarms, freezer alarms, UPS, generator, transfer switch, and switchgear alarms, and control the Facility and Construction Site lighting via its software program.
- 7.7.16.1(2) The system is to be used for energy management functions as well as energy related data acquisition and trending. The digital meters monitoring the electrical power systems are to be connected to this system.
- 7.7.16.1(3) Building Control Systems utilizing IP based communications in part or in whole, will reside on the FM Network, separate from the Owner's network.

7.7.16.2 Performance Criteria

7.7.16.2(1) Refer to mechanical sections for details of the Building Management System.

7.7.16.2(2) Refer to Communications sections for details on the FM Network.

7.7.17 Specialty Systems

7.7.17.1 Basic Requirements

7.7.17.1(1) Special electrical and communications systems are required in the Facility and form essential parts of the complete Facility. Power supply, specially conditioned power and communication conduits and other electrical operational support equipment will be supplied and installed in order to provide for all the requirements of permanent installations of these special electrical and electronic systems.

7.7.17.2 Performance Criteria

7.7.17.2(1) Cables, connectors, conduit systems, fittings and hardware used to make connection to special equipment will be of institutional or industrial quality, and will be so selected and installed as to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.7.17.2(2) Connections to special equipment will be designed and installed to easily permit removal and replacement of the equipment and will provide for the eventuality that equipment may be replaced in the future with upgraded and dissimilar equipment types.

7.8 Communications & IT (Division 27)

7.8.1 General

7.8.1.1 Basic Requirements

7.8.1.1(1) All IT, communications and ESS equipment must be:

7.8.1.1(1)(a) new;

7.8.1.1(1)(b) procured through manufacturer-authorized distribution; and

7.8.1.1(1)(c) manufacturer supported and serviced in Canada.

7.8.1.1(2) The latest proven technology for transferring, securing, and storing information will be utilized by the Design-Builder. The Design-Builder will provide the most current technology and systems available at the time of Substantial Completion.

- 7.8.1.1(3) Communications and IT equipment provided will be the current production model that is fully supported by the manufacturer, with no known or manufacturer-published scheduled end of life date, 8 months prior to the Target Substantial Completion Date.
- 7.8.1.1(4) The Design-Builder will provide, at its expense, a 3rd party commissioning agent which will provide a commissioning report to the Design-Builder and the Owner to confirm the integration of the IT and communications systems.
- 7.8.1.1(5) The design and configuration of any portion of the IT network designed and/or installed by the Design-Builder will need to be approved by the Owner. Cable tests will be set up by the Design-Builder and witnessed and confirmed by the Owner.
- 7.8.1.1(6) Four months prior to the Target Substantial Completion Date, the Design-Builder will provide the Owner the schedule for providing Facility layout, design drawings as well as other information required for any work the Owner is required to perform as identified in this Schedule.
- 7.8.1.1(7) The Design-Builder will complete, at no expense to the Owner, any warranty work that is required on any portion of the IT and communications systems. The warranty period will be the greater of the vendor's warranty period or two years from the Substantial Completion Date.
- 7.8.1.1(8) Installed solution will meet or exceed the requirements of: applicable industry standards (TIA/EIA); Section 9 of SSBC Technical Standards for Offices issued Dec 17, 2014; and the requirements described in this Schedule and Appendix 1F Systems Network.
- 7.8.1.1(9) The Design-Builder will procure all software and user licenses required for the operation of the IT Systems. Licenses will include a 20% buffer for future flexibility. All licenses will be obtained in the name of the Owner.
- 7.8.1.2 Performance Criteria
- 7.8.1.2(1) The IT and communications systems will be proven technology, effectively used in other mental health facilities, easy to operate, and easy to maintain. The IT and communications systems' design will be flexible to accommodate changing operational requirements and will be scalable to accommodate growth throughout its useful life.
- 7.8.1.2(2) The Design-Builder will be responsible for training / educating all user / non-user staff on the proper use of IT equipment and systems that are

provided by the Design-Builder unless otherwise instructed by the Owner. Training will commence a minimum of one month before Substantial Completion.

- 7.8.1.2(3) The IT systems will be chosen because they are cost effective, provide efficiencies for staff and Clients, perform the necessary tasks to meet Owner requirements, are adaptable to change, flexible in implementation and are expandable to accommodate growth.
- 7.8.1.2(4) The Design-Builder will turn over the fully functional, fully tested and commissioned, including equipment installation, patching and finalized documentation, of all communications systems including structured cabling, telecommunications rooms and server room to the Owner at least eight weeks prior to Substantial Completion for exclusive use by the Owner.
- 7.8.1.2(5) The Design-Builder will need to grant access to the Owner to the telecommunication rooms and server room prior to the handoff described in Section 7.8.1.2(4) when requested by the Owner.
- 7.8.1.2(6) All IT and communications equipment will be connected to UPS and generator.
- 7.8.1.2(7) All ESS equipment will be connected to UPS and generator.

7.8.2 IT Network Design and Installation

7.8.2.1 Basic Requirements

- 7.8.2.1(1) The Facility will include the following separate and distinct IT networks: facilities management network (“**FM Network**”), Owner network (including wireless network) and ESS network. Any wireless communications technology employed by the FM network, BMS or ESS must not interfere with or degrade the Owner wireless network or each other.
- 7.8.2.1(2) The Owner will provide the Owner’s network.
- 7.8.2.1(3) The Design-Builder will provide the ESS network and FM Network. Refer to the Appendix 1F(xvii) - Technology Systems Responsibility Matrix.
- 7.8.2.1(4) The Design-Builder will design and configure the Electronic Security IT network.
- 7.8.2.1(5) The Design-Builder will provide a server rack for the Owner’s equipment.

- 7.8.2.1(6) The Design-Builder will provide the Owner with the design of all Facility, user and communications systems which the Design-Builder is designing and which are network connected or enabled. Integrate the technology systems in consultation with the Owner.
- 7.8.2.1(7) Refer to Appendix 1F(xv) - IMIT Systems Integration Matrix.
- 7.8.2.1(8) Determine the integrated functional and operational requirements in consultation with the Owner.

7.8.2.2 Performance Criteria

- 7.8.2.2(1) The Facility will include telecommunications and server rooms as required to service voice/video/data requirements of the Facility.
- 7.8.2.2(2) The Design-Builder will need to provide details of its designs which would include at minimum Facility layout and room configuration designs, MEP designs, designs of other systems which the Design-Builder is required to design and which are IP enabled, room locations and numbering and any other information deemed necessary by the Owner in order for the Owner to complete its required work with respect to the IT Systems.
- 7.8.2.2(3) The Design-Builder will design and construct the telecommunications rooms to meet environmental conditions as specified by Section 9 of the SSBC Technical Standards for Offices issued Dec 17, 2014 and the Owner during the Review Procedure. The Design-Builder will provide the Owner with the design of the telecommunications rooms and the server rooms for review.
- 7.8.2.2(4) All telecommunications rooms and server rooms will be constructed as restricted access rooms with access card entry. The Design-Builder will provide the Owner with 500 access cards.

7.8.3 Network Equipment

7.8.3.1 Basic Requirements

- 7.8.3.1(1) The Owner network equipment will be provided by the Owner. Refer to Appendix 1F(xvii) - Technology Systems Responsibility Matrix.
- 7.8.3.1(2) FM Network and ESS network will be provided by the Design-Builder.
- 7.8.3.1(3) The Design-Builder will provide sufficient racks of the type (2 post or 4 post) specified by the Owner for the Owner's IT network equipment in each telecommunications rooms and server room.

- 7.8.3.1(4) All telecommunications rooms and server room will be protected by the Design-Builder against water leakage and damage. The Design-Builder will submit plans in this regard to the Owner for review and approval.
- 7.8.3.1(5) The wired and wireless infrastructure will support the network end use equipment provided by the Owner and Design-Builder.
- 7.8.3.1(6) ESS Network:
- 7.8.3.1(6)(a) Provide fully redundant core switches, each located in separate telecommunications rooms. Core switches will be based upon the Cisco 6500 series, HP 5900AF, or equivalent.
 - 7.8.3.1(6)(b) Core switches will employ virtual switching and be configured so that in the event that one core switch fails, the remaining core switch can fully support the entire network without user intervention and with service degradation or interruption.
 - 7.8.3.1(6)(c) For each core switch, provide 2N redundant power supplies, and sufficient modules with fibre uplinks supporting at minimum 10 Gbps for all telecommunications rooms.
 - 7.8.3.1(6)(d) Provide access layer switches that will support real time applications such as video conferencing, VoIP, IP Video Surveillance cameras.
 - 7.8.3.1(6)(e) Access layer switches will: be layer 3 or higher; have redundant power supplies; have PoE+ (30 watts) on all ports to support all connected PoE devices; and have 50% spare PoE power budget on each switch stack in each telecommunications room.
 - 7.8.3.1(6)(f) Multiple switches in telecommunications rooms will be stacked and support management of the entire stack as one virtual switch. Provide all necessary stacking and management modules and cables.
 - 7.8.3.1(6)(g) Access layer switches will be Cisco 3800 series, HP 2900 or equivalent.
 - 7.8.3.1(6)(h) Provide Checkpoint 1100 series, or current supported model, firewall to facilitate secure integration between the ESS network and the Owner network. Configure the firewall in consultation with the Owner IT representative, including whether the connectivity occurs at the core layer or the access layer
- 7.8.3.1(7) All network equipment will be connected to the Facility based UPS managed central power supply and generator.

- 7.8.3.1(8) Provide an additional 20% spare, unused switch (access and core) ports in each telecommunications room.

