# SCHEDULE 3

# DESIGN AND CONSTRUCTION SPECIFICATIONS

**TABLE OF CONTENTS**

# SCHEDULE 3

# DESIGN AND CONSTRUCTION SPECIFICATIONS

## PART 1. INTERPRETATION

### 1.1 Definitions

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

"**BC Building Code**" means the British Columbia Building Code;

"**BMS**" has the meaning set out in Section 7.6.1.1(1) of this Schedule;

"**Building**" means the critical care tower building to be constructed by Project Co pursuant to this Agreement, and includes all additions and improvements thereto over the term of this Agreement;

"**Clinical Specification**" has the meaning set out in Section 2.3.1 of this Schedule;

"**Data Room**" means the electronic data room that was maintained by the Authority during the request for proposals stage of the Project;

"**EOC**" has the meaning set out in Section 5.3.6 of this Schedule;

"**Evidence-Based-Design**" or "**EBD**" has the meaning set out in Section 3.1 of this Schedule;

"**Project Design Objectives**" has the meaning set out in Section 3.2.1 of this Schedule;

"**Helipad**" has the meaning set out in Section 2.6.1 of this Schedule;

"**Indicative Design**" has the meaning set out in Section 2.8.1 of this Schedule;

"**North Building**" means the building described as the "North Building A" on Appendix 2H [Site Plan];

"**North Building Link**" has the meaning set out in Section 4.3.2.3 of this Schedule;

"**Nurse Call Proposal**" has the meaning set out in Section 7.8.10.1(1) of this Schedule;

"**Project Co's End-Use Equipment**" has the meaning set out in Section 7.8.8.1(1) of this Schedule;

"**SMH Master Site Planning Concept**" means the Authority's master plan for SMH entitled "The SMH Master Site Planning Concept" dated November 3, 2009;

"**South Building**" means the building described as the "SMH-South Building and Underground Parkade" on Appendix 2H [Site Plan];

"**South Building Service Connection Room**" means the room to be constructed by the Authority on level P1 of the existing South Building parkade, along the north wall between grid lines 2 and 5; and

"**South Building Spine**" has the meaning set out in Section 4.3.2.2 of this Schedule.

## 1.2 Interpretation

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

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

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

## 1.3 Acronym List

1.3.1 ARCAL – Aircraft Radio Control of Aerodrome Lighting

1.3.2 AFUE - Annual Fuel Utilization Efficiency

1.3.3 ANSI - American National Standards Institute

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

1.3.5 ASME - American Society of Mechanical Engineers

1.3.6 ASPE - American Society of Plumbing Engineers

1.3.7 ASTM - American Society for Testing and Materials

1.3.8 AV / IT – Audio Visual / Information Technology

1.3.9 BCERMS - British Columbia Emergency Response Management System

1.3.10 BCICA - British Columbia Insulation Contractors Association

1.3.11 BCLNA - British Columbia Landscape & Nursery Association

1.3.12 BCSLA - British Columbia Society of Landscape Architects

1.3.13 BICSI - Building Industry Consulting Service International

1.3.14 BMS - Building Management System

1.3.15 CATV – Community Access Television

1.3.16 CCD – Charge Couple Device

1.3.17 CCTV – Closed Circuit Television

1.3.18 CEC – Canadian Electrical Code

1.3.19 CFL – Compact Fluorescent Lamp

1.3.20 CGA - Compressed Gas Association

1.3.21 CIF – Common Intermediate Format

1.3.22 CISCA - Ceiling Interior Systems Construction Association

1.3.23 CODEC – Coder/Decorder

1.3.24 CPTED - Crime Prevention Through Environmental Design

1.3.25 CPU – Central Processing Unit

1.3.26 CRT – Cathode Ray Tube

1.3.27 CRTC – Canadian Radio-television and Telecommunications Commission

1.3.28 CSA - Canadian Standards Association

1.3.29 DDC - Direct Digital Controls

1.3.30 DFO - Department of Fisheries and Oceans

1.3.31 DID – Direct Inward Dialling

1.3.32 DISS - Diameter Index Safety System

1.3.33 DSSS – Direct Sequence Spread Spectrum

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

1.3.35 EHR – Electronic Health Record

1.3.36 EMT – Electric Metallic Tubing

1.3.37 FACP – Fire Alarm Control Panel

1.3.38 FATO – Final Approach and Take-off Area

1.3.39 FM – Factory Mutual

1.3.40 GPS – Global Positioning Satellite

1.3.41 HAZMAT - Hazardous Materials

1.3.42 HEPA - High Efficiency Particulate Air

1.3.43 HL7 – Health Level 7

1.3.44 HOA – Hand/Off/Auto

1.3.45 HP – Horsepower

1.3.46 HRC – High Rupting Capacity (fuse type)

1.3.47 HVAC - Heating, Ventilating and Air-Conditioning

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

1.3.49 IEEE - Institute of Electrical and Electronic Engineers

1.3.50 IP – Internet Protocol

1.3.51 IT – Information Technology

1.3.52 IT/Tel – Information Technology / Telecommunication

1.3.53 KW – Kilowatt

1.3.54 KWH – Kilowatt hours

1.3.55 KV – Kilovolt

1.3.56 KVA – Kilovolt Ampere

1.3.57 LAN – Local Area Network

1.3.58 LCD – Liquid Crystal Display

1.3.59 LDRP – Labour Delivery Recovery and Post-Partum

1.3.60 LED – Light Emitting Diode

1.3.61 LEED – Leadership in Energy Efficient Design

1.3.62 Mb - Megabit

1.3.63 MCP – Motor Circuit Protector

1.3.64 MPI – Master Painters Institute

1.3.65 NEMA - National Electrical Standards Association

1.3.66 NFPA - National Fire Protection Association

1.3.67 NTSC – National Television Standards Committee

1.3.68 OFDM – Orthogonal Frequency Division Multiplexing

1.3.69 OS&Y - Open Stem and Yoke

1.3.70 PACS - Picture Archiving and Communication System

1.3.71 PBX – Private Branch Exchange

1.3.72 PC – Personal Computer

1.3.73 PDA – Personal Digital Assistant

1.3.74 PoE – Power Over Ethernet

1.3.75 PTZ – Pan Tilt Zoom

1.3.76 PVC – Polyvinyl Chloride

1.3.77 RCDD – Registered Communications Distribution Designer

1.3.78 RTLS – Real Time Location System

1.3.79 SAGA - System of Approach Azimuthal Guidance

1.3.80 SES – Safety Engineering Society

1.3.81 SIP – Session Initiated Protocol

1.3.82 SMACNA – Sheet Metal and Air Conditioning Contractors National Association

1.3.83 SMDR – Station Message Detail Recording

1.3.84 SNR – Signal to Noise Ratio

1.3.85 SQL – Structured Query Language

1.3.86 STC – Sound Transmission Coefficient

1.3.87 TCO – Total Cost of Ownership

1.3.88 TCP – Transmission Control Protocol

1.3.89 TDM – Time Division Multiplexing

1.3.90 THD -Total Harmonic Distortion

1.3.91 TLOF – Touchdown and Lift-off Area

1.3.92 TTMAC – Terrazzo and Tile Manufacturers Association of Canada

1.3.93 TVOC – Total Volatile Organic Compounds

1.3.94 TVSS Transient Voltage Surge Suppressor

1.3.95 UBC, FOM, - University of British Columbia, Faculty of Medicine

1.3.96 ULC - Underwriters' Laboratories of Canada

1.3.97 UPS – Uninterruptible Power Supply

1.3.98 V - Volt

1.3.99 VAR – Volt Ampere Reactive power

1.3.100 VFD - Variable Frequency Drive

1.3.101 VLAN – Virtual Local Area Network

1.3.102 VOC – Volatile Organic Compounds

1.3.103 VoIP – Voice Over Internet Protocol

1.3.104 WAN – Wide Area Network

1.3.105 WAP2 – Wireless Application Protocol 2

1.3.106 WMM – WiFi Multimedia

## PART 2. GENERAL

### 2.1 Standards

2.1.1 Project Co will undertake the Design and Construction:

2.1.1.1 in accordance with the standards set out in this Schedule;

2.1.1.2 in accordance with the BC Building Code and all applicable Laws;

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

2.1.1.3(1) all persons who will be Facility Users;

2.1.1.3(2) all Governmental Authorities; and

2.1.1.3(3) the community;

2.1.1.4 in accordance with Good Industry Practice; and

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

2.1.2 If more than one of the above standards is applicable then the highest such standard will apply.

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

2.1.4 Without limiting Section 2.1.1 of this Schedule, Project Co will undertake the Design and Construction in compliance with all applicable standards, including:

2.1.4.1 BCICA Quality Standards Manual for Mechanical Insulation

2.1.4.2 ANSI / ASHRAE

2.1.4.2(1) 52.2-2007: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;

2.1.4.2(2) 55-2004: Thermal Environmental Conditions for Human Occupancy;

2.1.4.2(3) 62.1-2007: Ventilation for Acceptable Indoor Air Quality;

2.1.4.2(4) 90.1-2007: Energy Standard for Buildings Except Low Rise Residential Buildings;

2.1.4.2(5) 111-2008: Practices for Measurement, Testing, Adjusting & Balancing of Building HVAC Systems;

2.1.4.2(6) 129-1997: Measuring Air Change Effectiveness; and

2.1.4.2(7) 135-2004: Data Communication Protocol for Building Automation & Control Networks.

2.1.4.3 ASHRAE

2.1.4.3(1) Handbooks: 2009 Fundamentals, 2006 Refrigeration, 2007 HVAC Applications, 2008 HVAC Systems and Equipment;

2.1.4.3(2) Design of Smoke Control Systems;

2.1.4.3(3) ASHRAE Guideline 12-2000 - Minimizing the Risk of Legionellosis Associated with Building Water Systems;

2.1.4.3(4) ASHRAE Guideline 1.1-2007 – HVAC & R Technical Requirements for the Commissioning process; and

2.1.4.3(5) ASHRAE Guideline 0-2005 – The Commissioning Process.

2.1.4.4 ANSI / ASME

2.1.4.4(1) B31.1 Power Piping;

2.1.4.4(2) B31.9 Building Services Piping;

2.1.4.4(3) Section VIII: Pressure Vessels;

2.1.4.4(4) Section IX: Welding Qualifications;

2.1.4.4(5) Unfired pressure vessels; and

2.1.4.4(6) AWS D1.3-98 - Structural Welding Code - Sheet Steel.

2.1.4.5 ANSI / EIA

2.1.4.5(1) 568-B.1 & 568-B.2 (CSA-0T529-M95) Commercial Building Telecommunications Cabling Standard – Parts 1 & 2:

2.1.4.5(2) 568-B3 (CSA-T529-M95) Commercial Building Telecommunications Cabling Standard – Part 3;

2.1.4.5(3) 569-B (CSA-T530) Commercial Building Standard for Telecommunications Pathways and Spaces;

2.1.4.5(4) 606A (CSA-T528) Administration Standard for Telecommunications Infrastructure of Commercial Buildings;

2.1.4.5(5) 607A (CSA-527) Commercial Grounding and Bonding Requirements for Telecommunications.

2.1.4.5(6) 758 Customer Owned Outside Plant Telecommunications Cabling Standard;

2.1.4.6 ANSI / TIA

2.1.4.6(1) 942 Telecommunications Infrastructure Standard for Data Centers;

2.1.4.6(2) TSB-162 Telecommunications Cabling Guidelines for Wireless Access Points;

2.1.4.7 ANSI / ESNA American National Standard Practice for Lighting

2.1.4.8 ASPE Plumbing Engineering Design Handbook, Volumes 1-4

2.1.4.9 ASTM

2.1.4.9(1) A185-06 - Standard Specification for Steel Welded Wire Fabric;

2.1.4.9(2) A82/A82M-05 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;

2.1.4.9(3) ASTM C568-03 - Standard Specification for Limestone Dimension Stone;

2.1.4.9(4) ASTM C615-03 - Standard Specification for Granite Dimension Stone;

2.1.4.9(5) ASTM C503-05 - Standard Specification for Marble Dimension Stone;

2.1.4.9(6) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone;

2.1.4.9(7) BCSLA and BCLNA - BC Landscape Standard – Current Edition

2.1.4.10 CAN ULC

2.1.4.10(1) S524 Standards for the Installation of Fire Alarm Systems;

2.1.4.10(2) S537 Standards for Verification of Fire Alarm Systems;

2.1.4.11 CGA - P-2.1: Standard for Medical / Surgical Vacuum Systems in Hospitals

2.1.4.12 CSA

2.1.4.12(1) B52-05: Mechanical Refrigeration Code;

2.1.4.12(2) B51-2003: Boiler, Pressure vessel and Pressure Piping Code;

2.1.4.12(3) B149.1-05: Natural Gas and Propane Installation Code;

2.1.4.12(4) B651-95: Barrier Free Design;

2.1.4.12(5) C22.1 & C22.2 Canadian Electrical Code as adopted in British Columbia;

2.1.4.12(6) C282 Emergency Electrical Power Supply for Buildings;

2.1.4.12(7) Z32.04 Electrical Safety and Essential Electrical System in Health Care Facilities;

2.1.4.12(8) Z317.5 Illumination Systems in Health Care Facilities;

2.1.4.12(9) Z318.5 Commissioning of Electrical Equipment and Systems in Health Care Facilities;

2.1.4.12(10) Z7396.1-06 “Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases and Vacuum;

2.1.4.12(11) Z7396.2-06 “Medical Gas Pipeline Systems – Part 2: Anaesthetic Gas Scavenging;

2.1.4.12(12) Z317.2-10: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;

2.1.4.12(13) Z318.0-93: Commissioning of Health Care Facilities;

2.1.4.12(14) Z318.1-95: Commissioning of HVAC Systems in Health Care Facilities;

2.1.4.12(15) A23.4-05 - Precast Concrete - Materials and Construction;

2.1.4.12(16) W186-M1990 (R2002) - Welding of Reinforcing Bars in Reinforced Concrete Construction;

2.1.4.12(17) A370-04 - Connectors for Masonry;

2.1.4.12(18) A23.1-04/A23.2-04 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete; and

2.1.4.12(19) S832-06 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings).

2.1.4.12(20) S478 Guideline on Durability of Buildings

2.1.4.12(21) S413-07 Parking Structures

2.1.4.12(22) S16-01 Limit States Design of Steel Structures

2.1.4.12(23) S136-01 Design of Cold Formed Steel Members

2.1.4.12(24) S304-04 Masonry Design for Buildings

2.1.4.12(25) S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings.

2.1.4.12(26) Z317.1-09 Special requirements for plumbing installations in Health Care facilities

2.1.4.12(27) Z314.7-03 Steam sterilizers for Health Care Facilities

2.1.4.12(28) Z317.11-02 Area requirements for Health Care Facilities

2.1.4.12(29) Z317-10.09 Handling of waste materials in Health Care Facilities and Veterinary Health Care Facilities

2.1.4.12(30) Z317.13-07 “Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities

2.1.4.13 NFPA

2.1.4.13(1) 10-2002: Standard for Portable Fire Extinguishers;

2.1.4.13(2) 13: Standard for the Installation of Sprinkler Systems;

2.1.4.13(3) 14: Standard for the Installation of Standpipe System;

2.1.4.13(4) 56F: Non-flammable Medical Gas System;

2.1.4.13(5) 90A - Current Edition: Standard for Installation of Air Conditioning and Ventilation Systems;

2.1.4.13(6) 92A - Current Edition: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences; and

2.1.4.13(7) 101 - Current Edition: Life Safety Code

2.1.4.14 IEEE

2.1.4.14(1) 802.1 series for Interworking, Security, Audio/Video Bridging and Data Centre Bridging;

2.1.4.14(2) 802.3 series of Ethernet Standards;

2.1.4.14(3) 802.11 series of Wireless Standards;

2.1.4.15 NETA

2.1.4.15(1) ATS InterNational Electrical Testing Association (Acceptance Testing Specifications)

2.1.4.15(2) MTS Standards for Maintenance Testing

2.1.4.16 BICSI Telecommunications Distribution Methods Manual (TDMM);

2.1.4.17 Master Municipal Construction Document (MMCD);

2.1.4.18 City of Surrey Engineering Department Supplementary Master Municipal Construction Documents;

2.1.4.19 BC Supplement to TAC Geometric Design Guide;

2.1.4.20 AIA Guidelines for Design and Construction of Health Care Facilities, including NICU guidelines.

2.1.4.21 Recommended standards for Newborn NICU Design (Report of the Seventh Consensus Conference on Newborn ICU Design: February 1, 2007).

2.1.4.22 Fraser Health – Emergency Department Decontamination Room Design Requirements for Fraser Health Facilities.

2.1.4.23 Fraser Health – Safety Design Standards for Surgical Laser Procedure Performed outside the OR Department.

2.1.4.24 City of Surrey Engineering Department Design Criteria Manual.

2.1.4.25 British Columbia Ministry of Health and Ministry Responsible for Seniors – Standards for Hospital-based Psychiatric Emergency Services: Observation Units (March 2000).

**2.2 Use of Wood**

2.2.1 As contemplated by the *Wood First Act* (British Columbia), Project Co 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.

**2.3 Clinical Specifications**

2.3.1 Attached as Appendix 3A is the "Surrey Memorial Hospital – Emergency Department & Critical Care Tower Clinical Specification" (the "**Clinical Specification**").

2.3.2 Project Co will design and construct the Facility:

2.3.2.1 so that it accommodates all of the spaces, activities, functions, design features and adjacencies described in the Clinical Specification; and

2.3.2.2 in accordance with the requirements of the Clinical Specification, subject to any adjustments or refinements made in accordance with the User Consultation Process and the Design Review Procedure.

**2.4 Additional Rooms and Spaces**

2.4.1 Notwithstanding anything in the Clinical Specification, Project Co will design and construct the Facility to include all rooms and spaces as required to comply with the terms of this Agreement, including sufficient rooms and spaces as necessary for the operation and maintenance of the Facility and for Project Co to perform the Services in accordance with this Agreement.

**2.5 Future Conversion of Non-Clinical Space**

2.5.1 Project Co will design and construct one non-clinical level of the Facility to allow for the future conversion of that level to surgical/treatment type functions with minimal disruption to ongoing operations.

**2.6 Helipad**

2.6.1 Project Co will provide a helipad on the roof of the Building (the "**Helipad**") that meets the requirements of this Schedule and all applicable standards, including:

2.6.1.1 TP-312 – Transport Canada Aerodrome Standards and Recommended Practices;

2.6.1.2 ICAO / Annex 14, Volume II;

2.6.1.3 NFPA 70 National Electrical Code;

2.6.1.4 NFPA 70B Recommended Practice for Electrical Equipment Maintenance;

2.6.1.5 IEEE C2 National Electrical Safety Code; and

2.6.1.6 Canadian Aviation Regulations Standard 325 – Heliports.

**2.7 UBC Videoconference Rooms**

2.7.1 In addition to the requirements of this Schedule, Project Co will design and construct the UBC Videoconference Rooms in accordance with the requirements of Appendix 3B [UBC Videoconference Room Specifications]. If there is a conflict between a provision of Appendix 3B [UBC Videoconference Room Specifications] and a provision of this Schedule (with respect to the UBC Videoconference Rooms only), the provision of Appendix 3B [UBC Videoconference Room Specifications] will govern.