7.8.3.2 Performance Criteria

- 7.8.3.2(1) The Design-Builder will work with the local telecommunications company co to install the wide area network connections to the Facility.
- 7.8.3.2(2) All devices will employ QoS.
- 7.8.3.2(3) ESS network will employ VLANs, subnets, QoS, bandwidth management to achieve and maintain optimal network performance.
- 7.8.3.2(4) ESS network security will employ strong endpoint user authentication compliant with IEEE 802.1x.
- 7.8.3.2(5) Provide network intrusion detection and intrusion prevention (IDS/IPS) capable of detecting, preventing, logging and alerting of all network security attacks. Ensure to train Owner representative on the configuration and operation of the IDS/IPS.
- 7.8.3.2(6) Provide DHCP server with DHCP scope reservations to authenticate all IP devices on the ESS network. DHCP Server will be appliance based. Software based and switch embedded DHCP servers are not acceptable.
- 7.8.3.2(7) Develop a comprehensive Network Threat and Risk Assessment (NTRA) of the ESS network, identifying all foreseeable threats, critical points of failure, risk of failure, resulting mitigation and contingencies and incorporate into the network design. For each foreseeable threat, identify: risk of occurrence, impact of occurrence, mitigating measure(s) and contingency measures. Submit draft a NTRA at Design Development - 60% complete stage and a final NTRA at the Pre-Tender - 90% complete phase.
- 7.8.3.2(8) ESS network design will employ mitigating measures all foreseeable threats identified in the NTRA;
- 7.8.3.2(9) Develop a comprehensive disaster recovery plan (DRP) for the ESS network. The DRP will include contingency plans on how to recover from failures should the threats identified in the NTRA occur.

7.8.4 Structured Cabling

7.8.4.1 Basic Requirements

- 7.8.4.1(1) Provide a structured cabling system capable of supporting all data, voice, video and security services throughout the Facility.
- 7.8.4.1(2) The cabling infrastructure will be designed by Design- Builder by a Registered Certified Data Designer (RCDD) or professional engineer and will be to the latest TIA / EIA standards.

7.8.4.2 Performance Criteria

- 7.8.4.2(1) All cables will terminate in telecommunications rooms sized in accordance with the TIA / EIA 569 standard.
- 7.8.4.2(2) Provide the following rooms:
 - 7.8.4.2(2)(a) two communications entrance facility rooms;
 - 7.8.4.2(2)(b) two main telecommunications rooms;
 - 7.8.4.2(2)(c) sub telecommunications rooms. Quantity of rooms will be dependent on Facility layout.
- 7.8.4.2(3) Main telecommunications rooms will have space for one server cabinet in addition to required communications racks and will act as the server rooms. Provide additional rack(s) as necessary in the primary main telecommunications room to house the ESS servers.
- 7.8.4.2(4) Refer to Appendix 1F – System Network for minimum room dimensions, layouts and additional requirements.
- 7.8.4.2(5) Except for the parkade levels, telecommunication rooms will serve the floor they are on and will be placed to maximize the area they serve. The rooms will be located away from sources of water. Communications outlets in the parkade levels may be routed to the telecommunications room on the same level or on the immediately adjacent level.
- 7.8.4.2(6) Telecommunications rooms will be stacked vertically and located next to a permanent structural wall but will not share a wall with an elevator.
- 7.8.4.2(7) Provide a primary and physically diverse secondary pathway riser connecting the main telecommunications rooms to all telecommunications rooms and entrance facilities. Primary and secondary pathway risers will each consist of a minimum of four 4” conduits. Maintain minimum 20 meters separation between the primary and secondary pathway risers; between the primary and secondary entrance facilities; and between the primary and secondary main telecommunications rooms..

- 7.8.4.2(8) Telecommunications rooms on the same floor will be connected with cable tray or with minimum of three 3" conduit ducts.
- 7.8.4.2(9) Each entrance facility room will be connected with minimum three 4" conduit ducts to communications service provider man holes outside the Facility and with minimum three 3" conduit ducts to each main telecommunications rooms. Locate entrance facility rooms in north-south diverse locations and separated by at least 20m. Route conduit ducts in north-south diverse routes. Connect service provider infrastructure junction box or manhole to the main entrance facility room, the secondary entrance facility room will be stubbed into a clearly labeled pull box outside the Facility near the Site boundary line.
- 7.8.4.2(9)(a) Each entrance facility room will be a minimum of 2M x 3M complete with one 2 post rack for service provider equipment. The secondary redundant entrance facility room for the future redundant service connection may be combined with the electrical room provided there is space for one 2 post rack with minimum 1.5M service clearance at the rear of the rack, and 1M service clearance at the front and one side of the rack.
- 7.8.4.2(10) All telecommunications rooms will be fed by the facility critical UPS, with a back-up emergency power generator. Power distribution in communication rooms will have separate redundant A and B branches for increased reliability. A and B branches will be maintained upstream to the main UPS distribution centre. Vertical power strips (match twist locking receptacles to overhead power modules and receptacles) within the cabinets and racks in the Telecommunications rooms will be plugged into both the A and B power circuits; all equipment with redundant power supplies will plug into both the A and B power circuits.
- 7.8.4.2(11) Unless noted otherwise, Telecommunications rooms will contain only Communications and Electronic equipment and will not contain any equipment (electrical, mechanical or otherwise) that is not directly related to supporting the communications or electronic security systems.
- 7.8.4.2(12) Telecommunications rooms will not act as a pathway for ducts or piping not related to communications systems.
- 7.8.4.2(13) All HVAC equipment serving telecommunications rooms will be rated for 24/7 operation and will be powered by generator in the event of a power brown out or outage. Ambient temperature will be maintained within the range of 18°C to 23°C. Relative humidity (RH) will be maintained between 35% and 55%. Provide HVAC sufficient to maintain ambient temperature and RH ranges in the TRs based on 5 KW heat load per

cabinet and 3 KW heat load per rack, including future racks and cabinets.

7.8.4.2(14) Communications Racks and Cabinets:

- 7.8.4.2(14)(a) Server cabinets housing servers or computers for the communications systems or electronic security systems will be a minimum of 24" wide x 42" deep and have a minimum of 44 rack units useable.
- 7.8.4.2(14)(b) Equipment cabinets housing data switches will be 30" wide x 36" deep and will have a minimum of 44 rack units useable; The cabinets will be collocation type with 2 lockable doors at the front of cabinet and 2 lockable doors at the back. Keys for upper and lower doors will be different.
- 7.8.4.2(14)(c) All cabinets will have solid, lockable side panels, lockable perforated front and rear doors, and vertical wire management on both sides of each equipment cabinet.
- 7.8.4.2(14)(d) All active equipment cabinets will have top of rack fans.
- 7.8.4.2(14)(e) Two-post relay racks will be used only for patch panels that support workstation voice and data horizontal cabling, and security field device cabling.
- 7.8.4.2(14)(f) Provide a minimum of 150mm wide vertical wire management on each side of each two-post rack. Provide a single 300mm wide vertical wire management between two-post racks where multiple two-post racks are ganged together.
- 7.8.4.2(14)(g) Provide primary and redundant secondary 120V/20A power strips for each rack and cabinet. Primary power strips will be mounted on the left side and secondary power strips mounted to the right side of each rack.
- 7.8.4.2(14)(h) Provide primary and redundant secondary 208V/20A power strips for each rack and cabinet. Primary power strips will be mounted on the left side and secondary power strips mounted to the right side of each rack.
- 7.8.4.2(14)(i) Connect primary power strips to A-power circuits and secondary power strips to B-power circuits.
- 7.8.4.2(14)(j) Provide a minimum of two racks for horizontal cabling and 1 switch cabinet for each telecommunications room.

- 7.8.4.2(15) Communications cabling will be installed in cable trays and/or in conduits. Cable trays will be wiremesh type with minimum size 18"x 4". The conduits, pathways, room layouts, and design will comply with the TIA / EIA-569 Commercial Building Standard for Telecommunications Pathway and Spaces, latest edition and will be reviewed and approved by the Owner.
- 7.8.4.2(16) The cabling design and installation will comply with the TIA / EIA – 568C family of Commercial Building Cabling Standards and Optical Fibre Cabling Standards.
- 7.8.4.2(17) Testing of the fibre optic cable will meet the TIA / EIA 526-7, and TIA / EIA 526- 14 standards for Optical Power Loss measurement of single mode and multimode fibre cable plant.
- 7.8.4.2(18) The management and administration of the cabling plant will be done in accordance with the TIA / EIA 606 standard – the Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- 7.8.4.2(19) The grounding of the conduit pathways and components is to meet the TIA / EIA 607 Standard – Commercial Building Grounding and Bonding Requirements for Telecommunication.
- 7.8.4.2(20) Cable types will be unshielded twisted pair, coaxial and fibre optic multimode and single mode. The bandwidth requirements and distance limitations will determine the type of cable installed.
- 7.8.4.2(21) At minimum, a 24 Strand OM4 Multi-Mode fiber will be provided from two main telecommunications rooms to each sub telecommunications room and to entrance facility rooms. In addition, provide single mode fiber cables to entrance facility room. Refer to Appendix 1F(x) – Data Fibre Backbone Diagram.
- 7.8.4.2(22) Copper voice backbone will consist of multi-pair Category 3 cables between main telecommunications room and all other telecommunications rooms. Refer to Appendix 1F- Systems Network.
- 7.8.4.2(23) Copper data backbone will consist of minimum two Category 6A cables from two main telecommunications rooms to each sub telecommunications room and to entrance facility rooms. Refer to Appendix 1F(xi) – Voice Cat 3 Backbone Diagram.
- 7.8.4.2(24) Provide QR540 hardshell coaxial cable between main telecommunications room and all other telecommunications rooms for

CATV backbone. Refer to Appendix 1F(xii) – Data Copper Backbone Diagram.