**2.8 Indicative Design**

2.8.1 The Authority's architectural consultant undertook an indicative design of the Facility (the "**Indicative Design**"). The Indicative Design is based on the Clinical Specification but also reflects consultations with potential Facility Users. Drawings describing the Indicative Design are available in the Data Room.

2.8.2 Project Co may, use the Indicative Design as a basis for its design, but the Authority makes no representation as to the accuracy or completeness of any aspect of the Indicative Design.

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

**2.9 Commercial Opportunities**

2.9.1 Project Co may provide commercial space in the Facility only if such space is approved by the Authority. Any commercial space provided must compliment healthcare objectives.

**PART 3. DESIGN PRINCIPLES AND OBJECTIVES**

**3.1 Evidence Based Design**

3.1.1 In undertaking the design of the Facility, Project Co will apply Evidence Based Design methodologies to achieve the Project Design Objectives. "Evidence Based Design" or "EBD" means that decisions about the design of the Facility will be based on credible research, information derived from comparable projects, and information about Authority operations, in order to achieve the best possible outcomes. The goal of EBD is to deliver measurable improvements, for example in the Authority's patient and workflow outcomes, productivity, economic performance, and customer satisfaction.

## 3.2 Project Design Objectives

3.2.1 Project Co will apply the following five design objectives (collectively the "**Project Design Objectives**") in undertaking the Design:

3.2.1.1 master planning (as described in Section 3.3);

3.2.1.2 sustainability (as described in Section 3.4);

3.2.1.3 optimized outcomes (as described in Section 3.5);

3.2.1.4 adaptability, flexibility and expandability (as described in Section 3.6); and

3.2.1.5 environmental quality (as described in Section 3.7).

In addition to the descriptions of these objectives in this Part 3, specific requirements related to these objectives are included in Parts 4 – 6 of this Schedule.

3.2.2 The Project Design Objectives are integrated objectives and Project Co will apply them on an integrated basis throughout the Design and Construction.

## 3.3 Master Planning

3.3.1 Project Co will design the Facility:

3.3.1.1 to respond to the key concepts outlined in the SMH Master Site Planning Concept;

3.3.1.2 so that it is an integrated part of the SMH Campus, and accordingly:

3.3.1.2(1) facilitates the delivery of clinical and non-clinical support services across the SMH Campus, for example, through the provision of efficient physical links to existing SMH buildings; and

3.3.1.2(2) effectively integrates with existing SMH Campus infrastructure;

3.3.1.3 to have a strong urban presence and a distinctive architectural character, reflecting the Authority's values and role as the major centre for health in the community;

3.3.1.4 to support community access and include a highly visible main entry and lobby (designed with appropriate high profile architectural scale and features) that will form the main entry to the SMH Campus and the hub for SMH Campus way finding; and

3.3.1.5 to permit the Authority's need to enforce regional health care standards.

3.3.2 Project Co will consider all design decisions within the context of enhancing the SMH Campus.

## 3.4 Sustainability

3.4.1 In addition to the requirement to achieve LEED Gold Certification in accordance with the provisions of Schedule 2 [Design and Construction Protocols], Project Co will:

3.4.1.1 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 Operating Periods, including by minimizing the Authority's operating costs (for example in relation to utilities and carbon taxes);

3.4.1.2 give priority to efficient use of resources, protection of health and indoor environmental quality;

3.4.1.3 consider efficiencies and innovations that may be possible through integration of systems within the SMH Campus to minimize operational costs for the Authority; and

3.4.1.4 apply a total systems approach to minimize energy consumption and incorporate energy consumption management techniques that are targeted to stabilize and optimize energy flows.

3.4.2 Project Co will use the following standards and guidelines as references in undertaking the Design and Construction:

3.4.2.1 US Green Building Council – LEED for Health Care;

3.4.2.2 The Green Guide for Health Care;

3.4.2.3 Green Globes – Environment Assessment for New Buildings;

3.4.2.4 BOMA ( Building Owner and Managers Association ) Go Green Program;

3.4.2.5 ASHRAE Green Healthcare Construction Guidance Statement, Jan 2002;

3.4.2.6 Sustainable Health Care Architecture –by Robin Guenther and Gail Vittori;

3.4.2.7 Canadian Building Green Hospitals Checklist - Canadian Coalition for Green Health Care;

3.4.2.8 Natural Resources Canada Energy Innovators Initiative;

3.4.2.9 Building Materials for the Environmentally Hypersensitive, CMHC;

3.4.2.10 ASHRAE Proposed Standard 189- Standard for the Dosing and High Performance Green Buildings; and

3.4.2.11 ASTM E917.24401-1 Life Cycle Cost Assessment Methodology.

## 3.5 Optimized Outcomes

3.5.1 Project Co will:

3.5.1.1 design and construct the Facility to facilitate the delivery of efficient and effective workflow and processes, and elimination of waste, within both clinical and non-clinical service delivery;

3.5.1.2 recognize the value to the Authority of LEAN healthcare (or equivalent methodologies) in supporting the delivery of Authority activities, and accordingly will allow the findings from such methodologies to play a key role in influencing design decisions;

3.5.1.3 wherever appropriate, apply standardization to reduce errors and improve quality of service delivery, for example by assisting caregivers in quickly accessing equipment. In order to optimize caregiver performance, patient treatment modules will contain a number of standard room types; room details (including controls and control locations) will also be standardized;

3.5.1.4 design workplaces to support innovative and collaborative methods of working, help incorporate the Authority's new and emerging technologies, respond to diverse work styles (such as hoteling and job-sharing), and optimize flexibility and space utilization. A key element to the development of an integrated workplace is the provision of physical environments that support varied workplace strategies. Accordingly, Project Co will design workplaces to:

3.5.1.4(1) include modular, generic, acuity adaptable rooms and spaces, where appropriate;

3.5.1.4(2) provide floor lay-outs that accommodate teams as well as individuals, and that support mobile employees who require flexibility and use portable technology; and

3.5.1.4(3) consider co-location options, space saving strategies, and lay-outs and furniture that facilitate change.

## 3.6 Adaptability, Flexibility and Expansion

3.6.1 Project Co will design and construct the Facility:

3.6.1.1 so that it can accommodate the rapid cycle of innovation and change to support development and implementation of new clinical and non-clinical work processes and technology change;

3.6.1.2 to accommodate program, service, work and equipment change with minimized utility infrastructure and Facility impact, including down time, and so that clinical areas are acuity adaptable.

3.6.1.3 to support future expansion of components, and capacity as a whole, including planning zones for growth, loose fit design to optimize functionality within a given floor area, and multi-use adaptable space; and

3.6.1.4 with an infrastructure that incorporates excess systems capacity and includes systems and components that support future expansion with minimized disruption and allows for upgrades in Authority technology or technological progression.

## 3.7 Environmental Quality

3.7.1 Project Co will design and construct the Facility:

3.7.1.1 to include an interior design that aligns with the Authority's clinical strategies and service models and gives priority consideration to family and patient centred design, best practice infection control standards, and safety for patients and staff;

3.7.1.2 to include ergonomic design features throughout all spaces in the Facility that specifically facilitate the physical activities of staff and patients, including for example, appropriate millwork, lighting, lift devices, and patient assist or equipment manoeuvring space;

3.7.1.3 to provide a healing environment (by including elements that have been proven to create therapeutic and low stress environments), and create a comfortable functional environment for patients, their families, and staff, by including:

3.7.1.3(1) design elements such as noise and light control, natural light and materials, design for family interface; and

3.7.1.3(2) design features such as sound and music, color, pattern, air quality, nature and view of nature, art and aesthetic forms, as tools for creating an environment that will support and distract patients of all ages and their families.

3.7.1.4 to include an easily legible configuration for Facility circulation, and an indoor way finding and signage system that is simple, intuitive, and fully coordinated with the Authority within the SMH Campus; and

3.7.1.5 to provide easy access to wheelchairs/stretchers close to the entrance of the Building; and ensure that all patient-occupied spaces are designed for disabled access and assistance by nursing staff.

3.7.2 Project Co will incorporate the following "Universal Design" philosophies in the design and planning of the Facility to address barriers to equitable access to healthcare such as cultural diversity, physical capability and gender:

3.7.2.1 Equitable use – the design will be easy to use by people with diverse abilities;

3.7.2.2 Flexibility in use – the design will accommodate a wide range of individual preferences and abilities;

3.7.2.3 Simple and intuitive – the design will be easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level;

3.7.2.4 Perceptible information – the design will communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities;

3.7.2.5 Tolerance for error – the design will minimize hazards and the adverse consequences of accidental or unintended actions;

3.7.2.6 Low physical effort – the design is capable of being used efficiently and comfortably and with a minimum of fatigue; and

3.7.2.7 Size and space for approach and use – appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture or mobility.

## PART 4. SITE DEVELOPMENT REQUIREMENTS

### 4.1 Master Planning

4.1.1 Project Co will perform an overall site planning study to understand the site context and opportunity, to validate the Building siting, and to plan a seamless integration of the new Facility to the existing SMH Campus within the context of the SMH Master Site Planning Concept.

4.1.2 While a prototype approach to the design for a health care facility is desirable, tailoring prototypes to the specifics of an existing site is critical for the success of the design. Accordingly, Project Co will consider existing site constraints, infrastructure, unique context and site specific master planning for adaptation of any desirable prototypes.

4.1.3 Project Co will design the Facility and the Site to allow for future expansion of SMH and the Facility and, in particular, to allow for the addition of a building similar to the Building to the south of the Site (as shown in the SMH Master Site Planning Concept).

### 4.2 Urban Design and Site Development

4.2.1 General

4.2.1.1 Consider the impact of site development and Facility placement on adjacent neighbours and land uses. Preserve visual privacy and sunlight for adjacent properties and buildings, and include features that will give the Facility an appropriate identity in the overall urban context.

4.2.1.2 Consider the potential of retaining existing trees on the Site to reduce the impact of the Facility on its neighbourhood context and to contribute to the healing environment for patients, visitors and staff.

4.2.1.3 Consider the micro-climatic effects arising from the location and configuration of parking, walkways and buildings, including effects of building entrance orientation on patient, staff and visitor comfort and safety. Consider the existing slope across the Site and its impact on site circulation, Facility location and configuration.

4.2.1.4 Articulate the exterior of the Facility to create an architecturally interesting and refined structure. Consider emphasizing the modular requirements of the program in the massing and materials to achieve articulation, visual interest, and human scale.

4.2.1.5 Contribute to an urban, pedestrian-oriented City centre environment by creating a fine-grained road/pedestrian/open space network that contributes to smaller, human scaled blocks and increased access/permeability.

4.2.1.6 Consider the increased vehicular and pedestrian permeation of the Site with pedestrian oriented walkway connections to the main entry from King George Highway, 96th Ave and 94A. Reinforce the physical relation of the structures with the major city streets of King George Highway, 96$^{th}$ Ave and 94A Ave and create a legible site layout and pattern to foster a strong sense of place and identity. Create vehicular connections between 96$^{th}$ Ave and 94A along the building façade.

4.2.1.7 Design for the functional separation of traffic for emergency vehicles, visitors, staff, and service vehicles.

4.2.1.8 Integrate vehicular circulation with layout of pedestrian and bicycle zones throughout the Site to provide visible connections, promote safe travel, and to minimize conflict between vehicles and other modes of travel. Design the driveways to provide connections between the surrounding roads and the main entrance to the Building.

4.2.1.9 Design for maximum access to the Facility. Provide separate and distinct passenger-side drop-off areas at each of the main entrance to the Building and the Emergency Department entrance as follows:

4.2.1.9(1) Emergency Department drop-off area: The passenger-side drop-off area at the Emergency Department entrance will be large enough to accommodate a minimum of seven cars plus a taxi zone for a minimum of one taxi cab.

4.2.1.9(2) Main entrance drop-off area: The Authority is considering demolishing that portion of the existing Charles Barham building shown as to be demolished on the drawing attached as Appendix 3J [Charles Barham

Building]. If the Authority notifies Project Co by April 1, 2011 that it will complete the demolition work and make the resulting space available to Project Co by October 1, 2011, then Project Co will, subject to approval by the City, design and construct the main entrance passenger-side drop off area so that it is large enough to accommodate a minimum of seven cars plus a taxi zone for a minimum of one taxi cab. If the Authority fails to notify Project Co by April 1, 2011 or complete the demolition work by October 1, 2011, then Project Co will design and construct the drop off area to accommodate a minimum of five cars plus a taxi zone for a minimum of one taxi cab. In either case Project Co will provide a reasonable setback between the Charles Barham building and any access roads to the main entrance.

4.2.1.9(3) Each of the main entrance and Emergency Department drop off areas will:

4.2.1.9(3)(a) be covered with canopies that extend a minimum 300mm over curbs to allow shelter from inclement weather along the entire length of the entrance; and

4.2.1.9(3)(b) include waiting space for seated, in-wheelchair and standing users.

4.2.1.10 Reduce the visual impacts of large parking lot areas by dividing the parking area into smaller parking lots; and plant shrubs and small trees to define circulation routes for pedestrians and vehicles.

4.2.1.11 Mitigate the nearby noise from King George Highway, 96th Avenue and 94a Avenue through the use of exterior glazing. Where possible, provide connection to the outdoors, natural light and the exterior environment in all inpatient rooms, meeting rooms, staff lounges and alike.

4.2.1.12 Create meaningful open spaces both urban and natural for the benefit of visitors and staff which provide opportunities for recreation and contribute to a cohesive, healthy community; capitalize on opportunities for outdoor areas of respite and repose to aid in providing a healing environment.

4.2.2 Public Realm and Open Space

4.2.2.1 Design and construct the Facility with consideration for the legibility, quality and consistency of the overall treatment of the public realm, including public open space, pedestrian corridors and streets, to achieve the urban design objective for a unified and attractive built environment.

4.2.2.2 Provide a hierarchy of open spaces as follows:

4.2.2.2(1) public open spaces;

4.2.2.2(2) semi–private open spaces; and

4.2.2.2(3) private open spaces;

4.2.2.3 Achieve segregation between different open spaces through landscape barriers such as hedges and planting.

4.2.3 Site Wayfinding and Exterior Signage

4.2.3.1 Arrange pedestrian pathways to ease wayfinding and create an amenable environment for pedestrians through the use of coordinated methods of wayfinding which inform people of routes through the Site to specific buildings and entries or to the major street and transit nodes. Encourage pedestrians to avoid unsafe vehicle roads by providing well-signed alternative pedestrian routes. Utilize paving patterns which can easily be differentiated from vehicular paving by pedestrians where they cross vehicular traffic to access the Emergency Department and main entrance.

4.2.3.2 Provide continuity of treed walkways for consistent sun/shade protection when desired.

4.2.3.3 Provide visually connected pathways and integrated plazas.

4.2.3.4 Provide external directional signage that:

4.2.3.4(1) clearly identifies the Facility and it's components including the Emergency Department, main entry drop off area, surface and underground parking;

4.2.3.4(2) clearly indicates points access for the public, parking and restrictions for various vehicle types and restrictions to 'after-hours' access;

4.2.3.4(3) is well illuminated, backlit, reflective or high contrast and easily visible at night; and

4.2.3.4(4) minimizes light spillage.

4.2.3.5 Without limiting the requirements of Section 4.2.3.4, provide all necessary exterior illuminated signage along King George Highway, 94$^{th}$ 'A' Avenue and 96$^{th}$ Avenue. Design and construct such signage so that it is visible for drivers of vehicles to identify at a far enough distance so that they can safely slow down and follow the signage to enter the Facility and the parking areas.

4.2.4 Site Access for the Disabled

4.2.4.1 The primary pedestrian systems, public open spaces, primary private walkways and principal entrances to the Facility should be accessible to the physically challenged.

4.2.4.2 Use appropriate signage, markers, or other levels of wayfinding along access routes to indicate to the physically challenged the route terminus points or any required route changes to ensure convenient universal access throughout the Site.

4.2.5 Site Lighting

4.2.5.1 Provide lighting for public outdoor spaces and the adjacent private property to create an unobtrusive, human scale lighting concept, with a hierarchy of fixture types designed according to functional and security needs (including CPTED), and reflecting the hierarchy of pedestrian corridors.

4.2.5.2 Light fixtures within the reach of pedestrians will be vandal proof.

4.2.5.3 Lighting on pedestrian paths will illuminate not just the path but also the surrounding area adjacent to the path particularly en route to transit connections.

4.2.5.4 Provide lighting to facilitate ease and safety of pedestrian access to public transit.

4.2.6 Landscaping

4.2.6.1 Provide landscaping for the complete Site that contributes to the creation of a liveable, healthy and responsive community.

4.2.6.2 Use large calliper deciduous trees and evergreen trees that provide seasonal interest in association with ground covering shrub plantings. Use a variety of plant material to reflect seasonal change.

4.2.6.3 Use large numbers of single species to help unify the urban character, create recognizable spaces, contribute to site orientation and create a strong sense of place.

4.2.6.4 Use of indigenous flora will be considered a priority, in terms of minimizing maintenance; and expressing an attitude about the Pacific Northwest context.

4.2.6.5 Use flowering and fruiting trees to promote natural avian habitat.

4.2.6.6 Landscape open space and setbacks to include existing trees that are of high quality, desirable species and appropriately situated.

4.2.6.7 Group plants to minimize the use of water, chemicals and fossil fuel use for routine maintenance and to promote a healthy local ecosystem using sustainable measures.

4.2.6.8 Provide elements of healing gardens to stimulate senses of sight, smell and touch.

4.2.6.9 Unify the ground plane treatment through the use of common paving materials, tree grates, lighting and other landscape furniture items.

4.2.6.10 Shrubbery within 2 m of walkways will not exceed 50 cm in height.

4.2.6.11 Provide and coordinate design for street furniture, including benches provided at regular intervals for ease of use particularly for the infirm. Select products on the basis of safety, comfort, design and materials that relate to the Facility architecture and landscape design, durability and required maintenance.

4.2.6.12 Utilize a variety of scales, locations and orientations to cater to varied outdoor activities and varied experiences of the staff and visitors.

4.2.6.13 Where possible use exterior steps and landscape features for the enjoyment of staff and visitors.

4.2.6.14 Minimize grade changes for drop curbs and raised crossings. Drop curbs aligned to pedestrian crossings.

4.2.7 Parking

4.2.7.1 Design and construct permanent parking for the Facility, including:

4.2.7.1(1) at least 90 surface parking stalls (55 new and 35 stalls to replace stalls lost due to construction);

4.2.7.1(2) at least 350 below grade parking stalls;

4.2.7.1(3) any additional parking stalls as may be required by the City; and

4.2.7.1(4) a well-lit secure bicycle locking/parking facility for an appropriate number of bicycles.

4.2.7.2 Design and construct below grade parking in accordance with the following:

4.2.7.2(1) design and construct parkade access so as not to obstruct free flow of traffic in and out of the Site or onto adjacent streets;

4.2.7.2(2) design and construct a parkade that is capable of being secured and locked when not in use;

4.2.7.2(3) provide adequate provision for ingress and egress to all parking spaces to ensure ease of mobility, ample manoeuvring clearances, and safety of vehicles and pedestrians; and

4.2.7.2(4) design parking levels and their vehicular circulation for ease of expansion and connectivity to parking levels below planned future development.