- 7.8.4.2(25) All components for fiber and Category 6A cable plant will be of the same manufacturer and will be supplied by one of the recognized industry leaders. The system will be installed by a data contractor who is certified by the manufacturer consistent with the manufacturer's best warranty.
- 7.8.4.2(26) Standard density RJ45 patch panels will be used for all copper terminations in the communication telecommunications rooms. The Design-Builder will terminate fibre cabling on patch panels in telecommunication rooms with connector type as directed by the Owner.
- 7.8.4.2(27) The Design-Builder to provide and install a complete category 6A structured cabling solution throughout the building. If a category better than category 6A is the latest standard at the time of ordering, it will be presented by the Design-Builder to the Owner to determine if the Owner wants to utilize the latest standard.
- 7.8.4.2(28) A star wired cabling approach will be utilized to wire all outlet locations back to telecommunications rooms and all telecommunications rooms to the server room.
- 7.8.4.2(29) All rooms that have or are anticipated to have data, phone, fax, computer, video, or other end-use devices will have a cable system drop for each anticipated piece of equipment that will run to the appropriate telecommunications room. Horizontal cabling will be Category 6A and will be suitable to accommodate Owner IT equipment without differentiating on the type of end-use device. Cable jacket will be blue color. Maximum cable distance from a telecommunications room to the building perimeter of the areas serviced by that telecommunications room will not exceed 85M.
- 7.8.4.2(30) The Design-Builder will provide cable for all public phones, allowing for a minimum of two public phones per main lobby.
- 7.8.4.2(31) Data ports will be installed at same height as adjacent electrical receptacle, except where floor located data ports are specified (such as for video conferencing equipment) or unless otherwise identified by the Owner. The location of each data drop will be identified by the Owner
- 7.8.4.2(32) In addition, the Design-Builder will provide an additional 20% drop count over and above those prescribed and locate these additional drops as directed by the Owner.

- 7.8.4.2(33) All IT Systems conduit pathways and cable trays will have maximum 40% fill.
- 7.8.4.2(34) All telecommunications rooms will have spare capacity as recommended by TIA / EIA – 568C family of Commercial Building Cabling Standards and Optical Fibre Cabling Standards. All cabling will be run in conduit or cable tray. J-hooks may be used only in locations approved by the Owner for use.
- 7.8.4.2(35) Fibre optic cabling will be utilized to connect telecommunications rooms to the server room. Multimode and singlemode fibre will be provided with type depending on equipment requirements.
- 7.8.4.2(36) Note that fibre optic cabling may also be required to be provided by the Design-Builder in rooms requiring video streaming, in digital operating rooms and areas where bandwidth requirements necessitate. The Owner will provide information on these requirements during design.
- 7.8.4.2(37) All data will be pulled, end to end terminated, tested and labeled. This must be complete at least eight weeks prior to the Target Substantial Completion Date. The Owner will provide the labelling method and requirements. The appropriate flame spread rating will be provided by the Design-Builder for the cabling system.
- 7.8.4.2(38) All cable labeling will be implemented by the Design-Builder and provided to the Owner for confirmation.
- 7.8.4.2(39) Unless noted otherwise, the Design-Builder will terminate all horizontal cables on patch panel in the telecommunications room with proper labeling as outlined in 7.9.4.2(12).
- 7.8.4.2(40) The Design-Builder will provide data and power cables for all end-use devices in sufficient quantity to make each device operational plus 10% spare of the length and quality specified by the Owner. The Owner will specify the length of cables required for procurement by the Design-Builder.
- 7.8.4.2(41) The Design-Builder will provide patch cables in sufficient quantity, based on Owner network design and Owner approval, plus 10% spare. Patch cable will allow complete connection from end to end. The Design-Builder will patch from the patch panel to the applicable network switch using short patch method as defined by the Owner.
- 7.8.4.2(42) If self-registration systems, electronic directional systems and Client education kiosks are to be provided in reception areas during construction or planned to be provided at some time in the future, the

Design-Builder will provide floor data outlets and floor power to connect these floor mounted systems.

- 7.8.4.2(43) The Design-Builder will ensure that specialized systems requiring multiple drops will have sufficient drops at each location to ensure system operation. The Owner will provide the specific location and requirements for these specialized system data drops.
- 7.8.4.2(44) The Design-Builder should ensure that all patch cables and end use device cables should be dressed and concealed, to a standard approved by the Owner.
- 7.8.4.2(45) At a minimum there must be one duplex power drop beside every data drop unless otherwise specified by the Owner for video conference or other IT facilities.

7.8.5 Wireless Infrastructure

7.8.5.1 Basic Requirements

- 7.8.5.1(1) Provide infrastructure to support the wireless network coverage with a signal strength of -65dB or better throughout the Facility with support for 1.5 devices per occupant in each space, including outdoor staff or Client occupied space.
- 7.8.5.1(2) Owner wireless network equipment, including wireless access points and wireless controller, will be provided by the Owner. Refer to Appendix 1F – Systems Network.
- 7.8.5.1(3) Not used.
- 7.8.5.1(4) Infrastructure (conduit and cable plant) to support the wireless networks will be provided by the Design-Builder.
- 7.8.5.1(5) Design-Builder will provide a comprehensive predictive study of the Owner wireless network. and provide a strategy on avoidance of interference between the separate wireless networks.

7.8.5.2 Performance Criteria

- 7.8.5.2(1) The predictive study will, as a minimum, include predictive simulations showing: wireless access point locations; and signal coverage, signal strength and SNR heat maps. Predictive study will demonstrate compliance with the performance requirements prescribed herein. Simulation model will have realistic input parameters representing the actual building construction, including: wall types, (e.g. wiremesh, concrete with rebar, concrete block etc.); columns; doorways; windows

and glazing; metal lockers and any other materials affecting radio frequency signal propagation in order to yield the most realistic model and simulation possible.

- 7.8.5.2(2) For the purpose of the wireless predictive study, assume Cisco AP3702i wireless access points employing IEEE 802.11ac standards operating at 5GHz.
- 7.8.5.2(3) The Design-Builder will provide infrastructure to support a wireless network throughout the Facility, with no dead spots, allowing any standard network applications or telephone applications to utilize the wireless network.
- 7.8.5.2(4) The wireless staff communications system will connect to the Owner wireless network. Refer to Appendix 1F – Systems Network.
- 7.8.5.2(5) Installation of UTP cables and termination equipment required for the proposed Wireless LAN will be provided by the communications wiring system contractor and will conform to the standards set forth in the specifications. All cables to be tested/certified and will match or exceed industry specs. Results of tests to be submitted to the Owner after completion of cable installation.
- 7.8.5.2(6) All access points and wireless components will be seismically supported.
- 7.8.5.2(7) The Owner may require a wireless metro network and to support this, the Design-Builder must provide a structured cabling system that will connect the wireless Metro roof top access points to the nearest communication rooms using 52 mm conduit. The Design-Builder will follow the cabling standard for the wireless access point cabling.
- 7.8.5.2(8) The Design-Builder will construct a specific roof box for the conduit and cable for the wireless antennae. Conduit will include weatherhead, gooseneck or termination box with cover plate.
- 7.8.5.2(9) The Design-Builder will provide a structure on the roof to which a wireless antenna can be mounted.
- 7.8.5.2(10) The Design-Builder will evaluate solutions for lightning strikes impacting all rooftop communication towers.
- 7.8.5.2(11) Design-Builder to include a conduit (minimum 35mm) from the exterior antennae to a location inside the Facility for future extension to a Facility distribution panel for possible cell site use in future.

7.8.6 Wireless Staff Communication Systems

7.8.6.1 Basic Requirements

- 7.8.6.1(1) The wireless staff communication system will be required to function throughout the entire Facility and cannot be used as a primary life safety system (for example fire alarm, etc.). The Design-Builder will ensure network connectivity between all devices meets vendors' recommended specifications for latency requirements and quality of service.
- 7.8.6.1(2) The wireless staff communication system will be Vocera communications system or equivalent.
- 7.8.6.1(3) The Design-Builder will provide a wireless staff communication system that will integrate with the Owner telephony system and the Owner network via the Owner wireless network. Refer to Appendix 1F – Systems Network.
- 7.8.6.1(4) The Design-Builder will ensure that the wireless staff communication system will meet the IEEE 802.11a, b, g, and n standards and allow sufficient bandwidth to display user data.
- 7.8.6.1(5) Wireless data security encryption techniques are to be employed by the system in compliance with IEEE 802.11i.

7.8.6.2 Performance Criteria

- 7.8.6.2(1) The Design-Builder will provide a complete wireless staff communication system that will allow staff to place calls from wireless handheld devices and initiate a two-way voice conversation.
- 7.8.6.2(2) The wireless communication system will tie into the head end CPU and application server, and consist of antennae base stations, line cards, and software and wireless handheld devices. Antennae base stations are to be located in concealed areas throughout the Facility to provide full coverage with no dead spots.
- 7.8.6.2(3) The wireless communications system server will include application software for full programming as well as gateway software to integrate at minimum with the Owner-provided IP telephony system.
- 7.8.6.2(4) The Design-Builder will procure all software and user licenses for the system. All licenses will be procured in the name of the Owner.
- 7.8.6.2(5) Wireless handheld devices will automatically log onto system with no manual activation required.
- 7.8.6.2(6) All wireless handheld communication devices will be capable of making an external call.

- 7.8.6.2(7) The Design-Builder will coordinate with the Owner for proper programming and initialization of wireless staff communication system devices.
- 7.8.6.2(8) In consultation with the Owner, the Design-Builder will determine programming requirements such as phone groups, personal profiles, extensions, long distance access, dialing plan, text messaging, web access, email access, encryption requirements and fully program system. Prior to implementation, the Design-Builder will provide the Owner the schedule for meeting with the Owner.
- 7.8.6.2(9) Provide 150 wireless staff communications system badges; 2 batteries for each device; and ten 8-bay battery chargers including the necessary mounting and wearable accessories to allow staff to properly utilize them in their day to day operation. Fully charged battery will have a minimum of 8 hours of talk time and the necessary power supplies will be provided by the Design-Builder for use by the wireless staff communications system battery chargers.
- 7.8.6.2(10) The Design-Builder will procure and install in consultation with the Owner, a wireless communications system telephony server.
- 7.8.6.2(11) The wireless communications system telephony server will be located in the main telecommunications room along with applications servers. The server will be connected to a Facility based UPS that will provide a minimum of 30 minutes of continuous power.
- 7.8.6.2(12) The Design-Builder will provide all user training prior to "Go Live" (the date that the system will be turned over to the Owner for use) at date and times that are agreed upon by the Design-Builder and the Owner. The Design-Builder will need to ensure all vendors provide user training on vendor equipment prior to Substantial Completion.
- 7.8.6.2(13) All equipment and materials must be sourced through an authorized Canadian distributor by an authorized dealer of the product. After installation, materials for service must also be readily available from more than one Canadian dealer.

7.8.7 Telephony

7.8.7.1 Basic Requirements

- 7.8.7.1(1) The Design-Builder will provide all infrastructure necessary to fully support VoIP telephony including all required cabling, racks, pathways and spaces.

- 7.8.7.1(2) The Owner will provide an IP based telephone system.
- 7.8.7.1(3) Consult with the Owner to coordinate the installation of the IP telephony solution.
- 7.8.7.1(4) Refer to Appendix 1F(xvii) Technology Systems Responsibility Matrix.

7.8.8 Public Address

7.8.8.1 Basic Requirements

- 7.8.8.1(1) The paging system will connect to the telephone system allowing any telephone to page in the Facility.
- 7.8.8.1(2) The paging system will be part of the fire alarm system including monitored lines and speakers.

7.8.8.2 Performance Criteria

- 7.8.8.2(1) Provide all necessary components including, but not limited to amplifiers, mixers, speakers, zone paging modules, telephone interface modules, microphones, and other devices for a fully complete and operational overhead paging throughout the Facility.
 - 7.8.8.2(1)(a) Provide complete speaker coverage of the Facility so that emergency pages can be heard everywhere in the Facility with high intelligibility and low loss of articulation of consonants (%ALCONS).
 - 7.8.8.2(1)(b) The paging system will be a constant voltage system with speakers placed to cover all areas and provide at minimum 60 dB in all areas of the Facility. Amplifiers to be sized to drive all speakers in each zone plus 20% additional spare capacity for future growth. The mixers will accommodate all inputs and provide the required signal to the amplifiers and speakers.
- 7.8.8.2(2) In addition to the zones required by BC Building Code for the fire alarm system, provide additional PA system zones to allow paging into individual departments. Develop the paging zones and units zone groups in consultation with the Owner. It is necessary to drive different inputs into each department. Auxiliary audio inputs will be overridden when paging takes place. Each zone to be accessible by telephone to allow department paging or Facility wide paging. A page in one department will be isolated to that department.
- 7.8.8.2(3) Develop public address system call functionality in consultation with the Owner.

- 7.8.8.2(4) Speakers will be recessed in ceiling and come complete with speaker back box avoiding any ligature points.
- 7.8.8.2(5) Paging sound levels will be at least 15 dB above ambient noise levels in mechanical rooms and similar locations.
- 7.8.8.2(6) Paging speakers are not required within Client rooms and offices. Audibility into such rooms will be accomplished by placement of speakers near door openings.
- 7.8.8.2(7) Amplifiers to be distributed such that the failure of one set of amplifiers does not cause the entire system to malfunction.
- 7.8.8.2(8) Telephone access to paging will be less than 2 seconds from the time the telephone dials to the time the message is sent over the speakers.

7.8.9 Audio Visual (AV)

7.8.9.1 Basic Requirements

- 7.8.9.1(1) Provide a complete and fully operational AV system for each of the following spaces:
 - 7.8.9.1(1)(a) Entrance and Meeting Facility: 01.08 Meeting Room, Small; 01.09 Meeting Room, Medium; 01.12 Computer Training Lab
 - 7.8.9.1(1)(b) Maples Administration: 03-17 Meeting Room;
 - 7.8.9.1(1)(c) PAC: 02.16 Meeting Room
- 7.8.9.1(2) For each room requiring AV systems, provide the following:
 - 7.8.9.1(2)(a) Inputs:
 - (a).1 Provide in-table AV inputs, each with autosensing HDMI, VGA, and discrete audio input. HDMI and VGA will be autosensing and autoswitching; Provide ONE in-table input boxes for every 4 seating positions or portion thereof, c/w power and communication outlet in each table box;
 - (a).2 Input (audio and video) from local Owner computer.
 - (a).3 In-table AV boxes will be fed from a floor box below the table. Coordinate exact locations and integration with the table with the Owner.
 - 7.8.9.1(2)(b) Outputs:

- (b).1 Provide minimum 70 inch, interactive multi-touch LCD display with 1920x1080 resolution;
- (b).2 Provide dual 70-inch LCD displays for rooms requiring video conferencing;
- (b).3 Wall mount the display on the end wall away from the door at a height that is suitable for comfortable viewing from a sitting position based on the room design, dimensions and site line analysis;
- (b).4 Provide in-wall seismic backing for all display mounts;
- (b).5 In the spaces where the 70 inch display is too small to display 16-point font and have it legible from the farthest position in the room the display device will be projector and screen:
- (b).6 Projector will have a minimum of 3500 ANSI lumen light output, 1920x1080 resolution, 16:9 aspect ratio, and will be ceiling mounted; Projector screen will be motorized, flush mounted into the ceiling and min 120" diagonal in size, 16:9 aspect ratio to match the aspect ratio of the projector; c/w post tension suspension screen frame. Screen functions up, down and stop will be controlled by the AV control system as well as backup wall mounted up/down/stop push button control that is connected directly to the screen motor control inputs;
- (b).7 Provide ceiling mounted high fidelity speakers for playback of content audio; Audio signal will be capable of producing a maximum intelligible signal level of 85dBA sound pressure level at a plane 1.5M above the floor.

7.8.9.1(2)(c) AV switching and control system:

- (c).1 Provide audio/video switch and amplifier with adequate input and output ports to accommodate required inputs; c/w with HDCP and EDID minder; c/w video distribution amplifier where there is a local DVMS or VV computer so that computer display and LCD display or projector are showing the same cloned content;
- (c).2 A push-button control panel will be wall mounted near the door and will provide system on/off, volume control, screen control (where projector/screen installed) and input selection;
- (c).3 Integrate control system with: projection screen to lower and raise with system down and up; with LCD display for on/off, and input selection on display based on system input selection.

7.8.9.1(2)(d) Infrastructure Requirements:

- (d).1 Provide conduit to house all cabling. Conduits will be routed in walls, ceilings and floors and will not be visible;
- (d).2 Provide all power and communications cabling and outlets to support the AV systems;
- (d).3 No wiring will be visible.

7.8.9.1(3) Lighting will be designed conducive to AV presentation systems with dimming fixtures and controllability to turn off the fixtures near the display to avoid glare or reflections on the display surface.

7.8.9.1(4) Without limiting the above, provide screen and display sizes so that the ratio of the screen or display height to distance to the farthest viewer will not be less than 0.17.

7.8.10 Video Conferencing

7.8.10.1 Basic Requirements

7.8.10.1(1) Provide a complete and fully operational video conferencing system comprised of the audio visual system described in Section 7.8.9 and the video conferencing solution and equipment described in this section. Provide such video conferencing system for the following spaces:

7.8.10.1(1)(a) Entrance and Meeting Facility: 01.10 Meeting Room, Large;

7.8.10.1(1)(b) Maples Administration: 03-16 Boardroom;

7.8.10.1(1)(c) Maples Connect, BIFROST, and Outreach Programs: 04.18-01 Video Conference Room; 04.18-02 Video Conference Room;

7.8.10.1(1)(d) PAC: 02.15 Boardroom/Clinical Meeting Room.

7.8.10.1(2) The video conferencing systems will be IP-based and communicate using industry standard video conferencing communications protocol (proprietary communications protocols are not permitted).

7.8.10.1(3) Provide a complete and fully operational touch screen AV control solution.

7.8.10.1(4) Video conferencing systems will use the structured cabling system and will be integrated with the Owner's data network.

7.8.10.1(5) The Owner will provide the configuration of the security settings to allow video conferencing and teleconferencing traffic to leave the Facility and deployment of QoS of video- and tele- conferencing network traffic.

7.8.10.1(6) Video conferencing solutions will be connected to the Owner data network.

7.8.10.2 Performance Criteria

7.8.10.2(1) Provide audio and video systems and equipment as described in the Section 7.8.10.

7.8.10.2(2) Provide minimum 1080p full HD PTZ video conferencing camera;

7.8.10.2(3) Video conferencing system CODEC will:

7.8.10.2(3)(a) be IP-based and communicate using industry standard H.323 video conferencing communications protocol;

7.8.10.2(3)(b) have teleconferencing card complete with both analogue and SIP ports;

7.8.10.2(3)(c) will be compatible, including SIP ports, with Microsoft Unified Communications platform, including MS Skype for Business, and Cisco switches;

7.8.10.2(3)(d) have licensing for operating at full HD (1080p) resolution and allow 4-way multipoint operation; and

7.8.10.2(3)(e) employ automatic bandwidth management including adjustment of video resolution and/or compression in order to maintain required audio quality.