4.2.7.2(5) apply CPTED principles, including the following:

4.2.7.2(5)(a) reduce opportunities for graffiti through the use anti graffiti coatings;

4.2.7.2(5)(b) reduce opportunities for hiding spaces;

4.2.7.2(5)(c) ensure the interior is well lit and paint walls and ceilings in light colours; and

4.2.7.2(5)(d) provide glazing between parking areas and exit stairs;

4.2.7.2(6) clearly mark all parking spaces;

4.2.7.2(7) use way finding strategies, including signage, to allow each floor to be identifiable and to assist in orientation and ease of finding/identifying parking stalls;

4.2.7.2(8) use vehicle ramps that do not exceed 10% slope;

4.2.7.2(9) lay out public parking such that it does not require a vehicle to back up for more than 10m;

4.2.7.2(10) maximum allowable slope or cross-fall is 5% applicable to both the parking stalls and access aisles.

4.2.7.2(11) set parking lot layouts in an orderly and logical design to minimize confusion and excessive internal circulation; and

4.2.7.2(12) provide appropriate number of motorcycle parking spaces.

4.2.7.3 At locations determined in consultation with the Authority, provide appropriate foundations and any required power and communications connections for “pay by stall” ticket dispensers for surface and below grade parking. The Authority will be responsible for procuring and installing the ticket dispensers.

## 4.3 Connections to Existing Hospital and Site Services

4.3.1 General

4.3.1.1 The Facility will not function autonomously but instead will contribute to an overall integrated SMH Campus. Accordingly, Project Co will design the Facility to maximize opportunities for connections to the existing SMH buildings and enhance the ability for the existing SMH buildings and the Facility to function in a cohesive manner.

4.3.2 Connections for People and Materials

4.3.2.1 Design the Facility to expand on and maintain the continuity of existing circulation systems. The movement of public, patient and materials distribution through the SMH Campus must be effective, contiguous and integrated.

4.3.2.2 Provide a level floor, interior, three storey connection between the Facility and the South Building on Level 0, Level 1 and Level 2 (the "**South Building Spine**"). Provide continuous clear or translucent glazing the full length of the South Building Spine to provide natural light and views to the exterior. The South Building Spine will provide separation of public, patient & staff, equipment and material flows as follows:

4.3.2.2(1) on level 0 the South Building Spine will be a dedicated link for material management services and, accordingly, will extend to the South Building service elevator and will be wide enough to accommodate service carts and trains, etc.;

4.3.2.2(2) on level 1 the South Building Spine will be a dedicated link for patients and staff;

4.3.2.2(3) on level 2, the South Building Spine will have two separate corridors to accommodate the movement of two separate and independent groups:

4.3.2.2(3)(a) one corridor will be a staff and patient only corridor for the transport of critically ill infants from the family birth unit in the South Building to the NICU. This corridor may cross a public corridor/vestibule if access to the public corridor/vestibule is electronically controlled (including with a warning and monitoring system) and capable of being shut down to the public during the transport of an infant;

4.3.2.2(3)(b) the other corridor will be a public concourse between the Facility and the South Building, and will be designed so as to accommodate future retail opportunities (including space for future installation of mechanical and electrical services appropriate for potential retail uses).

4.3.2.3 Provide an additional level floor, interior connection link on level 1 of the Facility between the north end of the Emergency Department and the existing ambulance entrance in the North Building (the "**North Building Link**").

4.3.2.4 The South Building Spine and North Building Link will be designed to provide for ease of patient and material transfers between the existing Hospital and the Facility.

4.3.2.5 Wherever possible, design and construct the South Building Spine and North Building Link so as to maintain existing fire exits and fire ingress/egress routes from the South Building and the North Building. As necessary, modify or replace any fire exits and fire ingress/egress routes affected by the construction of the South Building Spine or North Building Link with equivalent exits and ingress/egress routes as approved by the Authority. Any work required in the Hospital or to connect to the Hospital, must be completed in accordance with a Work Plan approved by the Authority in accordance with the requirements of Schedule 2 [Design and Construction Protocols].

4.3.3 Service Connections

4.3.3.1 Design the Facility to provide seamless and accessible service connections, and robust system capacity. Provide optimized utilization of building and site services, and provision for future flexibility and expansion. Engage the Authority in identifying optimal solutions to achieve these results, as well as opportunities for innovation.

4.3.3.2 Relocate existing services as needed to accommodate construction of the Facility and reconnect existing services to ensure that Hospital operations continue without interruption. Provide, as necessary, temporary services to ensure that the Hospital remains operational at all times.

4.3.3.3 Any shut down of existing SMH services, or any work required to connect to the existing Hospital, must be completed in accordance with a Work Plan approved by the Authority in accordance with the requirements of Schedule 2 [Design and Construction Protocols].

4.3.3.4 Provide any services that cross a building or utilidor with seismic mitigation and building separation devices.

## 4.4 Site Infrastructure

4.4.1 General

4.4.1.1 Project Co will provide, as necessary, adequate and reliable infrastructure to provide all necessary municipal services to the Facility.

4.4.2 Municipal Off-Site Services Infrastructure

4.4.2.1 Design and construct all municipal off-site services to provide the infrastructure necessary to support the Facility in accordance with the requirements of the City and other Governmental Authorities, including with respect to sanitary sewers, storm sewers and drainage, water and road works. Refer to the City document entitled “P3 Proponent Information Package – Surrey Memorial Hospital Expansion Project” dated December 1st, 2009 for information about the City’s requirements.

4.4.3 On-Site Services Infrastructure

4.4.3.1 Design and construct all on-site servicing to meet or exceed the design and quality requirements for the corresponding municipal off-site services, and to meet the needs of the Facility.

4.4.3.2 Sanitary Sewers

4.4.3.2(1) Provide sanitary sewers of a diameter, grade and depth to safely convey all effluent from the Facility. The sanitary sewer system will include the pipes, manholes and all other required appurtenances to comply with applicable municipal and provincial standards.

4.4.3.3 Storm Sewers and Drainage

4.4.3.3(1) Provide storm sewers and drainage network of a size, grade and depth to safely convey all storm water.

4.4.3.3(2) Provide site storm water management system to ensure no net increase in storm water discharge to the creek and downstream flows for the 5 year return period.

4.4.3.3(3) Provide adequately sized water quality/sediment control inlet chambers as a component of the drainage system for both the surface and underground parking lot, before discharging to the offsite drainage system.

4.4.3.4 Watermain and Appurtenances

4.4.3.4(1) Provide watermain system (watermain and ancillary components) from the new King George Highway water connection capable of providing all required domestic and fire fighting capacity and redundancy for the Facility.

4.4.3.4(2) Provide a second water service capable of providing domestic cold water for the Facility by connecting to the existing onsite water system at the South Building Service Connection Room. The Authority will provide an isolation valve the point of connection in this room, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's piping at this location. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing SMH buildings.

4.4.3.4(3) The watermain system and the secondary water service will include proper backflow preventers necessary to protect the municipal system

and on site facilities from contaminants based on the hazard level of the Facility.

4.4.3.5 Road Works

4.4.3.5(1) Design and construct on-site roadway, including the pavement, curbs and gutters, sidewalks, walkways, signage, pavement markings, and traffic calming devices, that are handicapped accessible and wheel-chair friendly, to provide safe passage between parking areas, loading areas, emergency vehicle areas and drop off areas.

4.4.3.6 Street Lighting Around the Facility

4.4.3.6(1) Provide lighting for on-site roadways, walkways and parking areas to ensure safe vehicle and pedestrian traffic with respect to collisions, personal safety, and building access and egress. Lighting will be sympathetic to the existing SMH buildings.

4.4.3.7 Electrical, Telecommunications, Gas Services

4.4.3.7(1) Provide adequate electrical, telecommunication and natural gas services to the Facility.

## PART 5. BUILDING DESIGN REQUIREMENTS

### 5.1 Adaptability and Flexibility

5.1.1 Project Co will:

5.1.1.1 provide a design layout that will accommodate changes to uses and functions in the Facility with minimal required changes to the Facility's structure and building systems;

5.1.1.2 where functionally appropriate, consolidate modular general space and segregate special purpose or highly serviced space;

5.1.1.3 utilize building systems and components that facilitate changes in the Facility configuration and changes in servicing;

5.1.1.4 locate permanent building elements, such as stairs, elevators and duct shafts, to minimize constraints on changes to the Facility;

5.1.1.5 minimize interior columns for ease of planning and re-planning of care areas;

5.1.1.6 avoid interior shear walls if possible;

5.1.1.7 provide adaptability and flexibility in highly technical areas (such as diagnostic and treatment areas), which contain many small rooms with stringent functional

and ergonomic requirements affecting the placement of furniture and equipment;

5.1.1.8 standardize the design and layout of recurrent room types, including but not limited, to washrooms, treatment bays, patient rooms, clean and soiled utility rooms, equipment rooms and patient washrooms;

5.1.1.9 consider the ongoing adaptation and reuse of the Facility as it relates to sustainable building design.

5.1.1.10 provide excess capacity in vertical (and horizontal) distribution shafts and plenums to accommodate service system improvements, new equipment, digitization, Picture Archiving and Communication System (PACS), and emerging technologies;

5.1.1.11 accommodate the vertical and horizontal distribution of electrical and mechanical services to allow maintenance and changes to occur with the least disruption to clinical service delivery, particularly where the need for service flexibility is highest;

5.1.1.12 provide building service systems and operations designed to minimize service disruptions to areas adjacent to building maintenance and renovation areas; and

5.1.1.13 provide a system where appropriate to accommodate access for raceways for cable and fibre optic connections under each control and computer room in medical imaging.

**5.2 Expandability**

5.2.1 Project Co will:

5.2.1.1 locate primary circulation corridors to allow expansion without increasing the complexity of the circulation system as a whole;

5.2.1.2 provide floor zoning that allows for expansion of programs or services, for example by locating administrative and other non-clinical ‘soft’ functions adjacent to clinical areas that are likely to need to expand;

5.2.1.3 utilize open planning to create soft zones responsive to rapid change and growth by use of modular fit out; and

5.2.1.4 provide excess capacity in all building systems as required by this Schedule.

**5.3 Post Disaster Requirements**

5.3.1 In undertaking the Design, Project Co will consider the need to protect the life safety of all Facility occupants and the need for continuing services following an earthquake or other disaster.

5.3.2 Design and construct the Facility's structure, structural components, non-structural components, anchorages, and equipment to post disaster standards in accordance with the BC Building Code.

5.3.3 Design and construct essential services including the electrical system, steam, domestic water and medical gases to post disaster standards as defined in the BC Building Code. Locate these services in utilities enclosures that meet post disaster standards as defined in the BC Building Code.

5.3.4 Design and construct the Emergency Department so that it is capable of meeting its full functional requirements for a minimum period of 72 hours following a natural disaster or other incident. This includes the provision of all required potable water and sanitary sewage storage. In addition, provide for connections on the exterior of the Building at the Emergency Department to allow delivery of water by tanker truck and removal of sewage waste.

5.3.5 Design and construct the NICU and ICU so that they are capable of meeting their full functional requirements for a minimum period of 72 hours following a natural disaster or other incident (except that additional storage tanks are not required for potable water or sanitary sewage storage).

5.3.6 Project Co will design and construct the Facility so that it includes space that is capable of being used as an Emergency Operations Centre ("**EOC**") during an emergency. The EOC will:

5.3.6.1 be located in General Administration;

5.3.6.2 include a 12 seat conference room, 4 – 6 smaller offices spaces to be used as break out rooms, a supply storage area and a food preparation/storage area;

5.3.6.3 be capable of supporting the following communication systems, including with all required cabling, conduit paths and other infrastructure:

5.3.6.3(1) telephone – the EOC will have 12 phone lines and will be capable of supporting teleconferences and videoconferences;

5.3.6.3(2) ham radio – the EOC will include a suitable area for operation of a ham radio, back up power for the ham radio, infrastructure for 2 specialized antennas on the highest point of the Building and storage room for amateur radio kits;

5.3.6.3(3) satellite phone - fixed or mobile (if fixed, provide infrastructure for a specialized antenna on the highest point of the Building);

5.3.6.3(4) fax – the EOC will have 2 fax lines (one for outgoing messages and one for incoming messages);

5.3.6.3(5) computers – the EOC will have 24 network connections and complimentary electrical connections;

5.3.6.3(6) display/whiteboards – the EOC will have space for 4 display/whiteboards and capability to support an electronic whiteboard; and

5.3.6.3(7) televisions and radios – the EOC will have 2 cable or satellite connections.

Project Co will consult with the Authority to determine all required infrastructure requirements.

## 5.4 Architecture

### 5.4.1 Building Form and Character

#### 5.4.1.1 General

5.4.1.1(1) The Facility will be highly articulated and transparent to break down its scale, utilizing such components as glazing, canopy and shading systems, as well as exposed structural elements.

5.4.1.1(2) Maximize glazing at exit stairs. Roof top mechanical/electrical equipment will be screened and incorporated in architectural elements. The use of a penthouse for such equipment is encouraged.

5.4.1.1(3) Where retaining walls are necessary, they should be consistent in materials and quality to that of the Facility.

5.4.1.1(4) Use wood as a featured material in both the interior and exterior of the Facility.

#### 5.4.1.2 Exterior Building Materials and Colour

5.4.1.2(1) Exterior materials will include high quality finish materials with colour to reinforce entry areas, vertical circulation elements or significant areas in the Facility.

5.4.1.2(2) Exterior materials will be high quality and durable. Exterior materials should include wood cladding and soffits (subject to Section 2.2 of this Schedule), stone or metal cladding, architectural concrete, clear glass and brick masonry. Stucco will not be a principal building material and is discouraged.

5.4.1.2(3) Facade transparency and views into non-clinical building activities should be provided, especially at grade levels; accordingly, use of mirrored or highly reflective glass is discouraged.

5.4.1.3 Roofs

5.4.1.3(1) Landscaping and other “green” treatments of roof areas are encouraged, including provision of useable outdoor open spaces.

5.4.1.3(2) Where not landscaped, roof areas will be designed to be attractive when viewed from above and should avoid use of large areas of undifferentiated gravel.

5.4.2 Building Configuration and Internal Circulation

5.4.2.1 Building Entrances

5.4.2.1(1) All direct entries into the Facility from the exterior will be protected from snow and rain by canopies or building overhangs.

5.4.2.1(2) Entrance vestibules will provide complete transparency from the exterior, from the interior immediately in front of the vestibule, and from habited spaces adjacent to at least one long side of the vestibule.

5.4.2.1(3) Entrance vestibules will be configured and sized such that only one set of doors will open at one time in order to preserve the airlock effect for climate control. Ensure adequate distance between the sets of doors to allow stretchers and wheelchairs to fit lengthwise into the vestibule.

5.4.2.1(4) At all entrances, provide automatic doors activated by handicapped accessible push-button controls located on the inside and outside of both sets of doors. Doors will be configured for push-pull manual operation in addition to automatic operation.

5.4.2.1(5) Entrance doors to the Emergency Department and patient care areas will be sufficiently wide to allow access for stretchers surrounded by medical staff.

5.4.2.1(6) Pedestrian interest and comfort at entries will be provided through specifically designed seating, signage, lighting and features that signal the Facility's use.

5.4.2.2 Exit Stairs

5.4.2.2(1) Locate exit stairs strategically for the convenience of staff moving between related clinical departments.

5.4.2.2(2) Locate exit stairs conveniently accessible from circulation routes.

5.4.2.2(3) Avoid stair locations that negatively impact planning flexibility or constrain desirable views from patient care and staff work areas.

5.4.2.2(4) Provide day lighting and views from stairwells for orientation and amenity, and provide adequate lighting into stairwells for staff security at night.

5.4.2.3 Convenience Stairs

5.4.2.3(1) Consider the provision of convenience stairs where appropriate, located strategically to reduce elevator use by staff, visitors and patients.

5.4.2.4 Corridors

5.4.2.4(1) Corridor widths will be as follows:

5.4.2.4(1)(a) global circulation corridors and corridors accessing patient care areas within the Facility will be minimum 2400 mm wide;

5.4.2.4(1)(b) corridors accessing the service areas will be minimum 2000 mm wide except the service corridor on level 0 of the Facility will be minimum 3600 mm wide to accommodate supply truck trains; and

5.4.2.4(1)(c) corridors in all other areas will be minimum 1500 mm wide;

5.4.2.4(2) Design corridor ceiling space to accommodate all mechanical and electrical services.

5.4.2.4(3) Wherever possible provide alcoves accessible from corridors to accommodate disaster preparedness cabinets supplied by the Authority.

5.4.2.4(4) Corridors in patient care areas will have alcoves for storage of equipment. The alcoves will be dispersed between patient rooms allowing corridors to be kept clear of equipment and supplies. Provide the alcoves with power outlets for charging electronics and data ports, each at waist height for ease of access. Corridors will have recessed rest areas for patients to promote mobility and activity.

5.4.3 Building Envelope

5.4.3.1 Complete the Design and Construction so as to prevent the accumulation and stagnation of rain, snow, ice and dirt on the horizontal and vertical surfaces of the building envelope(s) appropriate for the climate the Facility is situated in.

5.4.3.2 Design exterior walls in accordance with the ‘rain-screen principles’. Include a continuous air space of minimum 25 mm clear width.

5.4.3.3 Ensure that materials and systems of the wall and roof assemblies contribute to reducing heat gains and losses with minimal decline in performance over their expected 50 year lifespan.

5.4.3.4 Ensure continuation of the air barrier, vapour barrier, thermal barrier and rain barrier across the entire envelope including foundations, walls and roofs.

5.4.3.5 Design building envelope details to avoid thermal bridging.

5.4.3.6 Utilize a building envelope consultant through design and construction.

5.4.4 Interior Walls and Partitions

5.4.4.1 Use interior walls and partition systems that:

5.4.4.1(1) provide acoustic separations as required for the specific functions to be carried out in the spaces affected, and in accordance with the requirements of Appendix 3D [Sound Transmission Ratings]; and

5.4.4.1(2) provide separations required for fire safety and protection.

5.4.4.2 Seismic resistance capabilities will conform to the requirements of CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components of Buildings.

5.4.4.3 Design and select interior walls and partitions, partition systems and interior finishes to comply with the following criteria as may be relevant for the particular or specific functions enclosed:

5.4.4.3(1) cleaning, maintenance and infection prevention and control;

5.4.4.3(2) permanence and durability including impact resistance;

5.4.4.3(3) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.4.3(4) flexibility to permit adaptability of the internal spaces, if required to suit future process revisions.

5.4.4.4 Provide fittings, attachments and internal bracing/backup as required to accommodate and support wall mounted equipment at video-conferencing and other applicable rooms.

5.4.5 Ceilings

5.4.5.1 Accessible ceiling systems may provide access to the ceiling spaces throughout the system or at specific and particular locations.

5.4.5.2 Ceiling systems will comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed and will comply with the requirements of Appendix 3D [Sound Transmission Ratings].

5.4.5.3 Ceiling height will not be less than 2.7 metres above the finished floor in all areas except for the following:

5.4.5.3(1) ceiling heights in corridors, storage rooms and toilet rooms will be not less than 2.4 metres (except that ceiling heights in small, normally unoccupied spaces such as storage closets may be reduced to a minimum of 2.1 metres); and

5.4.5.3(2) suspended tracks, rails and pipes located in the traffic path for patients in beds and/or on stretchers, including those in patient service areas, will not be less than 2.2 metres above the finished floor.

5.4.5.4 For consistency with existing products and materials on the campus, all components including tiles and suspension systems will be of an imperial dimension standard.

5.4.5.5 Design and select ceiling systems and ceiling finishes to comply with the following criteria as may be relevant to the particular or specific functions of the space:

5.4.5.5(1) cleaning, maintenance and infection prevention and control;

5.4.5.5(2) flexibility and access to the spaces above;

5.4.5.5(3) compatibility with mechanical, plumbing, electrical, communications services and fixtures;

5.4.5.5(4) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and

5.4.5.5(5) aesthetic and design qualities to provide a healing environment for the patients, staff and public.

5.4.6 Floor Finishes

5.4.6.1 The floor and floor systems form a part of the interior space. Accordingly, Project Co will provide flooring that is complementary and integral to the functional and aesthetic requirements of the interior space.

5.4.6.2 Project Co will select floor finishes to suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated;

5.4.6.3 Flooring designs and patterns may comprise a component of the “way-finding” system of the Facility.

5.4.6.4 Project Co will design and select floor finishes to comply with the following criteria:

5.4.6.4(1) ergonomic comfort, cleaning, maintenance and infection prevention and control including the frequency and quality of joints and also including ease of replacement if and when required;

5.4.6.4(2) imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture;

5.4.6.4(3) permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;

5.4.6.4(4) aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public;

5.4.6.4(5) low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

5.4.6.4(6) compatibility of patterns and textures with the requirements for pedestrian safety and elder friendly design; and

5.4.6.4(7) incorporation of colours and graphics for way-finding.

5.4.6.5 Non-skid flooring will be used in food service areas, central cleaning and sterilizing, wash and change rooms, bathing areas, etc.

5.4.6.6 Patient shower floors will be provided with a positive slope to drains and be flush-walk-in without ridges for water retention.

## 5.5 Interior Environment

5.5.1 Infection Control

5.5.1.1 General

5.5.1.1(1) Design the Facility to mitigate and prevent, where possible, the spread of infection including via contaminated surfaces and airborne pathogens.

5.5.1.1(2) Select appropriate materials and use simple detailing leading to quality workmanship and ease of accessibility for routine cleaning and maintenance.

5.5.1.1(3) Design the Facility to consider ease of infection prevention and control in future alterations, modifications and additions.

5.5.1.1(4) Design the Facility to mitigate the spread of airborne infections during an outbreak by creating outbreak control zones as follows:

5.5.1.1(4)(a) outbreak control zones will be no more than 1000 m2 in area and contain no more than 14 patient care/treatment rooms;

5.5.1.1(4)(b) outbreak control zones will be bounded by construction that allows the mechanical ventilation systems to create negative pressure within a zone relative to adjacent floor areas;

5.5.1.1(4)(c) contain all patient care rooms within the NICU, HDCU, HCU and NU within outbreak control zones;

5.5.1.1(4)(d) provide an outbreak control zone in the paediatric zone of the Emergency Department and at least one outbreak control zone in the acute zone of the Emergency Department to enclose at least 20 exam/treatment rooms; and

5.5.1.1(4)(e) coordinate outbreak control zones with the mechanical requirements described in Section 7.4.4.1(3) of this Schedule.

5.5.1.2 Sinks and Hand Hygiene Stations

5.5.1.2(1) Design the Facility in compliance with all applicable infection control standards, including the following Authority infection control manuals and policies:

5.5.1.2(1)(a) Fraser Health – Acute Care Infection Prevention & Control Manual IC4:0100 Appendix B: Recommendations on the Placement of Alcohol Gel, Antimicrobial Soap and Plain Soap Within The Acute Care Hospital; and

5.5.1.2(1)(b) Fraser Health - Infection Control: It's in your Hands! Campaign Placement of Isagel Dispensers.

5.5.1.2(2) Prepare a workflow pattern and risk assessment in collaboration with the Authority to address placement of hand wash sinks and alcohol-based hand rub dispensers.

5.5.1.2(3) At minimum, provide hand washing sinks in the following rooms or areas:

5.5.1.2(3)(a) in the Emergency Department, provide 1 hand washing sink for every 4 beds in open multi-bed areas;

5.5.1.2(3)(b) examination and treatment rooms;

5.5.1.2(3)(c) procedure rooms;

5.5.1.2(3)(d) care team stations;

5.5.1.2(3)(e) medication rooms;

5.5.1.2(3)(f) nourishment areas;

5.5.1.2(3)(g) clean work areas;

5.5.1.2(3)(h) soiled utility rooms;

5.5.1.2(3)(i) public waiting rooms

5.5.1.2(3)(j) patient rooms

5.5.1.2(3)(k) patient therapy rooms

5.5.1.2(3)(l) housekeeping supply areas

5.5.1.2(3)(m) corridor alcoves, and

5.5.1.2(3)(n) laboratory areas.

5.5.1.2(4) At minimum, provide specialized scrub sinks in the following rooms or areas:

5.5.1.2(4)(a) in the pharmacy;

5.5.1.2(4)(b) all areas where invasive sterile procedures occur; and

5.5.1.2(4)(c) within each of the pods in NICU and at the NICU entrance.

5.5.1.2(5) Provide hand hygiene stations:

5.5.1.2(5)(a) at all entrances to the Facility so that visitors stop, take notice, and access them (stations should have at least four antiseptic hand rub dispensers mounted for convenient access for visitors); and

5.5.1.2(5)(b) at other locations determined in consultation with the Authority.

5.5.1.3 Surfaces

5.5.1.3(1) Ceilings

5.5.1.3(1)(a) Ceilings in patient care units and food preparation areas will be washable and able to withstand routine hospital cleaning.

5.5.1.3(1)(b) Ceilings in airborne isolation rooms and procedure rooms will be:

(b).1 smooth, solid surface, non-perforated and scrubbable; and

(b).2 capable of being cleaned using routine low level hospital disinfection chemicals

5.5.1.3(1)(c) Penetrations must be properly sealed to prevent the entrance of air, insects and rodents.

5.5.1.3(2) Floors

5.5.1.3(2)(a) Floors in patient care cares must be washable and able to withstand routine low level hospital disinfection.

5.5.1.3(2)(b) Penetrations must be properly sealed to prevent the entrance of air, insects and rodents.

5.5.1.4 Equipment & Storage

5.5.1.4(1) Provide storage shelves that are:

5.5.1.4(1)(a) cleanable with Authority approved detergents and disinfectants;

5.5.1.4(1)(b) not be located under sinks;

5.5.1.4(1)(c) 8-10” above the floor to permit routine cleaning; and

5.5.1.4(1)(d) 18-20” from ceiling to ensure adequate functioning of fire sprinklers;

5.5.1.4(2) If open shelving is provided for storage, the bottom shelf of such shelving will be a solid surface to prevent contamination from the floor.

5.5.2 Ergonomic Design

5.5.2.1 Project Co will provide:

5.5.2.1(1) detailed design features, which expressly facilitate the physical activities of the staff and patients to increase their safety, efficiency and general well being, and assist in eliminating ergonomic risk factors;

5.5.2.1(2) for all patient care and treatment spaces (including washrooms) to accommodate lifting and transfer devices; and

5.5.2.1(3) ergonomics design, consistent with Good Industry Practice, of all work spaces including millwork, furniture, lighting, and finishes to eliminate strain and injury to health care workers.

5.5.3 Elder-Friendly

5.5.3.1 Project Co will comply with “Code Plus, Physical Design Components for an Elder Friendly Hospital, January 2006”, which identifies components that are known to contribute adverse affects on functional ability and safety in older adults, and additional physical design elements that go beyond industrial building codes and standards together with corresponding recommendations for elder friendliness.

5.5.4 Colour

5.5.4.1 Project Co will:

5.5.4.1(1) provide departmental color palettes appropriate for the emotional and psychological needs of patients;

5.5.4.1(2) provide natural color palettes that contribute to the creation of a healing environment;

5.5.4.1(3) provide distribution of ambient full-spectral color within typical staff and patient environments; and

5.5.4.1(4) avoid glare-creating finishes.

5.5.5 Art Works

5.5.5.1 As part of the Authority’s art program, the Authority intends to procure various art works for display within the Facility.

5.5.5.2 Project Co will:

5.5.5.2(1) design the Facility to support the Authority’s art program by providing and identifying for the Authority effective and appropriate locations for major and minor art works throughout the Facility;

5.5.5.2(2) coordinate the procurement and delivery (including timing of delivery), of art works with the Authority and install all art works procured by the Authority;

5.5.5.2(3) provide lighting to enhance the display of all art works;

5.5.5.2(4) provide all necessary structural support, seismic restraint, vandal-proof mounting and other protective measures required for particular art works; and

5.5.5.2(5) consider the development of major public pathways as galleries with hanging and display systems that can accommodate complete size and spacing flexibility in mounting.

5.5.6 Interior Wayfinding

5.5.6.1 Project Co will:

5.5.6.1(1) provide a simple configuration of the Facility circulation systems and functions so that way finding is inherently easy;

5.5.6.1(2) locate major destinations, such as department entrances, directly off of entry spaces and/or along primary circulation paths for easy access, make waiting areas as open as possible to circulation routes without requiring wayfinders to pass through waiting areas;

5.5.6.1(3) provide significant recognizable, easily named and identified elements in key and easily found locations that can become 'meeting points' for patients and visitors;

5.5.6.1(4) design public elevator and stair lobbies and public circulation routes to be distinct from service routes and other non-public routes; and

5.5.6.1(5) orient all building plan directories to reflect the direction from which they are viewed.

5.5.7 Signage

5.5.7.1 Project Co will provide all signage required for the Facility in accordance with the following:

5.5.7.1(1) signage will comply with the Authority's "Graphic Standards" and be coordinated with the Authority. Take into consideration the Authority's "Wayfinding Workshop – Surrey Memorial Hospital" and the "Final Artwork" signage templates included in the Data Room;

5.5.7.1(2) signage will be highly visible (day and night), clear, concise, and well-differentiated from surrounding information, notices, advertising, etc.;

5.5.7.1(3) design signage such that the materials, colours, letter fonts, sizes and other aesthetic and functional considerations, such as Braille, conform to the overall way finding design system;

5.5.7.1(4) signage will be resistant to graffiti and physical damage;

5.5.7.1(5) use international symbols where and as applicable;

5.5.7.1(6) provide signage that directs visitors to all patient destinations and all other departments and rooms within. Prioritize patient destinations over non-patient destinations;

5.5.7.1(7) orient all important signs, including all patient destination signs, to be perpendicular to the line of patient travel on approach;

5.5.7.1(8) avoid multi-layered naming hierarchies and complex numbering systems; and

5.5.7.1(9) in consultation with the Authority, provide space for and install donor appreciation signage.

5.5.7.2 Project Co will provide a space located in proximity to the main visitor entrance(s) where the Authority may construct a feature to recognize donors, and other supporters of the Facility.

5.5.7.3 Design the internal directional signs to include:

5.5.7.3(1) a main directory, installed at or near the main public entrance to the Building that indicates the Building in relation to the overall SMH Campus and the location of every area and department within the Building that is accessible to the public;

5.5.7.3(2) a continuous ‘trail’ of signage from the entrances to each of the reception/information points listed on the directories;

5.5.7.3(3) installation of signage at each point at which a directional decision is required;

5.5.7.3(4) consistent terminology;

5.5.7.3(5) door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility. Door signage will:

5.5.7.3(5)(a) be developed in consultation with the Authority;

5.5.7.3(5)(b) be located in a consistent location for every space in the Facility;

5.5.7.3(5)(c) indicate restrictions on entry and warn of hazards, including “Laser in use” and “Radiology in use” signage;

5.5.7.3(5)(d) not be obscured by the emergency systems and Code Blue system call; and

5.5.7.3(5)(e) be consistent with the following room numbering protocol:

(e).1 each room has a unique identifier number;
(e).2 rooms are numbered in a manner that reflects normal movement through the Facility;
(e).3 labelling anticipates a person attempting to follow numbering along corridors in sequence;
(e).4 blocks of numbers are periodically skipped to allow for future expansion of the numbering system if rooms are added through renovations; and
(e).5 each room and space requires a unique number for service reasons. It is important that room numbers be determined early in design and maintained following occupancy. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).

## 5.6 Structural Design

### 5.6.1 Structural Design Principles

5.6.1.1 Project Co's structural engineer-of-record will be a professional engineer and a designated structural engineer licensed to practice in the Province of British Columbia with demonstrated experience in undertaking the structural design of buildings similar in size and complexity to the Facility.

5.6.1.2 The structural design, including minimum design loads and general provisions and material specifications, will satisfy the more stringent requirements of the BC Building Code, other applicable or referenced design standards, loading criteria required by equipment suppliers or construction technique and the principles detailed in this Section.

5.6.1.3 Prior to applying for a building permit for the Facility, Project Co will have a qualified second Professional Engineer licensed in the Province of British Columbia perform a concept review satisfying the requirements of the Association of Professional Engineers and Geo-scientists of British Columbia Quality Management By-law.

5.6.1.4 Project Co's structural engineer-of-record will perform field review of the Construction at sufficient frequency and review of the reports of the applicable inspection and testing agencies to verify that the building structures of the

Facility have been built in substantial conformance to the issued for construction structural drawings and any authorized amendments thereto.

5.6.1.5 Carry out the Construction so that Construction-caused settlement of existing buildings and structures does not exceed 6 mm at any location.

5.6.2 Structural Analysis Methods

5.6.2.1 Perform the structural analysis of the Facility generally in accordance with the provisions of BC Building Code, section 4.1.8.7; however, and as a minimum, it is essential that a Dynamic Analysis Procedure (Response Spectrum Acceleration Analysis) in accordance with the provisions of the BC Building Code, Section 4.1.8.12, be used.

5.6.2.2 The structural analysis of the Facility will include a three dimensional analysis accounting for all vertical and lateral loads together with all applicable load combinations, carried out using a computer software program consistent with Good Industry Practice.

5.6.3 Sub Structures

5.6.3.1 Building foundation systems will provide adequate support to the superstructure while limiting short and long term overall and differential settlement to acceptable levels. The long term differential settlement in any structural bay will not exceed 25mm.

5.6.3.2 Building foundation systems and site preparation design will be in accordance with recommendations from a qualified geotechnical engineer registered in the Province of British Columbia. Building foundations, including piling, conventional footings, or raft slabs, will be designed by the building engineer-of-record.

5.6.3.3 Refer to Schedule 2 [Design and Construction Protocols] for requirements regarding vibration from Construction activities.

5.6.3.4 During site preparation and construction, a qualified geotechnical engineer, registered in the Province of British Columbia, will provide site reviews and appropriate testing to confirm the general intent of the foundation and site preparation design recommendations are carried out.

5.6.4 Design loads

5.6.4.1 Performance criteria

5.6.4.1(1) Use the following minimum floor design specified live loads except where the specific use and occupancy of a space requires a higher live load:

5.6.4.1(1)(a) Underground parkade and basement slab on grade parkade: 2.4 kPA (50psf);

5.6.4.1(1)(b) Main (ground) floor and Assembly Areas: 4.8 kPa (100 psf);

5.6.4.1(1)(c) Upper Floors 3.60 KPa (75 psf); and

5.6.4.1(1)(d) Mechanical/electrical service rooms: 6.0 kPa (125 psf).

5.6.4.1(2) Design upper floors to accommodate concentrated loads from equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted, including medical equipment and patient lifting devices.

5.6.4.1(3) Design floors for a minimum superimposed specified dead load allowance of 1.0 kPa to allow for partitions, and 0.5 kPa to allow for ceilings and mechanical equipment; (other than medical equipment).

5.6.4.1(4) Design roofs for a minimum net uplift wind load of 1.5 kPa for the minimum snow and rain loads required by applicable Laws. Notwithstanding other requirements, the minimum specified live load for design of roofs will be 2.4 kPa (50 psf) and roofs will be designed to accommodate concentrated loads from equipment, machinery and features, whether roof or ceiling-mounted, including medical equipment and patient lifting devices.

5.6.4.1(5) Design roofs for the superimposed specified dead load of roofing materials, green roofs (if applicable), ceilings, mechanical equipment, but not less than 1.5 kPa (30 psf) to allow for future re-roofing alternatives.

5.6.4.1(6) Roof areas will designed for loads associated with the use of the Helipad.

5.6.4.1(7) Design floors and roofs above mechanical and electrical service rooms for a superimposed suspended equipment specified dead load of 2.0 kPa (40 psf) in addition to the minimum dead load allowances specified above.

5.6.4.1(8) Design floors for rooms designated for medical records storage or compact mobile shelving for a minimum 12.0 kPa (250 psf) specified live load.

5.6.4.1(9) Design all building elements, including overall building stability, for applicable wind and seismic loads specified in applicable Laws.

5.6.4.1(10) Climatic and seismic information for the determination of snow, wind, earthquake, and thermal loadings on the structure is provided in the BC Building Code. The strength design of members will be based on a 1 in 50 year return period for snow load and wind pressure, and the 24 hour rainfall for the Surrey area. Maximum exterior temperature ranges will be determined using the 2.5% January and July air temperatures.

5.6.4.1(11) Design the lateral load resisting systems for the structure based on the effects of the factored lateral wind pressures or seismic loads, whichever produces the more unfavourable effect.

5.6.4.1(12) The deflection requirements for all structural members are to be based on the above noted climatic data.

5.6.4.1(13) The design loads for are to be determined in accordance with the BC Building Code and the Structural Commentary – Part 4.

5.6.5 Flexibility for Future Change

5.6.5.1 Design the floor structure to be able to accommodate one 130mm diameter cored hole per structural bay at almost any location in the floor plate and the design for the concrete floors should assume at least one reinforcing bar in each direction at each core location is cut.

5.6.5.2 Design the floor structure with a minimum of one 150mm diameter knock-out opening on two sides of each column for future use and the knock-out openings will be in addition to any openings required for current services; additionally the floor structure will be capable of having a minimum of six additional core holes (100 mm diameter) per bay without additional reinforcing.

5.6.5.3 Select 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 should be a primary structural design criteria.

5.6.5.4 The minimum primary structural support grid will be 9mx9m to accommodate flexibility in the layout of the Facility.

5.6.6 Deflection limitations

5.6.6.1 Design the structure of the Facility to minimize the effects of deflection and long-term creep.

5.6.6.2 Design the structure to meet the deflection limits of the BC Building Code, and in accordance with the applicable materials design standards listed in Section 2.1 of this Schedule as a minimum and as appropriate for the non-structural

components of the Facility. Notwithstanding the above, the deflection limit will not exceed the levels specified in this Section.

5.6.6.3 Performance criteria

5.6.6.3(1) For concrete floor or roof construction, the maximum deflection occurring after the installation of non-structural elements, including long-term creep deflection and live load deflection, will not exceed span/480 and total short and long-term deflection is not exceed span/360;

5.6.6.3(2) for steel floor construction, the maximum live load deflection is not exceed span/480 with the total load deflection not exceeding span/360. The total load deflection is to include effects of shrinkage of concrete topping slabs;

5.6.6.3(3) for steel roof construction, the maximum live load deflection will not exceed span/360 and the total load deflection will not exceed span/240; and

5.6.6.3(4) the lateral building interstory seismic drift will not exceed 1 percent of the storey height.