7.8.10.2(4) Video conferencing will operate as video with audio and as audio only conferencing and will have analogue and SIP communications ports;

7.8.10.2(5) Provide audio DSP (digital signal processor) to process audio signals. Employ echo cancellation on all microphone inputs;

7.8.10.2(6) Video conferencing system will allow users to select any AV input to be shared in addition to the display of the near and far end video;

7.8.10.2(7) Provide ceiling mounted condenser microphones in the quantity and arrangement necessary to pickup all participants in the room for intelligible audio-only or video with audio conferencing;

7.8.10.2(8) Provide digital video matrix for dual screen use;

7.8.10.2(9) Provide a unified touch screen AV control solution complete with a GUI that is customized to the space and AV system functionality in the space the AV control solution is being installed.

- 7.8.10.2(10) GUI will be developed in consultation with the Owner and will be activity driven. Provide a minimum of 3 activities: "AV Presentation" mode, "Video-Conference" mode, and "Tele-conference" mode. Confirm all required activities during system design and allow for a minimum of 3 GUI review submissions.
- 7.8.10.2(11) Video conferencing system audio and video quality will:
- 7.8.10.2(11)(a) have voice quality comparable to that offered on circuit- switched voice networks;
 - 7.8.10.2(11)(b) employ an IP network that complies with the current, at time of Service Commencement, ITU-T G.114 standards, including the requirement for a one-way delay budget of not more than 150 ms for high voice quality;
 - 7.8.10.2(11)(c) employ a DSP (digital signal processor) with a jitter buffer; and
 - 7.8.10.2(11)(d) be compliant with current, at time of Substantial Completion, ITU-T G.165 for echo cancellation.
- 7.8.10.2(12) Video and audio quality will meet or exceed the ITU-T standards with a MOS score of 4.0 or greater and be suitable for evidentiary purposes.
- 7.8.10.2(13) The Design-Builder will meet with the Owner to determine exact specifications of equipment, room configuration, set up, and commissioning.
- 7.8.10.2(14) The Design-Builder will provide training for Facility staff of all videoconferencing and audio visual equipment unless otherwise specified by the Owner. The training will commence at least one month prior to Substantial Completion.

7.8.11 Central Dictation

7.8.11.1 Basic Requirements

- 7.8.11.1(1) The Owner will provide a central dictation system. All telephones in the Facility will be programmed by the Owner to access the dictation system.

7.8.11.2 Performance Criteria

- 7.8.11.2(1) All telephones will allow staff the ability to dictate onto the central dictation systems. An access code will be needed to access the dictation system.

7.8.12 Intercommunication System

7.8.12.1 Basic Requirements

- 7.8.12.1(1) Provide complete and fully operational intercommunication and video intercommunication systems including all required components.
- 7.8.12.1(2) Internal communication systems within departments are an important part of ensuring user staff can deliver and receive timely information.
- 7.8.12.1(3) Local Video Intercom systems are required at locked entrance doors that require controlled access for materials delivery and passage of persons (public, Clients, staff, etc.).
- 7.8.12.1(4) Intercom will connect to telephone system to allow for call-forwarding to nearest manned staffed reception area in event the entrance location personnel are not available.
- 7.8.12.1(5) The local intercom systems will be manufactured by recognized industry leaders in the intercom business.

7.8.12.2 Performance Criteria

- 7.8.12.2(1) A video intercom system will be provided at all entrance locations to the Facility, departments and units.
- 7.8.12.2(2) The Design-Builder will provide local intercom systems at all locations requiring public delivery access. The system will be capable of remotely unlocking the door.
- 7.8.12.2(3) A camera will view the face of anyone using any outside entrance door intercom station. Additionally, the area beside and behind the call originator will be viewable to the operator for duress mitigation.
- 7.8.12.2(4) Intercommunication will be provided between elevators and central elevator controller and switchboard/help desk/ call centre.
- 7.8.12.2(5) Stations will be of the following types:
 - 7.8.12.2(5)(a) desk mounted;
 - 7.8.12.2(5)(b) wall mounted; and,
 - 7.8.12.2(5)(c) flush mounted.
- 7.8.12.2(6) System as provided by the manufacturers will include the following:

- 7.8.12.2(6)(a) supply and installation of control equipment including auxiliary power supplies;
 - 7.8.12.2(6)(b) supply and installation of all system equipment and devices
 - 7.8.12.2(6)(c) supply and installation of all wiring required for complete system operation;
 - 7.8.12.2(6)(d) all required device set-up and system programming, testing and verification including all user selectable functions set up to Owner's desired settings. Review settings with Owner prior to implementation;
 - 7.8.12.2(6)(e) complete layout, wiring and installation diagrams for overall system design, updated to "as built" condition at the Design-Builder's completion and incorporated into maintenance manual;
 - 7.8.12.2(6)(f) complete instruction to Owner on system operation;
 - 7.8.12.2(6)(g) technical data on each product, including finishes;
 - 7.8.12.2(6)(h) description of system operation;
 - 7.8.12.2(6)(i) riser diagrams and system data;
 - 7.8.12.2(6)(j) equipment design considerations for future flexibility when indicated;
 - 7.8.12.2(6)(k) materials list and backbox schedule (including unique backboxes); and
 - 7.8.12.2(6)(l) factory prepared operation and service manual for each system, operation details, schematics, wiring diagrams, colour coding, terminal numbers, and component values for printed circuit board
- 7.8.12.2(7) System Verification
- 7.8.12.2(7)(a) Test and demonstrate the operation of the complete system to the Owner. This will include, but not be limited to:
 - (a).1 Detailed test and demonstration of each operable device
 - (a).2 Detailed test and demonstration of overall system operation
 - (a).3 Interfacing of various components.

7.8.13 CATV (Community Access Television) Distribution System

7.8.13.1 Basic Requirements

- 7.8.13.1(1) Provide CATV service distribution system including backbone and horizontal cabling, amplifiers, splitters, taps, terminators and other head end equipment that is required for a fully operational distribution system.
- 7.8.13.1(2) Provide CATV outlets in reception areas, waiting areas, TV rooms and other areas as per the Room Data Sheets. The service infrastructure is to include both CATV (coaxial cable) and Ethernet (Category 6A) to each location.
- 7.8.13.1(3) Provide plywood wall backing at all CATV outlet locations.
- 7.8.13.1(4) The Owner will provide end use devices such as televisions including mounting brackets.

7.8.13.2 Performance Criteria

- 7.8.13.2(1) Performance of signals for each VHF and UHF channel, at each CATV outlet, will be free from ringing, ghosting, noise, changes in colour hue, cross channel inter-modulation, RF beats, and hum modulation.
- 7.8.13.2(2) Minimum signal available at output of any CATV outlet will be 10 dBmV and not exceed 15 dBmV across the complete frequency range. Signals will also meet local CATV service provider requirements (e.g. Shaw and Telus TV).
- 7.8.13.2(3) Signal on any specific channel measured at any television receptacle in the CATV system will be within 6 dB of the same signal measured at any other CATV receptacle in the CATV system
- 7.8.13.2(4) There will be a minimum RF isolation between the receivers attached to the CATV system of 18 dB. CATV System as installed will be capable of distributing future VHF channels and will have minimum frequency band pass capability of 5 to 1000 MHz.
- 7.8.13.2(5) Provide bidirectional digital signal capable amplifiers as required to maintain signal quality.
- 7.8.13.2(6) System will be capable of accepting and distributing both data via Ethernet and video via internal RF TV distribution network for display on any TV. Outlets will contain both Ethernet and CATV receptacles.

7.8.14 Client/Staff Education System

7.8.14.1 Basic Requirements

7.8.14.1(1) The Owner will provide Client/staff education systems.

7.8.15 Emergency Intercom Stations

7.8.15.1 Basic Requirements

7.8.15.1(1) Provide wired IP-based emergency audio intercom stations in all parking areas.

7.8.15.1(2) The stations will be placed in well-lit areas and at all parking area entrances, and spaced such that no parking stall may be more than a maximum of 30m from a duress station and a maximum of 10m from the parking area edge.

7.8.15.2 Performance Criteria

7.8.15.2(1) Emergency intercom station will have a single red HELP button to place emergency calls to preprogrammed telephone number(s). Communications will be hands-free.

7.8.15.2(2) Pressing of the HELP button will be also registered by the security system and alarm will be generated at the security desk and at an off-site SafeLink motoring station.

7.8.15.2(3) Provide blue beacon/strobe light above each intercom station. The beacon light will be illuminated at all times. The strobe light will flash only when the Emergency Intercom Station HELP button is pressed.

7.8.15.2(4) The stations will have heavy-duty vandal proof construction and removal of the cover will be monitored with a tamper switch.

7.8.15.2(5) Activation of the HELP button will initiate the nearest one or more PTZ Cameras to zoom in on the button location and increase record rate and quality as well as notify the security desk.

7.8.16 Responsibility Matrix

7.8.16.1 The Design-Builder will comply with the responsibility matrix set out in Appendix 1F(xvii) – Technology Systems Responsibility Matrix.

7.8.17 DAS Distributed Antennae System (DAS) Infrastructure

7.8.17.1 The Design-Builder will provide power and conduit infrastructure to support a DAS solution.

7.8.17.2 As a minimum, provide 4 inch conduit from the main entrance of the Facility to one of the main telecommunications rooms, and extend one 4 inch conduit

from such main telecommunications room to each sub telecommunication room.

- 7.8.17.3 Extend one 2 inch conduit to the roof from the telecommunication room closest to the roof.
- 7.8.17.4 Clearly label both ends of all DAS infrastructure conduits and junction or pull boxes as "DAS".

7.9 Electronic Safety and Security – ESS (Division 28)

7.9.1 Fire Alarm

7.9.1.1 Basic Requirements

7.9.1.1(1) The fire alarm system will be designed, installed and verified to meet the latest applicable versions of the following standards.

7.9.1.1(1)(a) CAN / ULC S524-14 Standard for installation of Fire Alarm Systems

7.9.1.1(1)(b) CAN/ULC S537-13 Verification of Fire Alarm Systems

7.9.1.1(1)(c) Elevator Code CSA B44-13

7.9.1.1(2) In addition to the Facility wide audio and visual fire alarm indications, the fire alarm system will annunciate the approximate fire location on the in use wireless staff communications devices and on the Facility management system.

7.9.1.1(3) The system will utilize the latest proven technology available at the time of installation.

7.9.1.2 Performance Criteria

7.9.1.2(1) Provide a fully addressable, two stage computer based fire alarm system throughout the Facility.

7.9.1.2(2) A fire command centre will be provided at the fire department response point, but separated from shared public space. The command centre will include a fire alarm control panel, a fire alarm graphic annunciator panel, voice communications / paging facilities, an elevator status/control panel, elevator communications phone, maglock reset/controls.

- 7.9.1.2(3) Smoke and heat detectors will be individually field programmable and include multiple elements for earliest detection, individually adjustable for ambient environmental conditions.
- 7.9.1.2(4) Audible annunciation will be a zoned overhead fire alarm speaker system. Audible alert levels will be 15dBA above ambient with minimum of 75dBA and be audible in every room in the Facility.
- 7.9.1.2(5) Emergency paging will be accessible via microphone at the fire command centre. Separate speaker zone switches will be provided to allow paging to be routed on a per department / per floor / per stairwell basis. Switch for all call paging will also be provided.
- 7.9.1.2(6) Train staff on operation of system and incorporate fire plan in training to alert staff to policy and procedures in case of fire alarm and safe gathering points in case of evacuation.
- 7.9.1.2(7) Visual annunciation will be via graphic annunciator at fire command centre and local LCD room annunciators provided at all care (nursing) stations, security desk, and main control reception areas.
- 7.9.1.2(8) All alarms, trouble signals and other information will be enunciated at the security office location.
- 7.9.1.2(9) The system will include pre-programmed voice messaging to automatically audibly announce the location of the alarm.
- 7.9.1.2(10) After installation is complete the system will be verified in accordance with CAN/ULC-S537 and report submitted.
- 7.9.1.2(11) Fire alarm circuits to be wired in Class A configuration.

7.9.2 Access Control

7.9.2.1 Basic Requirements

- 7.9.2.1(1) Provide a complete and fully operational access control system. Integrate the access control system to other ESS sub systems for alarm aggregation and annunciation to the access control system GUI. Provide data drops where required for all end use devices that may be IP connected or enabled.
- 7.9.2.1(2) System GUI will have graphical mapping which is able to show site, building(s), floors, rooms and all electronic devices located inside those spaces as active icons which allow for audit and interaction with device in real time from workstation.

- 7.9.2.1(3) Determine security needs with the Owner. Supply 500 access cards including programming, and all software and equipment required to register and program the cards or user enrollment. Additional access cards will be the responsibility of the Owner. Access credentials will be 26-bit Corporate 1000, or others as directed by the Owner.
- 7.9.2.1(4) Location of all security devices and monitoring requirements to be identified.
- 7.9.2.1(5) All electronic locking hardware to be provided by Division 8.
- 7.9.2.1(6) All alarm annunciation requirements will be determined in consultation with the Owner and available for view on graphical mapping. As a starting point, provide alarm handling as per Appendix 1F(xvi) – Alarm Handling Matrix] and revise as necessary based on consultation with the Owner.
- 7.9.2.1(7) All security systems will use the structured cabling system and reside on the ESS Network to provide the capability for the Owner to review and monitor these systems from off-site locations.
- 7.9.2.1(8) Provide a GPS-based NTP time server that is not dependent on an Internet connection to obtain its time sync. Synchronize all communications and security systems with the time server to ensure the systems all share the same time for evidentiary purposes.
- 7.9.2.1(9) Provide training for Owner staff on the use, operation, and administration of the system. All training will occur prior to Substantial Completion.
- 7.9.2.1(10) All systems to be the latest proven technology supplied by industry leading manufacturers in the security industry at the time of construction. The software and supported hardware will not be exclusive to a single local dealer. Installation and service of the system will be available from at least three local (Lower Mainland) independently owned companies with manufacturer trained and certified technicians on staff and residing in Lower Mainland.
- 7.9.2.1(11) Systems will be interconnected to the fire alarm system to release doors for exit, where required.
- 7.9.2.1(12) Installed systems will meet or exceed the requirements of the SSBC Security System Specifications 2012 and the requirements described in this Schedule.

- 7.9.2.1(13) System software and hardware to be non-proprietary and available in the Province of BC to multiple vendors.
- 7.9.2.1(14) In addition to spaces identified in the Room Data Sheets requiring card readers, areas for installation of card access to be included, but not limited to:
 - 7.9.2.1(14)(a) kitchen
 - 7.9.2.1(14)(b) temporary holding
 - 7.9.2.1(14)(c) security vestibule
 - 7.9.2.1(14)(d) storage/records
 - 7.9.2.1(14)(e) laundry
 - 7.9.2.1(14)(f) nursing station
 - 7.9.2.1(14)(g) medication room
 - 7.9.2.1(14)(h) seclusion and ante rooms
 - 7.9.2.1(14)(i) reception
 - 7.9.2.1(14)(j) medical shared office
 - 7.9.2.1(14)(k) secure visitor waiting area
 - 7.9.2.1(14)(l) psychologist testing room
 - 7.9.2.1(14)(m) physicians', recreational programs and program coordinators' offices
 - 7.9.2.1(14)(n) living unit
 - 7.9.2.1(14)(o) staff stations
 - 7.9.2.1(14)(p) as well refer to door matrix and door hardware types

7.9.2.2 Performance Criteria

- 7.9.2.2(1) Design, provide, install and program the security systems in consultation with the Owner.
- 7.9.2.2(2) Provide card access control at all exterior entrances, stairwells, elevators (inside each cab and at each elevator lobby), departmental entrances, telecommunications rooms, seclusion rooms and at other

doors and as per the Room Data Sheets and Appendix 1F(xiv) – Circulation Spaces – IMIT Systems. Access Control Readers will be proximity type with allowance for optional reader-keypad combination units or keypad only.

- 7.9.2.2(3) The access control system will be PC based, contain an integral photo identification card system, and have sufficient capacity to handle at minimum 10,000 regional employees down to the field panel level, can grant or restrict access to employees via a programmable classification system, and run over a standard TCP/IP Ethernet network.
- 7.9.2.2(4) Access control server to be programmed to perform weekly backup which will be saved to a storage location remotely located from the server PC.
- 7.9.2.2(5) Access control panels to operate in non-degraded mode of operation in event of server connection failure and maintain no less than 20,000 events which will be appended to main server upon reconnection. Panels to be remotely firmware upgradeable.
- 7.9.2.2(6) Access control system will be capable of “locking down” (or unlocking) doors or groups of doors from graphical maps, events or physical inputs.
- 7.9.2.2(7) The system will utilize a central file server. Alarms will be annunciated on computer workstation at nurse stations and a main security desk. Provide a minimum of ten workstations complete with the option of web-stations and mobile applications. Security measures such as encryption, user authentication and SSL will be implemented with any such remote access. Default routing of alarms will be as per Appendix 1F(xvi) – Alarm Handling Matrix. System will have the ability for Owner staff to select secondary alarm routing locations should the unit or Client Care Station be un-manned (e.g. at night).
- 7.9.2.2(8) Routing of alarms to workstations will be based on monitored areas and may change throughout the day. The system will be able to reroute alarms on demand to another workstation based on staffing requirements.
- 7.9.2.2(9) Alarms will be also routed to wireless communication devices (wireless communications system) based on staffing requirements.
- 7.9.2.2(10) Standard of Acceptance: Kantech.
- 7.9.2.2(11) All Electronic Security Systems will be connected to UPS and emergency generator.

7.9.3 Intrusion Detection

7.9.3.1 Basic Requirements

- 7.9.3.1(1) Provide a complete and fully operational intrusion detection and alarm system. The system will directly monitor intrusion alarm devices, client assist initiation devices, emergency intercom stations, hardwired staff panic/duress initiation devices, and wireless staff duress alarms.
- 7.9.3.1(2) Intrusion detection systems will be separate from, but integrated with, the access control system for alarm annunciation. Integrate the intrusion alarm system with the wireless staff duress system to annunciate hardwired staff duress alarms to the wireless staff duress system alarm display. Integrate the intrusion alarm system with the wireless communications system to annunciate alarms to wireless communication system portable devices.
- 7.9.3.1(3) In addition to spaces identified in the Room Data Sheets requiring intrusion detection, areas for installation of intrusion alarm include, but not limited to:
- 7.9.3.1(3)(a) arts and crafts and equipment storage rooms;
 - 7.9.3.1(3)(b) exercise and fitness and recreation rooms;
 - 7.9.3.1(3)(c) multipurpose area;
 - 7.9.3.1(3)(d) client rooms;
 - 7.9.3.1(3)(e) special care, seclusion and ante rooms;
 - 7.9.3.1(3)(f) reception areas;
 - 7.9.3.1(3)(g) staff and retreat rooms;
 - 7.9.3.1(3)(h) program admissions meeting rooms;
 - 7.9.3.1(3)(i) living rooms;
 - 7.9.3.1(3)(j) workshop; and,
 - 7.9.3.1(3)(k) shipping and receiving.

7.9.3.2 Performance Criteria

- 7.9.3.2(1) The intrusion detection system will utilize industry proven devices for intrusion detection. These devices include motion detectors, magnetic door contacts, glass breakage detectors, and duress buttons.