5.6.7 Vibration limitations

5.6.7.1 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.

5.6.7.2 Floor system vibration characteristics are to be in accordance with Commentary D of the NBC 2005 Edition.

5.6.7.3 Performance criteria

5.6.7.3(1) Select and design floor structural systems to have a vibration acceleration maximum limit of 0.5%g with a damping ratio of 0.02 when an excitation force of 0.29 kN is applied.

5.6.7.3(2) Machinery that could be a source of vibration is to be mounted using vibration isolation techniques; this includes the potential dynamic loads associated with the use of the Helipad.

5.6.7.3(3) In areas supporting C.T. scanners, microscopes, and other sensitive equipment and occupancies, design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space and in-situ measurement verification of floor vibration characteristics is to be carried out where specified by the equipment manufacturer.

5.6.7.3(4) The following table indicates acceptable vibration levels for various typical medical and non medical Facility spaces:

| Occupancy or Equipment Requirements | Vibrational Velocity (1) | | Floor Stiffness $KF_n$ (2) |
|---|---|---|---|
| | in/s | m/s | Kips/in-sec |
| Mechanical rooms on an unoccupied floor above or below an occupied floor | 4000 | 1000 | Not Applicable |
| Office areas, waiting rooms and corridors | 1600 | 400 | 250-1500 |
| Mechanical Rooms on the same floor as an occupied area | 1200 | 300 | Not Applicable |
| Computer areas; patient care areas (daytime) – threshold of human perception | 8000 | 200 | 500-3000 |
| Operating rooms and critical work areas; bench microscopes up to 100 x magnification | 4000 | 100 | 1000-6000 |
| Bench microscopes up to 400 x magnification; optical and other precision balances; optical comparators | 2000 | 50 | 2000-12000 |
| Microsurgery, eye surgery; Bench microscopes at magnification greater than 400x; optical equipment on isolation tables | 1000 | 25 | 4000-25000 |
| Magnetic resonance imagers | 500 | 12 | 8000-50000 |
| Mass spectrometers | 250 | 6 | 16000-100000 |
| Value of constant velocity regions measured in one-third octave bands of frequency range 8 to 100 Hz. Based on ASHRAE, AISC and ISO Criteria.<br>KFn depends on walker weight and gait. Ranges indicated reflect average to conservative designs. Average walker (150 lbs, 75 steps/min). Conservative walker (185lbs, 100 steps/min) | | | |

5.6.8 Durability

5.6.8.1 Design the structure and structural components of the Facility for a minimum 50-year life span.

5.6.8.2 Design the structure in accordance with all applicable material standards.

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

5.6.8.3(1) adequate concrete crack control joints and expansion/contraction joints. Caulk exposed joints;

5.6.8.3(2) high strength concrete mixes proportioned to CSA A23-1/A23-2 durability requirements for exposure class;

5.6.8.3(3) reinforce concrete for crack control and repair exposed cracks;

5.6.8.3(4) hot-dip galvanize exterior exposed steel; and steel protection angles to exposed columns in loading bays; and

5.6.8.3(5) embedded steel protection angles and skid plates for loading docks and garbage compactors.

5.6.9 Medical equipment supports

5.6.9.1 Design and provide for support/anchorage of all Authority supplied equipment. Medical equipment will be supported, anchored, and braced to resist gravity, operational, and seismic loads in a manner appropriate for the functional and service requirements for the specific equipment.

5.6.9.2 The design for medical equipment supports, anchorage, and bracing will be carried out by a qualified professional engineer registered in the Province of British Columbia. Installations will be field reviewed by the design engineer.

5.6.9.3 Performance criteria

5.6.9.3(1) Design floor and roof assemblies to support the gravity and seismic loads for floor, wall, or ceiling-mounted medical equipment included on the Equipment List. Ensure that steel content of structural members is compatible with equipment which is sensitive to steel content of the surrounding structure.

5.6.9.3(2) Design the structure for the vibration limitations specified by the manufacturer of the specified equipment or required by the planned use and occupancy of the floor space and carry out in-situ vibration testing when specified by the equipment manufacturer;

5.6.9.3(3) Where practical the design of, supports for ceiling-mounted equipment, such as radiology gantries, is to be universal for re-use with future equipment installations; and

5.6.9.3(4) Drilled insert-type anchors for medical equipment supports and anchorage are to be rated by the insert manufacturer for seismic and

cyclic loading applications and drop-in sleeve anchors will not be permitted.

5.6.10 Member Design Criteria

5.6.10.1 Design all floor and roof structural framing members to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored loads

5.6.10.2 Design all floor and roof structural framing members to have sufficient stiffness so as to remain serviceable under the specified gravity loads. The deflection criteria is presented in the following table:

| Maximum Deflection/Span Ratios | | |
|---|---|---|
| Member Type | Specified Loading | Deflection Limits |
| Precast/reinforced concrete floor members supporting non-structural elements likely to be damaged by large deflections. | Long-term dead load plus live load | 1:480 |
| Structural steel members of floors or roofs supporting finishes susceptible of cracking. | Live Load | 1:360 |
| Structural steel members of floors or roofs supporting finishes susceptible of cracking. | Live Load | 1:360 |

5.6.10.3 Lateral Load Resisting System Design Criteria (wind)

5.6.10.3(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 unfavourable effect.

5.6.10.3(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 shall not exceed 1/500 of the storey height.

5.6.10.4 Cladding Support Design Criteria

5.6.10.4(1) If 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 and wind pressures.

5.6.10.4(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 following table:

| Maximum Deflection/Span Ratios – 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 |

5.6.10.5 Structural Integrity

5.6.10.5(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 blast-resistant 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 influences that may reasonably be expected over the service life of the structure.

5.6.10.6 Thermal Expansion

5.6.10.6(1) Design the primary and secondary structural elements to accommodate the effects of thermal movements of the Facility structure.

5.6.10.7 Seismic Isolation

5.6.10.7(1) Design the structure to be completely independent from any existing adjacent structures and any adjacent structures by a properly designed seismic isolation joint which takes into account the lateral drifts of both the new and adjacent existing structures in accordance with the provisions of the BC Building Code.

## PART 6. FACILITIES CONSTRUCTION SUBGROUP SPECIFICATIONS

### 6.1 Procurement and Contracting Requirements (Division 1) – NOT USED

### 6.2 Existing Conditions (Division 2)

6.2.1 Refer to Schedule 2 [Design and Construction Protocols] regarding available Site reports.

### 6.3 Concrete (Division 3)

6.3.1 Overriding Principles

6.3.1.1 Design and construct cast in place or precast concrete of appropriate properties for the intended use in accordance with the requirements of all applicable codes and specifications for the applicable concrete exposure class and to maximize the fly ash content of the mix.

6.3.1.2 Use wood formwork for all cast in place concrete.

6.3.2 Quality Requirements

6.3.2.1 Cause cast in place concrete and concrete materials to be inspected and tested by a CSA certified testing laboratory.

6.3.2.2 Cause precast concrete materials and workmanship to be inspected and tested by the precast concrete contractor as part of its quality control program in accordance with all applicable standards.

6.3.3 Performance Criteria

6.3.3.1 Finish concrete floors 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 Repair cracks in concrete floors and walls to suit the floor finish and long-term serviceability requirements of the floor.

6.3.3.3 Water proof foundation walls for basement occupied spaces, including any occupied spaces in underground parkade levels, to prevent groundwater ingress. Construction joints will have purpose-made water stops. A perimeter draining system will be installed around the exterior of the earth-retained foundation.

6.3.3.4 Exposed architectural concrete will comply with CAN/CSA A23.1-04 to minimize honey combing or patching.

## 6.4 Masonry (Division 4)

6.4.1 Basic Requirements

6.4.1.1 Masonry construction may be considered for exterior walls and walls systems where permanence of finishes, both visually and functionally, and ease of maintenance are primary considerations in the exterior fabric of the Facility.

6.4.1.2 Masonry construction may be considered for interior walls and wall systems when 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 Concrete unit masonry may be considered for both independent exterior walls and in exterior wall systems as a structural backing to other finish materials or systems.

6.4.2.2 Concrete unit masonry for interior applications may be considered as an integrally finished material, as a base for applied finish and as a structural backing to other finish systems.

6.4.2.3 Painted or unpainted concrete unit masonry will not be used as an exposed finish in clinical or public areas.

6.4.2.4 Where concrete unit masonry is used as the exposed finish all exposed corners will be radiused.

6.4.2.5 Masonry design and construction will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual and all applicable standards.

6.4.3 Brick Masonry

6.4.3.1 Exterior wall systems comprising brick masonry as a finish veneer to concrete, concrete masonry or metal framing will be a rain screen or cavity wall system.

6.4.3.2 Brick masonry below grade for exterior applications is not permitted.

6.4.3.3 Brick masonry in interior applications is to have integral finish and construction compatible with the Authority's infection prevention and control requirements.

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.

## 6.5 Metals (Division 5)

6.5.1 Basic Requirements

6.5.1.1 Structural steel, steel deck, and cold-formed steel stud design and construction may be considered for building elements and systems, where appropriate.

6.5.2 Performance Criteria

6.5.2.1 Design structural steel, steel deck, and cold-formed steel stud systems to comply with the deflection and vibration criteria outlined in Section 5.6 (Structural Design).

6.5.2.2 Erection tolerances for steel construction will be in accordance with all applicable CAN/CSA standards.

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 is to be considered. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight is to be considered in the design of the structure.

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 Section 6.3.3.1 of this Schedule. Thin overlay toppings to level floors will not be used.

6.5.2.5 Pay special attention to crack control of concrete topping slabs on steel deck to avoid random surface shrinkage cracking and radial cracking around re-entrant corners and special attention to curing is required for concrete topping slabs on metal deck.

6.5.2.6 Steel floor/roof decking is to be wide rib profile for ease of attachment of current and future services, equipment, and fixtures using drilled insert expansion anchors into the bottom of the deck ribs.

6.5.2.7 Steel floor/roof decking plus the concrete topping slab thickness is to satisfy the requirements of a ULC-rated assembly meeting the BC Building Code fire rating requirements. Spray on or applied fireproofing material is not to be used to achieve required floor deck fire rating.

6.5.2.8 Fire proof structural steel floor/roof framing and supporting members to meet the fire rating requirement.

6.5.3 Structural Steel and Steel Joists

6.5.3.1 Quality Requirements

6.5.3.1(1) Cause quality assurance testing and monitoring of workmanship to be carried out by an approved testing laboratory using testing procedures as specified in the CAN/CSA standards listed in Section 2.1 of this Schedule to verify soundness of representative shop and field welds.

6.5.3.1(2) Material quality including sourcing and welding quality will be monitored by an independent testing agency.

6.5.3.1(3) The specification for preparation and painting of Structural Steel components will conform to the Master Painters Institute (MPI) Standards.

6.5.4 Load Bearing Steel Studs

6.5.4.1 Overriding Principles

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 perimeter envelope.

6.5.4.1(2) Load bearing steel studs may be part of the structural framing or may be independent of the principle structural system.

6.5.4.2 Quality Requirements

6.5.4.2(1) Design, detail and construct load bearing steel stud design and construction to comply with all applicable CAN/CSA standards.

6.5.4.2(2) The steel stud manufacturer will be certified in accordance with CSSBI Standard 30M-06 and all applicable CAN/CSA standards.

6.5.4.2(3) The steel stud fabricator and erector will be experienced in the type of work undertaken.

6.5.4.2(4) 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 (L/720 for masonry veneers), unless a smaller maximum deflection is specifically required due to wall finishes.

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.

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.

## 6.6 Wood Plastics and Composites (including Millwork) (Division 6)

6.6.1 Basic Requirements

6.6.1.1 Do not use urea formaldehyde containing materials in the Facility.

6.6.1.2 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/communication rooms, roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including but not limited to exterior fascia's, cabinets, casework (excluding laboratory casework, 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 support functionality as defined in the Clinical Specification or as required for operation of the Facility; and

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

6.6.1.3 Use wood studs for non-load bearing framing in non patient care areas, subject to approval from the authority having jurisdiction under the BC Building Code. Wood studs will comply with applicable CSA standards for lumber. Wood framing design will be certified by a professional engineer registered in the province of British Columbia.

6.6.1.4 Provide solid polymer fabricated surfacing for:

6.6.1.4(1) all counters that incorporate sinks;

6.6.1.4(2) all reception desks; and

6.6.1.4(3) other areas as required to create surfaces that provide antiseptic or clean characteristics, special or regular maintenance, and resistance to caustic action of chemicals or agents used by the Authority.

6.6.1.5 Provide acrylic plastic products as required for wall cladding, wall protection, corner protection, casework finishing, trims, ornamental elements, and other applications to achieve a quality of interior finish suitable for use by patients and staff.

6.6.1.6 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 Manufacturer's Association of Canada (AWMAC) 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) For millwork and cabinets, seal all wood surfaces and edges with plastic laminate for infection control.

6.6.2.1(3) Comply with the requirements of credit 4.4 (Indoor Environmental Quality, Low-Emitting Materials: Composite Wood and Laminate Adhesives) of the LEED Rating System.

6.6.2.1(4) Adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian 'Eco-Logo' program, and CaGBC (Canada Green Building Council).

6.6.2.1(5) Use marine-grade plywood substrate for countertops. Do not use fibreboard or particleboard.

## 6.7 Thermal and Moisture Protection (Division 7)

6.7.1 Basic Requirements

6.7.1.1 Design construction assemblies according to building envelope principles.

6.7.1.2 Design construction assemblies to prevent the ingress of moisture or water vapour from the exterior through the building envelope and the passage of air through the building envelope from the interior spaces to the exterior and vice versa.

6.7.1.3 Design construction assemblies to prevent the ingress of moisture through foundation walls below grade, both subject and not subject to hydrostatic pressure.

6.7.1.4 Provide protection (such as insulation) to resist the transfer of heat through exterior walls and roofs to create comfortable, liveable interior environments.

6.7.1.5 Provide resistance to the propagation and spread of fire for exterior walls and interior walls designated as fire-resistance rated separations where appropriate.

6.7.2 Performance Criteria

6.7.2.1 Dampproofing

6.7.2.1(1) Provide foundation wall surfaces with dampproofing coverage that is sufficient to repel and prevent moisture ingress.

6.7.2.2 Waterproofing

6.7.2.2(1) Provide waterproofing to prevent moisture ingress to occupied spaces below grade, including any occupied spaces in below-grade parking levels.

6.7.2.2(2) Use membrane waterproofing to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated. Use fluid-applied waterproofing for mechanical room floors.

6.7.2.2(3) Provide waterproof membranes 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) Prevent water vapour transmission and condensation in wall assemblies, roofing assemblies, and under concrete slabs-on-grade within the Building perimeter by means of a continuous vapour barrier membrane.

6.7.2.4 Air Barriers

6.7.2.4(1) Prevent air leakage caused by air pressure across the wall and roof assembly by means of air barrier assemblies.

6.7.2.4(2) Provide air barrier assemblies that:

6.7.2.4(2)(a) limit air exfiltration and infiltration through materials of the assembly, joints in the assembly, joints in components of the wall assembly, and junctions with other building elements including the roof; and

6.7.2.4(2)(b) prevent air leakage caused by air pressure across the wall and roof assembly, including interruptions to the integrity of wall and roof systems such as junctions with dissimilar constructions.

6.7.2.5 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, depending on seasonal conditions, and to resist the absorption of water.

6.7.2.5(2) Use thermal protection materials of a type and quality that will provide consistent environmental quality to enclosed spaces.

6.7.2.5(3) Use foamed plastic insulation that is CFC and HCFC free.

6.7.2.5(4) Minimum insulation values will be R20 (U-Value 0.05) for exterior walls and R30 (U-Value 0.033) for roof areas.

6.7.2.6 Roofing

6.7.2.6(1) Comply with the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) latest standards and requirements for a five (5) year Guarantee, as published in the RGC Roofing Practices Manual. Perform roofing quality inspections as required by the RCABC to obtain the RCABC warranty.

6.7.2.6(2) Provide roofing assemblies that will withstand air pressures due to helicopter approaches and landings.

6.7.2.6(3) Comply with RGC Roofing Practices Manual "Acceptable Materials List," including:

6.7.2.6(3)(a) Membrane for green roofs – SBS modified (two-ply system); and

6.7.2.6(3)(b) Flexible membrane for reflective roofs – Elastomeric or Thermoplastic (single-ply system), Energy Star compliant (highly reflective) and high emissivity (of at least 0.9 when tested in accordance with ASTM 408).

6.7.2.6(4) Use foamed plastic insulation that is CFC- and HCFC-free.

6.7.2.6(5) Provide a complete horizontal barrier to weather and climate using one of the aforementioned roofing systems.

6.7.2.6(6) 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(7) Roofing systems will include:

6.7.2.6(7)(a) flashings and sheet metal;

6.7.2.6(7)(b) thermal insulation;

6.7.2.6(7)(c) assembly components for green roofs if used;

6.7.2.6(7)(d) roofing specialties and accessories required for completion;

6.7.2.6(7)(e) interior access systems to roof areas;

6.7.2.6(7)(f) protection from pedestrian traffic and solar radiation; and

6.7.2.6(7)(g) roof drainage, including overflow scuppers.

6.7.2.6(8) Provide sheet metal flashings that divert water away from membrane flashing termination and protect the membrane from deterioration due to the exterior elements and mechanical damage. Provide roofing membrane continuously under the metal.

6.7.2.6(9) Metal roofing systems, if used, will provide clear internal paths of drainage to allow any trapped moisture to drain to the exterior and avoid the staining of architectural finishes, forming of puddles, forming of icicles, and dripping on pedestrians. In designing the Facility, including any roof systems, ensure that entrance ways are protected from sliding snow and ice and that there are no accumulations of snow and ice in roof valleys.

6.7.2.7 Fire and Smoke Protection

6.7.2.7(1) Use spray-applied cementitious fireproofing if required to achieve a fire resistance rating.

6.7.2.7(2) Integrate barriers into vertical and horizontal space separations to protect against the spread of fire and smoke. Apply protection to exposed building elements (structural and non-structural) susceptible to fire and subsequent damage.

6.7.2.7(3) Apply protection around penetrations through vertical and horizontal fire-resistance rated separations.

6.7.2.7(4) Use firestopping and smoke seal systems that consist of asbestos-free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.

6.7.2.7(5) Use firestopping that:

6.7.2.7(5)(a) is compatible with substrates;

6.7.2.7(5)(b) allows for movement caused by thermal cycles; and

6.7.2.7(5)(c) prevents the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.

6.7.2.7(6) When more than one product is required for an assembly, use products that are compatible with one another and from the same manufacturer.

6.7.2.7(7) Use fire stopping sealants and coatings that are silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water. Do not use acrylic-based coatings and sealants.

6.7.2.8 Sealants

6.7.2.8(1) All sealants and sealant primers used on the interior of the Facility will comply with the requirements of LEED - low VOC.