- 7.9.3.2(2) Intrusion alarm system will have at least 599 zones and 32 partitions.
- 7.9.3.2(3) Alarms will be annunciated locally by sirens and keypads, at the main security desk and off-site at a SafeLink monitoring station.
- 7.9.3.2(4) In addition to annunciating to the alarm keypads, alarms will annunciate on graphical map GUI displays associated to the access control software as independent zones.
- 7.9.3.2(5) The software and supported hardware will not be exclusive to a single local dealer. Installation and service of the system will be available from at least three local (Lower Mainland) independently owned companies with manufacturer trained and certified technicians on staff and residing in Lower Mainland.
- 7.9.3.2(6) The intrusion alarm panels will have a built-in analog phone line digital communicator for remote zone alarm and system status monitoring, Communication format must be directly compatible with SafeLink central station receiver.
- 7.9.3.2(7) Provide all hardware to facilitate telephone line plus either Internet or GSM alarm communications of each intrusion alarm panel installed with an off-site SafeLink monitoring station. The selection of communication methods will be at the discretion of the Owner.
- 7.9.3.2(8) System software and hardware to be non-proprietary and available in the Province of BC to multiple vendors.
- 7.9.3.2(9) Standard of Acceptance: Bosch or DSC, no alternatives.

7.9.4 Video Surveillance

7.9.4.1 Basic Requirements

- 7.9.4.1(1) Areas which have video surveillance cameras installed will have signage posted at all public entrances and walkways to notify the public that the area is under video surveillance.
- 7.9.4.1(2) Video surveillance processes will be governed by the Public Surveillance System Privacy Guidelines for the province of BC as well as the *Freedom of Information and Protection of Privacy Act*.
- 7.9.4.1(3) System(s) will be a software-based virtual matrix residing on the ESS Network and using the structured cable plant for transmission of live and recorded images.

- 7.9.4.1(4) Design the ESS network in consultation with the Owner and submit finalized proposed design containing all components of the surveillance system to the Owner for review and input in advance of installation.
- 7.9.4.1(5) Standard of Acceptance: Avigilon or approved equivalent to meet specified requirements.
- 7.9.4.1(6) System software and hardware to be non-proprietary and available and serviceable in the Province of BC to multiple vendors.
- 7.9.4.1(7) In addition to spaces identified in the Room Data Sheets requiring video surveillance, areas for installation of surveillance cameras include, but not limited to:
 - 7.9.4.1(7)(a) main lobby and waiting areas;
 - 7.9.4.1(7)(b) arts and crafts and music rooms;
 - 7.9.4.1(7)(c) exercise, games and TV rooms;
 - 7.9.4.1(7)(d) dining areas and living rooms;
 - 7.9.4.1(7)(e) multipurpose and learning rooms;
 - 7.9.4.1(7)(f) secure visitor area;
 - 7.9.4.1(7)(g) Aboriginal programs room;
 - 7.9.4.1(7)(h) fitness rooms, exercise areas and ping pong alcove;
 - 7.9.4.1(7)(i) elevators; and
 - 7.9.4.1(7)(j) secure vehicle Sally Port.

7.9.4.2 Performance Criteria

- 7.9.4.2(1) The system must be able to record clear images of individuals, which would allow distinction of gender, ethnicity and age category. System will provide recorded images of sufficient quality to be used as court evidence in Canada.
- 7.9.4.2(2) Cameras will not be placed or reviewed for the purpose of observing work performance of employees.
- 7.9.4.2(3) Viewing monitor will have a visible range from 200mm to 450mm, depending on location and application and will be 24 inch or larger, 1920x1080 resolution, LED back or ledge lit, IPS ultrathin bezel type. Additionally, provide 2 minimum 30-inch LED flat panel IPS displays

with 2560x1600 resolution for the ESS workstation at the main security desk. Refer to Appendix 1F(ii) [ESS Overview].

- 7.9.4.2(4) Provide video surveillance system video monitors for department staff to locally monitor cameras associated with the general activity outside the main entrance to the area and adjoining waiting areas.
- 7.9.4.2(5) Provide digital PC based network video recorder (NVR) or Digital Video Management System (DVMS) complete with software that controls all parameters of each individual camera, pan tilt zoom functionality, frame by frame recording, pre and post alarm recording, motion detection, sequence switching, multiplexing, adjustable frame speeds, and will record all cameras 24-hours per day, 7 days a week. Recording rate will be 15 fps at all times. All cameras will be IP addressable. At a minimum, the system will include super-dynamic digital cameras. Software to be the latest version available at time of installation and upgraded through course of construction to the point of handover to Owner.
- 7.9.4.2(6) Provide video storage capacity for minimum of 30 days at frame rates as indicated above, no more than 10% compression and minimum D1 resolution. Provide NVR's, workstations and connect to network. System will have the ability to choose recording rates and quality for each camera, have activity detection and incorporate smart search capabilities.
- 7.9.4.2(7) Camera image will be native 16:9 aspect ratio with quality requirements depending on mounting location and application; As a minimum, provide as follows:
 - 7.9.4.2(7)(a) Detection at perimeter of Facility is to detect and record on any change within the camera field of view. A human target is to be represented by 9% of the vertical height of the picture in a 16:9 format.
 - 7.9.4.2(7)(b) Classification at the physical facility exterior allows the viewer to differentiate between a human and any other moving pixel array. A human target is to be represented by 17% of the vertical height of the picture in a 16:9 format.
 - 7.9.4.2(7)(c) Assessment inside the Facility, lounge areas and parking areas allows the viewer to observe behavioral characteristics of a human. A human target is to be represented by 26% of the vertical height of the picture in a 16:9 format.

- 7.9.4.2(7)(d) Recognition inside the Facility, lounge areas and parking areas allows the viewer to be able to recognize facial expressions and details including race, colour and gender. The human head is to be singularly represented by 22% of the vertical height of the picture in a 16:9 format.
- 7.9.4.2(8) All IP cameras are to be remotely field firmware upgradable as new versions are made available.
- 7.9.4.2(9) Video surveillance system will integrate with access control, duress panic stations, intercoms and intrusion detection to allow for higher recording rates during alarm conditions. Cameras to be displayed as active icons on the Access Control GUI to allow for “click-to-view” from map.
- 7.9.4.2(10) Video surveillance display and review system will be network based application providing the capability for authorized users to remotely view, control and manage all aspects of the video surveillance system across the network. System will be capable to have network and web access for remote monitoring, using predefined user authentication. Security measures such as encryption, user authentication and SSL to be implemented with any such remote access.
- 7.9.4.2(11) Surveillance system will not reside on the Owner network but have controlled connectivity to it.
- 7.9.4.2(12) The video surveillance system will be capable of separating access to live and recorded video by user group.
- 7.9.4.2(13) The video surveillance system will have the ability to mask areas in both live and recorded video.
- 7.9.4.2(14) Display and review for all the cameras will be accessible through dual screen workstations located in the security office/kiosk. Provide video surveillance workstations with all required operating and application software, monitors, keyboard, mouse with interconnection to security system network. Operator log-in will be configurable to allow or restrict permissions such as export, review and live view of each camera. Log-in will be configured specific to each user to allow a GUI configuration specific to each user’s operational requirements.
- 7.9.4.2(15) Provide color high-resolution, high sensitivity (day/night) fixed dome type with an auto iris fixed dome cameras with auto-iris lens operation.

- 7.9.4.2(16) Mounting will be unobtrusive, matching colour with hidden cabling. Fixed cameras will be vandal resistant wall mounted and / or mounted at protective locations and heights.
- 7.9.4.2(17) PTZ color dome cameras will be high resolution, high-speed with low light day/night operation capability with 360 degrees rotation in less than 3 seconds. Domes will mount on poles, parapets and walls located to provide optimum unobstructed viewing of the area under surveillance. PTZ cameras will have the ability to mask portions of view through software and remote programming.
- 7.9.4.2(18) Cameras to be associated with alarms on a point-by-point basis where an activated alarm causes PTZ cameras to home in on the event and have the ability to increase record rate and quality.
- 7.9.4.2(19) Outdoor cameras will be complete with weatherproof housing and internal heater/ defroster/blower/wiper as required for suitable operation under varying environmental conditions. Provide lightning protection modules for structured cabling to outdoor cameras.
- 7.9.4.2(20) Cameras will not be set up in private areas such as Client rooms, treatment rooms or user areas (unless specifically identified for use by user department staff), locker rooms or washrooms.
- 7.9.4.2(21) Where applicable, video monitors will have privacy screens to prevent public and/or Clients from viewing the video.

7.9.5 Clinical Camera System

7.9.5.1 Basic Requirements

- 7.9.5.1(1) Provide a closed surveillance system which allows for live viewing of cameras in real time at one or more workstations while not recording any video.
- 7.9.5.1(2) Cameras and monitors may not be viewable to general public or any staff not specifically dedicated to Client care areas defined in consultation with the Owner.
- 7.9.5.1(3) Cameras in seclusion and special use rooms must be specifically approved for that use by the manufacturer.
- 7.9.5.1(4) System software and hardware to be non-proprietary and available in the Province of BC to multiple vendors
- 7.9.5.1(5) Areas for installation of clinical surveillance cameras to be included, but not limited to:

- 7.9.5.1(5)(a) secure interview rooms
- 7.9.5.1(5)(b) psychological testing and interview rooms
- 7.9.5.1(5)(c) secure rooms
- 7.9.5.1(5)(d) testing and assessment rooms

7.9.5.2 Performance Criteria

- 7.9.5.2(1) High resolution color CCD cameras with auto focus and auto iris are to be provided. Aesthetics are to be considered in selecting camera mounting with attention given to low-impact discreet appearance.
- 7.9.5.2(2) System is to be scalable to allow for addition of multiple cameras over time. If IP cameras are selected, the network is to be closed and specific to the clinical camera system.
- 7.9.5.2(3) Cameras will have performance which allows for low light operation. If camera is not able to provide image allowing for identification of a person in proximity of the camera then infra-red illumination is to be provided.
- 7.9.5.2(4) One or more viewing workstations must be available simultaneously for latency-free viewing of all or any cameras. Monitors at these workstations are to be no smaller than 24 inch flat panel LED, IPS models with ultrathin bevel.