6.7.2.8(2) Apply sealant materials to achieve:

6.7.2.8(2)(a) Seals to the building envelope systems and around openings in the building envelope systems as required to prevent water ingress;

6.7.2.8(2)(b) seals around and over cavities in or behind surface elements to allow effective infection prevention and control (note that sealant around door frames must include joints at bottom of door frames (between floor finish and frames);

6.7.2.8(2)(c) sealed joints between dissimilar or similar materials to allow a smooth or even transitions; and

6.7.2.8(2)(d) sealed expansion or controls joints in the building envelope systems or structural systems to allow movement.

6.7.2.8(3) Do not use unsealed joints in clinical areas.

6.7.2.8(4) For the exterior; use sealants to completely and continuously fill joints between dissimilar and/or similar materials.

6.7.2.8(5) For the interior; use sealants (at frames such as those at doors, windows and skylights), to completely fill joints between dissimilar materials using one component, acrylic emulsion, paintable type.

6.7.2.8(6) Use silicone caulking that is mildew-resistant and impervious to water for caulking washroom plumbing fixtures.

6.7.2.8(7) Use sealants with self-levelling properties for expansion and control joints in concrete floors using two-component epoxy urethane sealants.

6.7.2.8(8) Use non-sag sealants for exterior vertical expansion and control joints in masonry or wall cladding.

6.7.2.8(9) Use sealants that allow for minimum 25% movement in joint width.

6.7.2.8(10) In corridors and other traffic areas used by laundry carts, supply carts, material handling equipment etc., use traffic bearing type sealants suitable to support imposed load without deformation or failure.

6.7.2.9 Traffic Coatings

6.7.2.9(1) Protect the structural concrete floor slabs of parkade structures with a traffic coating to prevent the ingress of moisture into the slab.

6.7.2.9(2) Use traffic coating that complies with the following:

6.7.2.9(2)(a) Membrane: Fluid applied aliphatic polyurethane waterproof traffic membrane (colour as selected by the Authority), liquid applied, two component 100% solids, and meeting or exceeding the following specifications:

| Property | ASTM Test | Result |
|---|---|---|
| Tensile Strength | D638 | 9.1 MPa |
| Elongation at Break | D638 | 435% |
| Tear Strength | D624 | 38.2 KN/mm |
| Hardness | D2240 | 80 Shore A |
| Abrasion Resistance wear course (cs-17 wheel) | D4068 | Maximum Weight loss of 22 mg/1000 cycles |

6.7.2.9(2)(b) Topping: Polyurethane compound wear course.

6.7.2.9(2)(c) Filler and Primer: As recommended by membrane manufacturer.

6.7.2.9(2)(d) Sealant: polyurethane type, compatible with system and adjacent materials.

6.7.2.9(3) Provide fluid applied integral flashings at all locations where a horizontal surface butts a vertical surface and at all deck projections. Apply the membrane over the prepared surfaces at a minimum thickness of 500 microns thick and extend the membrane a minimum of 10 cm on vertical and horizontal surfaces.

## 6.8 Openings (Division 8)

### 6.8.1 Basic Requirements

6.8.1.1 Except where wire glass is required in accordance with the BC Building Code, construct interior windows and sidelights of tempered glass. For exterior glazing at doors and sidelights, use laminated glass.

6.8.1.2 Doors

6.8.1.2(1) Provide doors that suit the intended function of spaces or rooms requiring acoustic or visual privacy, security, special HVAC requirements, fire-resistance rated separations or other closures.

6.8.1.2(2) Size Requirements for Doors

6.8.1.2(2)(a) Provide door openings 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.

6.8.1.2(2)(b) Provide double doors into rooms where large pieces of equipment will be moved in or out during the lifetime of the Facility.

6.8.1.2(2)(c) HDCU and ICU room doors will be 3 panels wide sliding glass, and 2 panels wide sliding glass for the NICU and Emergency Department.

6.8.1.2(2)(d) Size door openings to accommodate movement of equipment, and to suit bariatric patient requirements for all patient rooms of medical/surgical units, ICU and HDCU.

6.8.1.2(2)(e) Provide double doors into corridors and major rooms to ease access where patients in beds or stretchers will be attended to or accompanied by a large number of medical staff and medical equipment.

6.8.1.2(2)(f) Unless required otherwise, provide doors to patient care areas, including doors to water closets and change room cubicles with a minimum width of 914 mm.

6.8.1.2(2)(g) Provide a minimum of 2134 mm high door or door leaf, unless specifically required for access to services or other purposes where height is restricted.

6.8.1.2(3) Acoustic Requirements for Doors: refer to Appendix 3D [Sound Transmission Ratings].

6.8.1.2(4) Provide patient rooms with hardware that allows the doors to stay in an open position and facilitates casual observance of patients by the nursing staff.

6.8.1.2(5) For doors into or between major departments or activity areas through which cart, stretcher, or bed traffic is anticipated on a routine basis, provide automatic activation by an electronic device or manual push button, located to allow emergency access without the necessity to stop movement. For all other doors through which cart, stretcher, bed, or frequent patient or staff traffic is anticipated on a routine basis,

provide appropriate hardware or automatic activation that allows the doors to stay in an open position.

6.8.1.2(6) Apply door sizes and designs consistently to rooms of similar use, location, and configuration.

6.8.1.2(7) Avoid doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to psychiatric holding rooms or to spaces that are used infrequently and are not subject to occupancy such as small closets.

6.8.1.2(8) Doors may swing into patient bathrooms, provided they allow for ease of patient use, both on their own and assisted by staff. Equip such doors with appropriate hardware to allow the door to be opened out into the room in an emergency situation. Alternatively “barn type” sliding doors may be used for patient bathrooms.

6.8.1.2(9) Provide all doors with appropriate hinges, edge protection, and face protection to minimize damage and resultant disruptive maintenance.

6.8.1.2(10) Finish doors and frames with a suitable finish that prevents dirt and fingerprint accumulation, and can be easily cleaned and disinfected.

6.8.1.2(11) Be consistent with the extent of glazing in a door, or the size and quantity of sidelights, and balance these between the nature of observation required and the privacy requirements of the occupants of the room. Where possible and appropriate, provide glazing in an adjacent sidelight rather than within the door itself.

6.8.1.2(12) Provide glazing in doors and sidelights in such a way that they allow patient observation and operational safety of the spaces they serve. Provide sealed double glazing in aluminum frame sliding doors, sliding doors to be without floor tracks, and be provided with emergency swing breakout.

6.8.1.2(13) Provide doors and door frames with the capability to withstand the varying and high levels of humidity and impact that occur typically within a hospital and in specific rooms within a hospital, and maintain their inherent aesthetic and functional capacities.

6.8.1.2(14) In areas where security is considered paramount, achieve security with the appropriate location, configuration, materials, construction, and detailing of doors and hardware.

6.8.1.3 Windows

6.8.1.3(1) Size, configure, and adequately construct windows to suit rooms that require daylight, views and/or natural ventilation.

6.8.1.3(2) Consider providing ‘borrowed light’ through interior windows to occupied rooms that do not have exterior windows. The intent is to borrow light from areas that have windows and consequently create a more comfortable and less closed-in atmosphere.

6.8.1.3(3) Provide operable windows (windows that may be opened and closed) in all rooms and spaces where acceptable for the functionality of the room or space, as described in the Clinical Specification.

6.8.1.3(4) Coordinate glazing heights with adjacent wall protection, handrails, 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 will comply with the requirements of the Canadian Steel Door and Frame Manufacturer’s Association (CSDFMA).

6.8.2.1(2) Provide interior metal doors with flush face construction.

6.8.2.1(3) Provide exterior metal doors with:

6.8.2.1(3)(a) flush face construction;

6.8.2.1(3)(b) edge seams to correspond with door function and minimize maintenance needed; and

6.8.2.1(3)(c) prepared surfaces to receive finishes that resist corrosion from exposure to weather.

6.8.2.1(4) Provide pressed metal frames with:

6.8.2.1(4)(a) fully welded construction;

6.8.2.1(4)(b) thermally-broken door frames for exterior door; 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) For exterior hollow metal door glazing, use sealed units with warm edge, argon filled space in thermally-broken frames to prevent heat loss.

6.8.2.1(5)(b) For interior hollow metal door glazing use tempered glass.

6.8.2.2 Wood Doors

6.8.2.2(1) All wood doors will comply with all applicable standards, including the Quality Standards for Architectural Woodwork published by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC).

6.8.2.2(2) Wood doors will have hardware and finishes that suit the intended function and aesthetics of the Facility.

6.8.2.2(3) Construct, finish, and install wood doors to minimize the requirement for maintenance and resulting disruption to Facility operations.

6.8.2.2(4) Provide wood doors in flush design, Custom Grade quality (as defined in the AWMAC standards referred to above), solid particleboard core.

6.8.2.2(5) Provide fire-resistance rated doors with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.

6.8.2.2(6) Install finish hardware securely to resist loosening over time. Fasten to solid wood backing, except where hardware is designed to be through-bolted.

6.8.2.2(7) Glue stiles, rails and faces to the core with Type II water-resistant adhesive to minimize de-lamination or disassembly as a result of moisture ingress.

6.8.2.2(8) Use B-Grade hardwood veneer with AWMAC No. 3 edge, finish to suit the intended use.

6.8.2.2(9) Do not use wood veneer-faced doors in critical care areas for reasons of cleanliness and infection prevention and control, unless suitably finished to mitigate such concerns.

6.8.2.2(10) In locations requiring radiation protection, line doors with lead and label such doors with lead thickness.

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 Building.

6.8.2.3(2) Provide glazed interior partitions as appropriate to comply with the functions of the spaces as defined by the Clinical Specifications.

6.8.2.3(3) Use aluminum doors within aluminum entrances and storefront.

6.8.2.3(4) Use frames that are thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.

6.8.2.3(5) Incorporate in the frames drained and vented system (rain screen) with a complete air and vapour seal, allowing any moisture entering the frame to drain to the exterior and allowing air into the pressuring chamber.

6.8.2.3(6) Use aluminum swing entrance doors that are heavy-duty commercial or institutional grade that may be automatically operated, motion-detector controlled.

6.8.2.3(7) Apply aluminum finish for exposed aluminum surfaces. Finish to be permanent and resistant to corrosion caused by weather exposure and climate.

6.8.2.4 Specialty Doors

6.8.2.4(1) Overhead Rolling Service Doors

6.8.2.4(1)(a) Restrain lateral movement of door curtain slats. Provide windlocks as required by door size or wind load requirements.

6.8.2.4(1)(b) Provide interlocking flat slats, complete with bottom bar and contact type bottom astragal.

6.8.2.4(1)(c) For manually operated doors, provide inside lift handle and locking bar or chain hoist. Motor operation may be provided on 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, provide automatic closing device 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) Provide grilles that allow visual access to secure areas.

6.8.2.4(2)(b) Provide aluminum or steel guides that are: fabricated to withstand vertical and lateral loads; counterbalanced by helical torsion springs; and sound-deadened.

6.8.2.4(2)(c) For manually operated closures, provide inside lift handle and locking bar or chain hoist. Motor

operation may be provided on grilles requiring constant usage. Chain operation will be by means of reduction gears and heavy chrome plated hand chain.

6.8.2.4(3) Overhead Rolling Counter Shutters / horizontal sliding grilles

6.8.2.4(3)(a) Provide shutter curtains fabricated with extruded aluminum, galvanized steel, or stainless steel interlocking flat slats, complete with guides of similar materials.

6.8.2.4(3)(b) Provide closures that are manually operated and with locking capability.

6.8.2.4(4) Interior Aluminum Sliding Doors and Sidelights

6.8.2.4(4)(a) Provide interior sliding doors and sidelights with recessed mounted track, sliding and fixed panel(s) single glazed with 6 mm clear fully tempered float glass.

6.8.2.4(5) Automatic Sliding Doors

6.8.2.4(5)(a) Automatic sliding doors complete with break-away capability for exiting may be installed at main entrance, provided that the size and configuration of the entrance vestibule is designed such that both sets of doors will not be open at the same time.

6.8.2.4(5)(b) Provide door operators, including the motion and presence detection system, that are: capable of operating within the temperature ranges existing at the Facility; and unaffected by ambient light or ultrasonic interference.

6.8.2.4(5)(c) Provide energy-saving devices to reduce conditioned air loss.

6.8.2.4(6) Automatic Swing Doors

6.8.2.4(6)(a) Use automatic swing doors for interior and exterior locations where appropriate, including the entrance vestibule, cross-corridor double-egress doors, entrances to departments and areas where stretchers and equipment are frequently wheeled, and doors to exterior spaces that are required to be handicapped accessible.

6.8.2.4(6)(b) If used, provide directional motion sensor control device that are unaffected by ambient light or ultrasonic frequencies.

6.8.2.4(6)(c) Equip all in-swing doors that are required exits with an emergency breakaway switch that internally cuts power to the operator. No external power switch allowed.

6.8.2.4(6)(d) Implement longer hold-open times to accommodate the elderly and frail.

6.8.2.4(7) Aluminum Curtain Walls

6.8.2.4(7)(a) Aluminum curtain walls will comply all applicable standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.8.2.4(7)(b) Incorporate in the curtain wall framing a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.8.2.4(7)(c) Provide curtain wall framing that incorporates a thermal-break.

6.8.2.4(7)(d) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.4(7)(e) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.5 Aluminum Windows

6.8.2.5(1) Aluminum windows will comply with all applicable standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.8.2.5(2) Incorporate in windows a drained and vented system complete with air and vapour seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

6.8.2.5(3) Provide windows that incorporate a thermal-break.

6.8.2.5(4) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.5(5) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events (with a safety factor).

6.8.2.6 Skylights

6.8.2.6(1) Skylights will comply with all applicable standards, including the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

6.8.2.6(2) Roof or skylight glazing may be provided where natural light is required in interior spaces to augment or complement interior ambient lighting.

6.8.2.6(3) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

6.8.2.7 Glass and Glazing

6.8.2.7(1) Glass and glazing will comply with all applicable standards, including the Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines and the Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual.

6.8.2.7(2) Exterior and/or interior glass and glazing may be provided as integral components of the exterior envelope, interior partitions and screens, exterior and interior doors, handrail balustrades, skylights and decorative and ornamental glazing.

6.8.2.7(3) Provide assemblies that resist local seismic conditions as a post-disaster building as defined in the BC Building Code.

6.8.2.7(4) Provide assemblies that resist 1-in-100 year climatic events (with a safety factor).

6.8.2.7(5) Use laminated safety glass in single-glazed skylights, entry doors and sidelights, or as the inboard light of a double-glazed skylight.

6.8.2.7(6) Mirrors

6.8.2.7(6)(a) For full wall unframed mirrors, use 6 mm thick minimum float glass backed with electrolytically-

applied copper plating. Grind smooth and polish all edges.

6.8.2.7(6)(b) For wall mounted posture mirrors, use framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back with galvanized steel.

6.8.2.8 Finish Hardware

6.8.2.8(1) Finish hardware will comply with all applicable standards, including the quality standards of the Door and Hardware Institute (DHI).

6.8.2.8(2) Provide all finish hardware from one supplier that is a member in good standing of the Door and Hardware Institute (DHI) and has in its employ one or more AHC (Architectural Hardware Consultant).

6.8.2.8(3) Hardware will be integrated with the security requirements and coordinated with electrical wiring and power requirements.

6.8.2.8(4) Select finishes to provide maximum longevity and preservation of the finish.

6.8.2.8(5) Provide, where applicable, ULC-listed hardware for the required fire rating.

6.8.2.8(6) Use heavy-duty commercial quality hardware; locksets and latchsets fully mortised type and lever handles of solid material.

6.8.2.8(7) For special areas provide hardware to suit the purposes unique to those areas, as identified in the user consultation process as described in Appendix 2B [User Consultation Process].

6.8.2.8(8) Keying

6.8.2.8(8)(a) Supply and install ASSA key cylinders, 6 pin (factory pinned) with matching keyway to the existing Hospital.

6.8.2.8(8)(b) Implement a 4-level system.

6.8.2.8(8)(c) Keying groups will be assigned by the Authority.

6.8.2.8(8)(d) New key fittings will be given to and controlled by the Authority.

6.8.2.8(8)(e) Turn over keys from factory to the Authority.

6.8.2.8(8)(f) Supply four (4) keys for each lock cylinder.

## 6.9 Finishes (Division 9)

### 6.9.1 Basic Requirements

6.9.1.1 Provide interior finishes that are capable of being maintained throughout the Operating Period to the B.C. Health Authorities Cleaning Outcome Standards (Version 7 – Revision A, issue date: October 24, 2007).

6.9.1.2 In areas where finishes and systems of installation will occur and water is anticipated to be present as part of cleaning or other procedures, allow water to collect and exit without causing damage to the finishes or substrate.

6.9.1.3 For areas in which wear is a concern, such as areas with anticipated pedestrian or wheeled traffic, use durable finish materials able to withstand damage and easily replaceable in sections if damage does occur.

6.9.1.4 Give priority to infection prevention and control in the selection of finishes for all patient care areas. Acoustic characteristics of finish materials will also be a priority consideration.

6.9.1.5 Select the appearance of finishes and colours to create and promote a natural healing environment, prevent glare, and minimize artificial lighting requirements.

6.9.1.6 Select materials to promote sustainability by, for instance, having low-emissivity or comprising of renewable resources.

6.9.1.7 Select finish materials that do not use known carcinogenic material or chemicals in their manufacture or disposal. Consult the Green Guide for Healthcare Version 2.2.

### 6.9.2 Performance Criteria

6.9.2.1 Interior Wall Framing in Patient Care Areas

6.9.2.1(1) Interior wall framing in patient care areas will comply with all applicable standards, including 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 for materials and workmanship for interior walls, including steel studs and furring and gypsum board ceiling suspension systems.

6.9.2.1(2) Use prefabricated non-load bearing steel studs for interior partitions and furring with no axial load other than its own weight, the weight of attached finishes, and lateral loads of interior pressure differences and seismic loads.

6.9.2.1(3) Construct steel stud framing to accommodate electrical, plumbing and other services in the partition cavity, and to support fixtures, wall cabinets, medical equipment and other such wall-mounted items. Provide reinforcement and backing.

6.9.2.1(4) Consider in design, 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.

6.9.2.2 Gypsum Board

6.9.2.2(1) Gypsum board will comply with all applicable standards, including the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual.

6.9.2.2(2) Gypsum board will be no less than 5/8” (16 mm) in thickness.

6.9.2.2(3) Use cementitious backer board (tile backer board) behind ceramic wall tile in showers or other wet areas. Use glass mat water-resistant gypsum backing panels behind sinks.

6.9.2.2(4) Use abuse-resistant gypsum board where required for increased resistance to abrasion, indentation, and penetration of interior walls and ceilings.

6.9.2.2(5) Use glass mat surfaced gypsum sheathing board wherever exterior gypsum sheathing is required at exterior walls.

6.9.2.2(6) Provide airborne sound insulation for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Make assemblies airtight. Do not locate back to back recessed wall fixtures such as cabinets or electrical, telephone and television outlets and medical gas outlets, which perforate the gypsum board surface. In addition, carefully cut any opening for fixtures to the proper size and appropriately seal piping penetration. Seal conduit/duct/piping penetrations with tape and fill at the plenum barrier. Make the entire perimeter of a sound insulating assembly airtight to prevent sound flanking. Use an acoustic caulking compound or acoustical sealant to seal between the assembly and all dissimilar surfaces (including at window mullions) in accordance with the recommendations of an acoustic consultant.