7.9.6 Wireless Staff Duress System

7.9.6.1 Basic Requirements

- 7.9.6.1(1) A new wireless staff duress system is required for the Facility and is to cover all areas of the Facility including elevators, parking areas, mechanical spaces, service areas, stairwells and common grounds where staff may be working.
- 7.9.6.1(2) Wireless staff duress system will communicate with the wireless communications system, security radios, pagers, the access control and intrusion systems and have the ability to integrate with surveillance cameras in proximity to active alarm.
- 7.9.6.1(3) The wireless staff duress system will locate an individual on activation:
 - 7.9.6.1(3)(a) within a 5M x 5M grid within the Facility for spaces larger than 25 square metres;

7.9.6.1(3)(b) room by room level for spaces that are 25 square metres or less; and contained exterior spaces; and

7.9.6.1(3)(c) room by room for all contained exterior spaces.

7.9.6.1(4) Receivers, repeaters and any other powered system components for wireless staff duress system will be connected to UPS power.

7.9.6.1(5) All system components will be rated for continuous duty 24-hours per day and supervised for tamper and power loss.

7.9.6.1(6) Alarm notification is to be received in multiple locations simultaneously including security workstation and local audible and visual annunciators at staff workstations. System design must ensure operator acknowledgement is made and allow for programmable instructions on acknowledgement.

7.9.6.1(7) System must allow for addition of wired devices within same architecture.

7.9.6.1(8) Provide 200 amount of transmitters with new batteries and lanyards or holsters and 400 amount of spare batteries.

7.9.6.1(9) System software and hardware to be non-proprietary and available in the Province of BC to multiple vendors.

7.9.6.2 Performance Criteria

7.9.6.2(1) Upon activation of any wireless staff duress device, the exact unit ID, assigned staff and location will be annunciated to the mapping software and staff workstation locations. A voice message will be broadcast over the security radios indicating location of panic alarm while a page sent to one or more pagers. Develop alarm routing in consultation with the Owner.

7.9.6.2(2) Supervision for each wireless staff duress device, as a minimum, will notify on the following:

7.9.6.2(2)(a) communication failure

7.9.6.2(2)(b) system trouble

7.9.6.2(2)(c) low battery

7.9.6.2(2)(d) device tamper

- 7.9.6.2(3) Wireless staff duress system will be integrated to other security systems either directly or via integration with a middleware to allow for all panic device alarms to be displayed on the main security system graphical map as they are activated.
- 7.9.6.2(4) Integration to either intrusion alarm system or access control system will allow for instant monitoring and response protocols using the redundant transmission methods deployed by those systems.
- 7.9.6.2(5) Wireless staff duress system is to integrate with the CCTV system to associate the panic device which is in alarm with the nearest two or more cameras to that device as it is activated. Those cameras will be displayed as pop-up events on the security workstation and the cameras will record at the highest frame rate and resolution possible for a period of time 30 seconds pre alarm to 90 seconds post alarm.
- 7.9.6.2(6) Each department will be provided with a test device which allows for a visible pass or fail for each device as it is tested.

7.9.7 Client Assist System

7.9.7.1 Basic Requirements

- 7.9.7.1(1) Provide a complete and fully operational client assist system, including head-end equipment and call buttons and stations.
- 7.9.7.1(2) Integrate the client assist system with the intrusion alarm system and access control system for alarm reporting and annunciation.

7.9.7.2 Performance Requirements

- 7.9.7.2(1) Provide client call button stations in spaces as identified in the Room Data Sheets. Client assist stations and call buttons will be located in consultation with the Owner, and at a minimum be located in a position that will best benefit the Client when they are in need of assistance.
- 7.9.7.2(2) Integrate the client assist system with the access control system for alarm reporting and annunciation.
- 7.9.7.2(3) Refer to Appendix 1F – Systems Network for more detail on the client assist system, integration with other systems, and alarm handling and routing.

8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS

8.1 Earthwork (Division 31)

8.1.1 Clearing and Grubbing

8.1.1.1 Performance Criteria

- 8.1.1.1(1) Prevent damage to trees, benchmarks, existing curbs and subsurface utilities to remain. Remove cleared and grubbed materials off-site to disposal area as directed by the Owner and the City of Coquitlam Soil Deposit Bylaw requirements.

8.2 Exterior Improvements (Division 32)

8.2.1 Aggregate Base Courses

8.2.1.1 Basic Requirements

- 8.2.1.1(1) Granular sub-base will be utilized for stability of surface treatment through freeze thaw cycles and for its ability to store rainwater

8.2.1.2 Performance Criteria

- 8.2.1.2(1) The depth of aggregate base courses will be designed to exceed limits defined by regional freeze thaw cycles averaged over a twenty year period.

8.2.2 Asphalt Paving

8.2.2.1 Basic Requirements

- 8.2.2.1(1) Asphalt paving will be utilized in areas where vehicle traffic and snow clearing equipment require a smooth surface for travel.
- 8.2.2.1(2) Place asphalt on an underlying base course that has been compacted and approved by the Design-Builder's geotechnical engineer.
- 8.2.2.1(3) Asphalt paving to be a minimum of 100mm thick.

8.2.2.2 Performance Criteria

- 8.2.2.2(1) Asphalt mix will be designed for use in climatic conditions found on Site.
- 8.2.2.2(2) Asphalt will meet or exceed MMCD requirements. Pavement structure thickness will as required by the Design-Builder's geotechnical

engineers, based on an assessment of the specific site conditions, but no less than 100mm in two lifts.

8.2.3 Unit Paving on Sand Bed

8.2.3.1 Basic Requirements

- 8.2.3.1(1) Unit pavers will be utilized in areas where a high level of finish is desired and/or a requirement for removal and replacement of paved surface in the future.

8.2.4 Concrete Paving

8.2.4.1 Basic Requirements

- 8.2.4.1(1) Concrete paving will be utilized in areas that require firm, long lasting hard surfaces for activities such as pedestrian pathways, loading docks and Facility entrances.

8.2.5 Fences and Gates

8.2.5.1 Performance Criteria

- 8.2.5.1(1) Fence materials will be designed and fabricated for a minimum 10-year lifetime.
- 8.2.5.1(2) Fences will be installed as per manufacturer's directions, or custom designed with footings to withstand freeze thaw cycles in the region averaged over the last twenty years.

8.2.6 Secure Fence

8.2.6.1 Basic Requirements

- 8.2.6.1(1) Threat perimeter fence will be at least 4m height, with posts spaced at least 2.4m on centre and curved top; and
- 8.2.6.1(2) Fencing will include fabric with diamond interwoven mesh with black PVC coating.
- 8.2.6.1(3) Provide secure containment of Clients where secured fencing is being utilized for outdoor spaces or areas of refuge;
- 8.2.6.1(4) Detention grade non-climbable (razor wire/ fencing/ bundles not acceptable);
- 8.2.6.1(5) Any openings/ penetrations through the secured perimeter will be with detention grade hardware;

- 8.2.6.1(6) Fencing posts to be located on the non-Client side;
- 8.2.6.1(7) Fencing components to be designed to not allow footholds or handholds for climbing;
- 8.2.6.1(8) Perimeter fence mesh will be 1/2" x 3" x 10.5 gauge PVC coated mesh. PVC color to be selected by consultant;
- 8.2.6.1(9) Where the secure fencing is located adjoining the Facility, the Facility area side is to be:
 - 8.2.6.1(9)(a) secure against abuse, vandalism
 - 8.2.6.1(9)(b) anti-climb
 - 8.2.6.1(9)(c) candy cane or overhang capping design to be review and approved by the Owner

8.2.6.2 Performance Requirements

- 8.2.6.2(1) Fencing, supports and footings will be designed and constructed to have a design service life of at least 50 years, unless otherwise permitted by the Owner.

8.2.6.3 Prescriptive Requirements

- 8.2.6.3(1) Secured fence will be detention quality, non-climbable to prevent escape and incursion.
- 8.2.6.3(2) Secured fence will be equipped with a continuous below grade beam to prevent escape and incursion below grade with a minimum depth of 900mm.

8.2.7 Exterior Site Furnishings

8.2.7.1 Basic Requirements

- 8.2.7.1(1) Construction Site furnishings will consist of benches (catalog, custom and/or built in), garbage containers, tables and chairs, bike racks, and umbrellas, to provide seating for a minimum of eight people in any outdoor area adjacent to the Facility for staff, Clients and visitors. Products will be selected on the basis of safety, comfort, durability, design and materials that relate to the Facility architecture and landscape design, durability and required maintenance. This requirement is over and above that described in the Equipment and Responsibility List. See Section 4.2 for Construction Site furnishing specific requirements.

8.2.7.2 Performance Criteria

- 8.2.7.2(1) Products will be selected and/or custom designed as part of landscape elements for their suitability and durability for the wet climate. Bench surfaces to be predominantly wood with structural elements to be architectural concrete or metal.

8.3 Utilities (Division 33)

- 8.3.1 The utility works must service the Facility and the expected land use with a reliable infrastructure that must be maintainable without disrupting the effective operation of the campus and related land uses. Where applicable all work in this section will be carried out in accordance with the City of Coquitlam Subdivision and Development Servicing Bylaw No. 3558, 2003 and design and construction specifications for civil works set out in the Master Municipal Construction Document (MMCD), as modified by the City of Coquitlam's supplemental MMCD specifications.