6.9.2.3 Ceramic Tilework

6.9.2.3(1) Ceramic tilework will comply with all applicable standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

6.9.2.3(2) In order to reduce opportunities for the spread of infection, minimize use of ceramic tile in interior applications at patient and other clinical areas.

6.9.2.3(3) For installations on wet and exterior surfaces, use floor tiles that have the following static coefficients of friction as per the American Society for Testing and Materials International (ASTM):

6.9.2.3(3)(a) Level Surfaces: Not less than 0.50 for wet and dry conditions.

6.9.2.3(3)(b) Stair Treads: Not less than 0.60 for wet and dry conditions.

6.9.2.3(3)(c) Ramp Surfaces: Not less than 0.60 for wet and dry conditions.

6.9.2.3(4) For exterior installations, provide frost-resistant exterior tiles with a moisture absorption rating of 3.0% or less.

6.9.2.3(5) Provide control joints and expansion joints in conformance with the recommendations of the TTMAC Tile Installation Manual.

6.9.2.3(6) Provide a waterproof membrane under ceramic floor tile in showers and other wet areas. The membrane may be trowel-applied, built-up, liquid-applied or sheet-applied.

6.9.2.3(7) Provide crack isolation membranes to resist crack transmission from the substrate due to lateral movement; design for use in thin-set applications of tile over a cracked substrate. Use elastomeric sheets or trowel-applied materials suitable for subsequent bonding of ceramic tile.

6.9.2.3(8) Set ceramic tile with latex modified mortar and grout with epoxy grout.

6.9.2.4 Ceilings

6.9.2.4(1) Acoustic Tile Ceilings/Wood Batten

6.9.2.4(1)(a) Ceiling tiles/wood batten may be used in the following locations:

(a).1 Hallways;
(a).2 Offices, meeting rooms;
(a).3 Common lobby, admitting areas;
(a).4 Waiting areas;
(a).5 Quiet rooms;
(a).6 Staff sleep rooms;
(a).7 Medication rooms;

(a).8 Paediatric Pharmacy;
(a).9 Coffee/gift shops;
(a).10 Patient and staff lounges; and
(a).11 Other areas requiring a non-institutional finish.

6.9.2.4(1)(b) Acoustic Panel: Non-directional, fissured pattern, white ceiling panel, trim edge detail (square) to fit a standard 15/16" T-bar grid panel size.

6.9.2.4(1)(c) Install acoustic ceiling tiles in the suspension system to provide the levels of sound attenuation required to suit the intended function of the room.

6.9.2.4(1)(d) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

6.9.2.4(1)(e) Special surface-treated ceiling tiles, such as wood, mylar or metal-faced tiles, may be used where maintenance and ease of cleaning are priorities as well as the accessibility and acoustic requirements.

6.9.2.4(1)(f) Provide acoustical panels that are appropriate for the normal occupancy condition range of 15°C - 29°C and maximum 70% relative humidity. When the service use temperature and relative humidity are expected to exceed these ranges, consider use of acoustical units specifically designed for such applications.

6.9.2.4(1)(g) Use tiles with scratch-resistant surfaces in any area where lay-in ceiling panels frequently need to be removed for plenum access.

6.9.2.4(1)(h) For ceilings installed in food preparation areas, use acoustic panels capable of being cleaned without undue wear on the panel.

6.9.2.4(2) Hard Ceilings

6.9.2.4(2)(a) Construct hard ceilings of 16 mm gypsum board where fire rating is not required. In fire rated rooms the gypsum board must be fire rated and the thickness of the gypsum board is to be determined by the rating required by the BC Building Code. Finish hard ceilings as per the paint specifications

outlined in Section 6.9.2.7. Provide hard ceilings for the following rooms:

(a).1 housekeeping and utility rooms;
(a).2 washrooms and shower rooms;
(a).3 procedure rooms and any other rooms where invasive procedures may be performed;
(a).4 sterile supply rooms; and
(a).5 other areas where infection prevention and control may be an issue.

6.9.2.5 Flooring

6.9.2.5(1) All Rooms Except Wet Rooms

6.9.2.5(1)(a) Use solid sheet flooring (or an equivalent product approved in advance by the Authority) for all rooms as specified in this Schedule or as requested by the Authority.

6.9.2.5(1)(b) Use solid cushioned sheet flooring such as sheet rubber for all patient care areas.

6.9.2.5(1)(c) Hot weld all joint seams.

6.9.2.5(1)(d) Form flash coved bases 150 mm high, straight cut, finished with clear silicone caulking. Do not cap.

6.9.2.5(1)(e) Use water soluble, low odour flooring adhesive.

6.9.2.5(1)(f) Hot weld new flooring to existing floor product.

6.9.2.5(1)(g) Where there is no existing product to butt against, finish edging finish with vinyl finishing strip as per manufacturers' specifications.

6.9.2.5(1)(h) Finish flooring with high speed buffing as per manufacturers' specification. Do not apply sealer or wax.

6.9.2.5(2) Wet Rooms

6.9.2.5(2)(a) Use slip-resistant solid sheet flooring (or an equivalent product approved in advance by the Authority) for all wet rooms.

6.9.2.5(2)(b) Hot weld all joint seams.

6.9.2.5(2)(c) Form flash coved bases 150 mm high, straight cut, finished with clear silicone caulking. Do not cap.

6.9.2.5(2)(d) Use solvent based, low odour flooring adhesive.

6.9.2.5(2)(e) Hot weld new flooring to existing floor product.

6.9.2.5(2)(f) Finish flooring as per manufacturer's specification. Do not apply sealer or wax.

6.9.2.5(3) Stair Covering

6.9.2.5(3)(a) Use one piece treads and sheet risers with carborundum strip (or an equivalent product approved in advance by the Authority).

6.9.2.5(3)(b) Use water soluble, low odour adhesive.

6.9.2.5(4) Comply with all applicable standards, including the National Floor Covering Association (NFCA) Specification Standards Manual. US Federal Specification RR-T-650d.

6.9.2.5(5) In selecting flooring materials, consider cleaning and maintenance, pedestrian and rolling traffic, acoustics, infection prevention and control, and aesthetics.

6.9.2.5(6) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate. Terminate flooring at the walls in the form of 150mm high flash coves.

6.9.2.5(7) Use heavy-duty materials for flooring on which wheeled or service vehicle traffic is anticipated and to which wear and damage may result.

6.9.2.5(8) Use permanent, heavy-duty integral materials such as seamless epoxy quartz flooring for flooring in areas subject to moisture and heat over extended periods of time.

6.9.2.5(9) Use suitable flooring in patient and staff areas where cart or stretcher traffic is expected or where cleaning on a regular or emergency basis is necessary.

6.9.2.5(10) Use water resistant and slip-resistant flooring in public, staff, and patient washrooms.

6.9.2.5(11) Consider resilient tile products for flooring in service corridors and service areas.

6.9.2.5(12) Use anti static flooring material for telecommunication rooms.

6.9.2.5(13) Resilient Flooring

6.9.2.5(13)(a) Choose products with exposed surface having anti-bacterial properties to prevent entry of gram-positive and gram-negative micro-organisms. Weld all seams. Provide integral cove bases.

6.9.2.5(13)(b) If used, provide slip-resistant sheet vinyl with a static coefficient of friction of 0.6 on level surfaces and 0.8 on ramps.

6.9.2.5(13)(c) If used, provide linoleum sheet flooring with a homogenous core of primarily natural materials, consisting of linseed oil, wood flour, and resin binders mixed and calendared onto a natural jute backing. Weld all seams. Provide integral cove bases.

6.9.2.5(13)(d) If used, provide rubber flooring tile formulated with 100% virgin elastomers, reinforcing agents, soil-resisting agents, and migrating waxes compounded to create durability, excellent cleaning characteristics, and exceptional slip resistance. Stud designs to have chamfered edges with a sharply-defined edge at the top for higher slip resistance, easier cleaning, superior maintenance and low vibration design to minimize vibration and noise.

6.9.2.5(13)(e) Hot weld all seam joints.

6.9.2.5(13)(f) Form flash cove bases 150 mm high, straight cut, finished with clear silicone caulking. Do not cap.

6.9.2.5(13)(g) Use solvent based low odour flooring adhesive.

6.9.2.5(13)(h) Finish flooring with high speed buffing as per manufacturers specification.

6.9.2.5(13)(i) Provide tactile warning strips and stair nosings to assist the visually impaired.

6.9.2.5(13)(j) Use adhesive for resilient flooring that meets or exceeds the United States Environmental Protection Agency (EPA) Standards for acceptable VOC concentration and emission rates.

6.9.2.5(14) Seamless Quartz Epoxy Flooring

6.9.2.5(14)(a) If used, provide seamless epoxy flooring with 100% solids, zero VOC, solvent-free comprised of a two-

component epoxy primer, a two-component epoxy resin and curing agent, coloured quartz aggregate broadcast into both primer and undercoat, and a high performance, UV-resistant two-component, clear epoxy sealer. Provide integral cove bases.

6.9.2.5(15) Carpets and Carpet Tiles

6.9.2.5(15)(a) Carpet finishes will be used in patient and staff areas where relaxation and comfort are primary considerations, including patient/public lounges, staff lounges, staff offices, conference/meeting rooms and areas of similar function. Provide 150 mm high rubber bases.

6.9.2.5(15)(b) Use carpeting that is certified under Canadian Carpet Institute/ Canadian Rug Institute (CCI/CRI) Indoor Air Quality Program and having CRI/IAQ Label and number certifying that VOC emission rate of less than 0.6 mg/m2/h4 has been passed.

6.9.2.5(15)(c) Choose carpet that has a maintained static generation at less than 3.5 KV at 21 °C and 20% relative humidity throughout its product life.

6.9.2.5(15)(d) Use non-solvent, non-toxic, odourless adhesive that, when installed, meets or exceeds EPA standards for acceptable VOC concentration and emission rate.

6.9.2.5(15)(e) Choose a carpet designed to accept wheelchair traffic.

6.9.2.6 Acoustic Treatment

6.9.2.6(1) Design and construct the Facility to comply with the minimum sound transmission ratings between spaces described in Appendix 3D [Sound Transmission Ratings].

6.9.2.6(2) In addition, provide acoustic treatment where sound attenuation, soundproofing or other sound control measures are necessary to create a healing environment for patients and a safe and comfortable environment for staff and where confidentiality is required.

6.9.2.6(3) Sound control will include:

6.9.2.6(3)(a) attenuation of sound within public, patient and staff environments;

6.9.2.6(3)(b) sound isolation between the exterior and interior spaces;

6.9.2.6(3)(c) sound isolation between interior spaces within the building at both horizontal and vertical separations;

6.9.2.6(3)(d) sound and vibration isolation of building service noises and sound isolation of building service rooms; and

6.9.2.6(3)(e) sound isolation as required for specialty rooms such as video-conferencing.

6.9.2.6(4) Design partition and ceiling construction to provide approximately the same degree of sound control through each assembly. When a partition is used for sound isolation, extend the sound control construction from slab to slab.

6.9.2.6(5) Optimum sound isolation requires that the integrity of gypsum board partitions and ceilings (mass) never be violated by vent or grille cut-outs or by recessed cabinets, light fixtures, etc.

6.9.2.6(6) Where penetrations are necessary, minimize placing them back-to-back and next to each other. Stagger electrical boxes and medical gas outlets, preferably by at least one stud space. Use mineral fibre insulation to seal joints around all cut-outs such as electrical, TV and telephone outlets, plumbing escutcheons, recessed cabinets, and bathtubs.

6.9.2.6(7) Minimize constructions such as ducts, rigid conduits, or corridors that act as speaking tubes to transmit sound from one area to another. At common supply and return ducts, provide sound attenuation liners at the diffuser and/or grill to maintain assemblies' STC. Seal around conduit.

6.9.2.6(8) Isolate structure-borne vibrations and sound with resilient mountings on vibrating equipment to minimize sound transfer to structural materials. Provide ducts, pipes, and conduits with resilient, non-rigid boots or flexible couplings where they leave vibrating equipment; isolate from the structure with resilient gaskets and sealant where they pass through walls, floors, or other building surfaces.

6.9.2.6(9) Use acoustic screens, vibration isolators, and carefully selected exterior equipment to prevent exterior noise that neighbours may find offensive.

6.9.2.7 Painting and Protective Coatings

6.9.2.7(1) Comply with LEED requirements for Low Emitting Materials Paints and Coatings. In particular:

6.9.2.7(1)(a) architectural paints, coatings and primers: low voc.

6.9.2.7(1)(b) anti-corrosive and anti-rust: low voc.

6.9.2.7(1)(c) clear wood finishes, floor coatings, stains and shellacs: low VOC.

6.9.2.7(2) Walls, doors and shelving

6.9.2.7(2)(a) Use eggshell or semi gloss for all walls, doors and painted shelving.

6.9.2.7(3) Door frames and metal doors

6.9.2.7(3)(a) Use semi gloss for all door frames and metal doors.

6.9.2.7(4) Wood finish doors

6.9.2.7(4)(a) Use clear coat interior rub varnish for all wood finish doors.

6.9.2.7(5) Paint Grade Doors

6.9.2.7(5)(a) Use semi gloss for all paint grade doors.

6.9.2.7(6) Ceilings

6.9.2.7(6)(a) Use eggshell paint for all ceilings.

6.9.2.7(7) Floors, concrete

6.9.2.7(7)(a) Use a 2-component (base component A, curing agent B).

6.9.2.7(7)(b) Use a primer if part of coating system.

6.9.2.7(8) Paint painted patient care areas with a semi-gloss finish.

6.9.2.7(9) Conform to all applicable standards, including the material and workmanship requirements of Master Painters Institute (MPI) Architectural Painting Specification Manual.

6.9.2.7(10) Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

6.9.2.7(11) Achieve a visually harmonious and aesthetically coordinated appearance across all areas of the Facility.

6.9.2.7(12) Use exterior and interior finish materials with surface finishes either as integral to the finish material or field-applied separately to the surface of the finish material.

6.9.2.7(13) Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

6.9.2.7(14) Provide a special protective coating on exterior and interior materials that are subject to corrosion from exposure to moisture or other corrosive agents, and where painting is deemed to be insufficient protection. Materials requiring a special protective coating include exterior and interior structural, galvanized, and miscellaneous steel.

6.9.2.7(15) Use paints with a minimal VOC level in patient, staff, and public interior areas.

6.9.2.7(16) Use interior paint materials of a quality to withstand regular or repeated cleaning as the function of the area dictates.

6.9.2.7(17) Paint handrails, doors, and frames with a contrasting colour from walls in consideration of the visually impaired.

6.9.2.7(18) Do not use materials containing lead and mercury.

6.9.2.7(19) If seamless epoxy wall coatings are used, provide a two-component, high solids, zero or low VOC, solvent-free, epoxy glaze wall coating that is seamless and abrasion, chemical, and UV-resistant.

6.9.2.8 Vinyl Acrylic Wall Covering

6.9.2.8(1) If vinyl/acrylic wall covering is used, provide vinyl/acrylic high impact rigid sheet, nominal 0.40” thickness with colour-matched vinyl/acrylic trim for joint/transitions.

6.9.2.8(2) Furnish complete packaged system containing all primers and adhesive. Use water-based and non-hazardous primer and adhesive materials.

6.9.2.9 Dry Erase Wall Covering

6.9.2.9(1) Provide as required throughout the Facility pigmented gloss vinyl wall covering presentation surfaces for dry erase markers, .61 kg/sq.m, non-woven backing.

6.9.2.9(2) Provide trim and other accessories including but not limited to wall covering trim of anodized aluminum, low profile trim, plastic marker dispensers, dry erase markers (set of 4 colours), low odour, and eraser, magnets, clearer, towels.

## 6.10 Specialties (Division 10)

6.10.1 Provide specialty products manufactured for the specific purposes intended, and installed in strict accordance with the manufacturer's directions.

6.10.2 Tackboards and Whiteboards

6.10.2.1 Provide, as appropriate throughout the Facility:

6.10.2.1(1) tackboard surfaces that allow pin penetration of the surface materials and have reasonable resistance to deterioration; and

6.10.2.1(2) whiteboard surfaces that allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort. Use porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant and have maximum contrast, glare control, and reflectivity.

6.10.2.2 Provide tackboards and whiteboards with extruded aluminum frames, accessory trays, maprails and maphooks.

6.10.2.3 Use non-toxic, water based lamination adhesive for tackboards and whiteboards.

6.10.3 Compartments and Cubicles

6.10.3.1 Provide compartments and cubicles including toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.

6.10.3.2 Provide exposed surfaces that are permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.

6.10.3.3 Secure partitions and standards to the floor or ceiling structure, and in a manner to resist lateral loading and impact.

6.10.3.4 For compartment/cubicle doors, use material matching the partitions and include permanent, purpose-made hardware. Design doors and hardware to provide barrier-free access.

6.10.3.5 Where appropriate and approved by the Authority, curtain tracks and curtains may be used in lieu of doors.

6.10.3.6 Provide a mirror in all change compartments.

6.10.3.7 Toilet Partitions

6.10.3.7(1) Galvannealed sheet metal will conform to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish in polyester, baked enamel or powder coating.

6.10.3.7(2) For stainless steel, use Type 304 conforming to ASTM A240 with No. 4 finish.

6.10.3.7(3) For plastic laminate, use Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to NEMA LD-3.

6.10.3.7(4) For particleboard core used for partitions, conform to CAN3-0188.1 Industrial Grade “R”.

6.10.3.7(5) For fibre-reinforced plastic (fibreglass), use a moisture resistant grade.

6.10.3.8 Change Cubicle Partitions

6.10.3.8(1) Where not adjacent to showers, change cubicle partitions will comply with the above requirements for toilet partitions.

6.10.3.9 Shower Partitions

6.10.3.9(1) Use solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or NEMA LD3.

6.10.4 Wall Guards and Corner Guards, Handrails, Wall Protection, Door Edge and Door Frame Protection

6.10.4.1 Wall and corner guards

6.10.4.1(1) Provide protection of walls and exposed wall corners at patient care areas, service areas, and other areas as required, to prevent damage due to impact from traffic such as stretchers, equipment and service vehicles.

6.10.4.1(2) Select materials appropriate to the amount and degree of impact anticipated.

6.10.4.2 Handrails

6.10.4.2(1) Provide handrails in all corridors and patient care areas of an appropriate type for patient support. Wood is preferred.

6.10.4.2(2) Select materials and shapes appropriate for the use, provide continuous uninterrupted supports.

6.10.4.3 Wall protection

6.10.4.3(1) Apply sheet wall protection to wall areas where the impact damage anticipated is of a larger area of wall than would be protected by bumper guards.

6.10.4.3(2) Provide wood wall bumper guards in high traffic pedestrian areas.

6.10.4.3(3) Provide wall splash back protection behind and surrounding hand sinks, scrub sinks and housekeeping sinks.

6.10.4.3(4) Apply sheet wall protection to faces of doors where impact damage is anticipated. Use sheet wall protection that complements the installation of door edge and frame protection.

6.10.4.3(5) Secure wall and corner guards to reinforcing and backing in the walls, such backing sufficient to withstand expected impact loads. Wall protection will be high impact and stain-resistant.

6.10.4.3(6) Use wall protection handrails and corner guard products that are stain-resistant to pen marks, paint, and graffiti, and able to withstand commercial cleaners without fading or staining. Use products containing anti-microbial additives to retard mildew and bacterial growth.

6.10.4.4 Door Edge and Door Frame Protection

6.10.4.4(1) Protect door edges and door frames in patient care areas from damage such as impact caused by the regular movement of stretchers and other wheeled vehicles.

6.10.4.4(2) Protect door edges and door frames in clinical and service areas from damage such as impact caused by regular and non-regular service vehicles.

6.10.4.4(3) Use bumper guards, crash rails, handrails, and corner guards that are high impact-resistant extrusion conforming to ASTM D4226 and with anti-microbial additive.

6.10.5 Metal Lockers

6.10.5.1 Provide individual and shared storage facilities in designated staff areas in the Facility based on expected staffing requirements as described in the Clinical Specification and as appropriate for operation of the Facility. Such storage facilities may be metal lockers and metal locker systems of sizes, numbers, and groupings as determined in consultation with the Authority.

6.10.5.2 For sheet metal, use galvannealed steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.10.5.3 Finish steel surfaces with polyester baked enamel or powder coating.

6.10.5.4 For single, double, or multiple-tier metal lockers for staff use, include a provision for locking with padlock, and complete with number plates, and hanging hooks.

6.10.6 Storage Shelving Systems

6.10.6.1 Provide storage systems for materials in designated storage areas.

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

6.10.6.3 For mobile storage systems, provide a high-density system designed to make maximum use of available space by eliminating need for access aisle for each run of shelving. Install and brace systems to resist seismic loads. The mobile storage system to be either power assisted or to be easily operable without undue required strength by any person.

6.10.7 Washroom Accessories

6.10.7.1 Provide washroom accessories in all public, patient, and staff washrooms as required in accordance with the applicable high quality hospital standards. Determine the type, size, and number of accessories with regard for the numbers and categories of users, in consultation with the Authority.

6.10.7.2 Staff and public washroom accessories will include the following:

6.10.7.2(1) soap dispensers;

6.10.7.2(2) toilet paper dispensers;

6.10.7.2(3) paper towel dispensers – “hands free” type;

6.10.7.2(4) paper towel disposals;

6.10.7.2(5) mirrors;

6.10.7.2(6) barrier-free grab bars (with integral tactile grip finish);

6.10.7.2(7) coat hooks;

6.10.7.2(8) sanitary napkin dispensers;

6.10.7.2(9) sanitary napkin disposals; and

6.10.7.2(10) baby change tables.

6.10.7.3 Patient washroom accessories will include the following:

6.10.7.3(1) soap dispensers;

6.10.7.3(2) toilet paper dispensers;

6.10.7.3(3) paper towel dispensers;

6.10.7.3(4) paper towel disposals;

6.10.7.3(5) mirrors;

6.10.7.3(6) handicap grab bars (with integral tactile grip finish); and

6.10.7.3(7) coat hooks.

6.10.7.4 Shower rooms or showers in washrooms will include the following accessories:

6.10.7.4(1) shower curtain and track or rod as appropriate;

6.10.7.4(2) handicap grab bars;

6.10.7.4(3) fold-down shower seat; and

6.10.7.4(4) use commercial grade accessories free from imperfections in manufacture and finish.

6.10.7.5 Install washroom accessories to allow cleaning and maintenance of the accessory and surrounding wall area.

6.10.7.6 Use fittings with concealed fastening for security and discouragement of tampering.

6.10.8 Privacy Curtain, Track and IV Tracks

6.10.8.1 Provide privacy curtains and IV tracks:

6.10.8.1(1) around each bed / stretcher holding area;

6.10.8.1(2) around each treatment space;

6.10.8.1(3) around exam cubicles; and

6.10.8.1(4) around beds/incubators in patient rooms.

6.10.8.2 Curtains will comply with CAN/CBSB-4.162-M, “Hospital Textiles - Flammability Performance Requirements”.

6.10.8.3 For cubicle tracks, use extruded, anodized aluminum, entirely enclosed except for the track guide.

6.10.8.4 Use cubicle carriers composed of a non-binding, abrasion-resistant, nylon block supported from self-lubricating bearings by two nylon wheels with a free-moving plated swivel-hook assembly. Fit one end of each track with a removable end stop to permit simple carrier replacement. Use anodized aluminum splicing clamps. Factory-curve tracks.

6.10.8.5 For IV tracks, use extruded aluminum, anodized finish and entirely enclosed except for slot in bottom. Provide IV carriers consisting of plated steel block supported from four nonconductive nylon ball-bearing wheels and equipped with 180-degree twist lock with nylon washer.

6.10.8.6 Curtain and IV tracks will be structurally supported.

## 6.11 Equipment (Division 11)

6.11.1 Refer to Section 7 of Schedule 2 [Design and Construction Protocols] and Appendix 2E [Equipment and Furniture].

6.11.2 Patient Lifts

6.11.2.1 Provide ceiling mounted Waverly Glen X-Y gantry tracks with a load bearing capacity of 450 kg in all patient rooms and treatment areas. Provide full length coverage of the patient bed plus 1000 mm beyond the edges into the lateral transfer zone. For patient rooms with washrooms, run the track continuous (without gate system) from the bed location into the washroom.

6.11.2.2 In undertaking the design of patient lifts, consider the recommendations set out in the following document prepared by the Authority: “Ergonomics Program – Workplace Fraser Health: Surrey Memorial hospital – Tower Development: Ceiling Lift Recommendations” dated October 2009.

6.11.3 Window Washing Systems

6.11.3.1 Provide equipment or appropriate anchors to facilitate window washing.

## 6.12 Furnishings (Division 12)

6.12.1 Furniture, Millwork and Casework

6.12.1.1 Refer to Appendix 2E [Equipment and Furniture];

6.12.1.2 In addition to Project Co’s obligation to provide Category F1 Equipment, provide all furniture, millwork and casework (except for Category D Equipment) required to support the programs and functions described in the Clinical Specification or as required to support the operation of the Facility, including:

6.12.1.2(1) tables, work stations, furniture storage carts and keyboard trays; and

6.12.1.2(2) the following furniture, millwork and casework:

6.12.1.2(2)(a) nourishment stations;

6.12.1.2(2)(b) kitchen counters;

6.12.1.2(2)(c) dirty utility room counters;

6.12.1.2(2)(d) care team stations;

6.12.1.2(2)(e) reception stations;

6.12.1.2(2)(f) patient room wardrobes, counters and cabinets;

6.12.1.2(2)(g) medication rooms;

6.12.1.2(2)(h) lab casework;

6.12.1.2(2)(i) pharmacy casework;

6.12.1.2(2)(j) interdisciplinary workstations;

6.12.1.2(2)(k) information desk;

6.12.1.2(2)(l) security kiosks;

6.12.1.2(2)(m) triage desk;

6.12.1.2(2)(n) biomed room counter and storage;

6.12.1.2(2)(o) patient therapy rooms counters and storage;

6.12.1.2(2)(p) respiratory therapy rooms counters and storage;

6.12.1.2(2)(q) pneumatic tube stations;

6.12.1.2(2)(r) lab work rooms counters and storage;

6.12.1.2(2)(s) registration cubicles;

6.12.1.2(2)(t) work/study carrels;

6.12.1.2(2)(u) counter and storage for trauma, procedure rooms and diagnostic imaging rooms;

6.12.1.2(2)(v) coffee tables and side tables; and

6.12.1.2(2)(w) work stations (height adjustable).

For each of the above items, determine in consultation with the Authority whether the item will be furniture, millwork or casework.

6.12.1.3 All furniture and millwork supplied by Project Co will:

6.12.1.3(1) be ergonomically designed and functional;

6.12.1.3(2) if used any patient care or treatment areas, have sealed surfaces and be covered in upholstery material that is inert and will not support microbial growth; and

6.12.1.3(3) as necessary, incorporate communications outlets and cabling that complies with Appendix 3E [Cable Infrastructure Standard].

6.12.1.4 In undertaking the design and construction of work stations, consider the recommendations set out in the following document prepared by the Authority: "Sitting and Standing Workstations: Recommended Heights, Widths, Depths and Clearances" dated October 2009.

6.12.2 Laboratory Casework

6.12.2.1 General Approach

6.12.2.1(1) Provide laboratory casework:

6.12.2.1(1)(a) for the specific and particular functions to be performed by the casework;

6.12.2.1(1)(b) to give the end users a good working ergonomic environment that is suited to their specific needs; and

6.12.2.1(1)(c) with structural rigidity and chemical resistivity to withstand the service conditions for which they are exposed.

6.12.2.1(2) All casework will be modular and consistent throughout the Facility.

6.12.2.1(3) All casework will be lockable.

6.12.2.1(4) Casework will be wood, metal and/or epoxy resin, selected to minimize cleaning and maintenance operations and maximize infection control capabilities. Refer to Section 2.2 of this Schedule regarding use of wood.

6.12.2.1(5) All epoxy resin material bench tops will be acid resistant.

6.12.2.1(6) Provide all lab benches with cabinets for approximately 50% of the length of the benches.

6.12.2.1(7) Lab bench systems will hide and organize instrument tubing, electrical and/or data cables.

6.12.2.1(8) Casework will comply with all applicable standards, including:

6.12.2.1(8)(a) at a minimum, the quality standards of the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) for Premium Grade; and

6.12.2.1(8)(b) the BC Building Code "Building Requirements for Persons with Disabilities".

6.12.2.1(9) Use non-toxic, non-solvent adhesive glue complying with AWMAC Quality Standards Manual, and that of Canadian "Eco-Logo" program or equivalent, with a Total Volatile Organic Carbon (TVOC) emissive content of 20 gr/litre.

6.12.2.1(10) Provide casework anchorage that complies with the seismic restraint requirements of BC Building Code.

6.12.2.1(11) Steel for cabinet construction for laboratory casework will be levelled prime quality furniture grade cold rolled steel.

6.12.2.2 Cabinets

6.12.2.2(1) Cabinet parts and sub-assemblies (doors, drawers, tracks and back panels) will be interchangeable in the field without requiring special tools. Doors and drawers will be interchangeable with like-sized cabinets. Cabinets will be constructed so that a standard height drawer can be removed and two ½ height drawers installed in its place. Likewise, a cupboard door or doors can be removed and replaced by a like-sized combination of drawers or vice versa. This interchangeability will permit rearrangement in the field of all components in addition to being able to relocate the entire cabinet, should changing needs dictate a revision in the layout of cabinets. All cabinets to be enclosed with doors, lockable, hardware to be stainless steel. Provide modesty panels where the back of the benches are exposed.

6.12.2.3 Wood Laboratory Casework

6.12.2.3(1) Cabinetwork and framing system will be constructed of prime grade selected materials to conform to AWMAC Premium Grade; Flush Overlay Cabinet construction.

6.12.2.3(2) Fabricate cabinets and cases as self-contained modules and in accordance with the best practices of the wood laboratory furniture industry. Finish exterior and interior surfaces to allow for relocation without the need of additional finishing.

6.12.2.3(3) Assemble units with concealed fasteners, or glued and screwed construction, making each unit rigid and self-supporting for use interchangeably in an assembly or for single unit use.

6.12.2.3(4) Use epoxy resin counter/bench tops and splash backs, to be provided in minimum two different colours, black in microbiology and different for the remaining use.

6.12.2.3(5) Finish exposed wood surfaces with a polymerizing two-component catalytic conversion varnish system specially formulated for chemical reagent resistance. The individual components will be chemically compatible to assure perfect adhesion and a top quality, durable finish.

6.12.2.4 Stainless Steel Casework

6.12.2.4(1) Fabricate from Type 316, No. 4 finish stainless steel.

6.12.2.4(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.

6.12.2.4(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.

6.12.2.4(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.

6.12.2.5 Leg Frame Laboratory Casework System

6.12.2.5(1) The leg frame system will provide complete independent rigid support for all overhead shelving, undercounter suspended cabinets, service cover panels, countertops, sinks and fittings including all mechanical

and electrical line work, as necessary to make the assembly operational.

6.12.2.5(2) The concept will permit the addition, relocation or removal of suspended base cabinets, the removal of the entire leg frame module including base cabinet and countertop, leaving intact the separate service strip with all its service fittings, service lines and cover panels as a finished operational component. The countertop height will be designed to be from desk to counter height adjustable without the addition of framing components.

6.12.2.5(3) Base framing modules on basic standard cabinet modules.

6.12.2.5(4) Steel frame will comprise vertical wall channels and independent self-contained pipe chase and leg sets which will allow for the removal and/or interchange of work surfaces, and suspended under-counter mounted cabinets and upper shelving. Determine pipe chase location in consultation with the Authority.

6.12.2.5(5) Fabricate system from prime quality furniture grade cold rolled steel. Form all components to create a rigid interlocking structure. All services will be fully accessible through removable cover panels, no special assembly tools are required. Bench legs to be fully adjustable. All legs will have leveller bolt. Suspended cabinets will be interchangeable and easily moved from workstation to workstation. Adjustable leg frame modules will be capable of adjusting countertop heights in 25 mm increments from 750 mm height up to 1100 mm height.

6.12.2.5(6) Finish for steel surfaces will be as specified above.

6.12.2.6 Miscellaneous Accessories

6.12.2.6(1) Laboratory casework will include the following accessory items:

6.12.2.6(1)(a) countertops and splashbacks;

6.12.2.6(1)(b) service fittings;

6.12.2.6(1)(c) drying racks;

6.12.2.6(1)(d) pegboards;

6.12.2.6(1)(e) acid storage cabinets;

6.12.2.6(1)(f) solvent storage cabinets;

6.12.2.6(1)(g) glassware drying cabinets;

6.12.2.6(1)(h) framed sliding glass doors;

6.12.2.6(1)(i) sliding glass doors;

6.12.2.6(1)(j) open storage units;

6.12.2.6(1)(k) emergency eye wash;

6.12.2.6(1)(l) emergency shower head;

6.12.2.6(1)(m) safety shower station;

6.12.2.6(1)(n) bin cabinets;

6.12.2.6(1)(o) file drawer cabinets; and

6.12.2.6(1)(p) mobile cabinets.

6.12.3 Window Coverings

6.12.3.1 Provide window coverings for:

6.12.3.1(1) all exterior windows (vertical blinds are preferred but other products may be used if they provide equivalent privacy, sun and heat control, are easy to clean and do not support or provide a surface that encourages spread of infectious disease (i.e. do not become electrostatically charged); and

6.12.3.1(2) all interior windows where privacy may be a concern.

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

6.12.3.3 Provide black-out window coverings for all patient rooms in the NICU, ICU and HDCU. Where window coverings are required for black-out functions, provide materials, tracks, seals, and operation suited to that purpose.

6.12.3.4 Use window coverings manufactured from materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control.

6.12.4 Window Shade Systems

6.12.4.1 Use shading fabric of PVC or vinyl-coated polyester or fibreglass yarn and that:

6.12.4.1(1) is waterproof, washable, rot-proof, flame-resistant, fungal and bacteria-resistant, colourfast to light, glare-reducing, and able to control heat gain and provide external visibility;

6.12.4.1(2) conforms to CAN/CBSB-4.162-M, “Hospital Textiles - Flammability Performance Requirements”; and

6.12.4.1(3) is tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.

6.12.5 Vertical Blinds

6.12.5.1 Vertical blinds will be a mono-control single cord blind system with rotating and traversing action. Vanes will be of aluminum alloy with baked enamel finish or fabric. Fabric will be waterproof, washable, rot-proof, flame-resistant, colourfast to light, and fungal and bacteria-resistant.

6.12.6 Venetian-Type Blinds between Glass

6.12.6.1 Provide integral blinds in interior glazing windows and glazed sliding doors for patient rooms in the ICU, HDU and NICU.

6.12.6.2 Blinds will consist of tempered aluminum alloy slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape. Use tapes with no special end rails required to attach the suspension members from the window opening to the blind.

6.12.6.3 Use a hardware/window design that does not allow air movement from a room to adjacent rooms. Openings in the glazing plane are not allowed.

6.12.6.4 The operator will be a specially constructed, permanent magnet capable of moving the blind assembly from a closed position in one direction to a closed position in the opposite direction.

## 6.13 Special Construction (Division 13)

6.13.1 Radiation Protection

6.13.1.1 Comply with all applicable requirements of the National Council on Radiation Protection and Measurement (NCRP).

6.13.1.2 Provide radiation protection in walls, doors, floors, ceilings and windows as required and appropriate to protect staff and patients from x-ray, imaging digitizing, CT scanner, radiology, and other rooms in the radiation protection shield.

6.13.1.3 Provide radiation protection by incorporating lead sheet of appropriate weight and thickness into wall and door assemblies and leaded glass manufactured for radiation shielding purposes into window assemblies.

6.13.1.4 Radiation shielding will be 0.9 mm lead to 2.1 m above the floor level as a minimum.

6.13.1.5 For sheet lead, comply with ASTM B749 Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate and meet or exceed Federal Specification QQL-201F Grade C.

6.13.1.6 For lead-lined gypsum board, comply with ASTM C36 or CAN/CSA-A82.27, Type X.

6.13.1.7 For lead glass, meet or exceed Federal Specification DD-G-451.

6.13.1.8 For cassette transfer cabinets, meet or exceed MIL-C-3673 (DM) Radiation shielded.

6.13.1.9 For radiation shielded doors, meet or exceed American National Standards Institute/ National Woodworkers Manufacturers Association ( ANSI/NWMA ) Industry Standard for wood doors and NCRP Report #49.

6.13.1.10 Fabricate radiation-shielded doors using a single layer of sheet lead with wood core laminated on each side of the lead. Bond cores using poured lead dowels at edges.

6.13.1.11 Fabricate radiation-shielded door frames with lead-lining.

6.13.1.12 Lead glass or lead louvers occurring in radiation shielded doors will be equivalent rated to sheet lead in doors.

6.13.1.13 For lead-laminated gypsum wallboard, use a single unpierced sheet of lead.

6.13.1.14 For sheet lead applied directly to partition steel studs, provide a continuous and complete protective shield.

6.13.1.15 Provide radiation shielding barriers, mobile or fixed, modular and transparent barriers to protect medical personnel by providing a full body shield. Provide units with distortion-free, lead-plastic windows.

6.13.2 Cooler and Freezer Rooms

6.13.2.1 Provide walk-in cooler and freezer rooms, with freezer room floors recessed into the slab for “flush” walk-in.

6.13.2.2 Design room enclosure elements to accommodate movement in wall and structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.

6.13.2.3 Design temperatures for cooler and freezer rooms will be as follows:

6.13.2.3(1) for cooler rooms: + 2oC to + 10oC;

6.13.2.3(2) for freezer rooms: -10oC to -25oC, with normal operation at + 4oC +/- ½oC;

6.13.2.4 Design floor, wall and ceiling panels to comply with ULC/ORD-C376 “Fire Growth of Foamed Plastic Insulated Building Panels in a Full-Scale Room Configuration”.

6.13.2.5 Design floor, wall and ceiling panels with tongue and groove joints to achieve a maximum air leakage rate of 75 Pa oF 0.00 m3/h-m2 and a water vapour permeance rate of 0.00 perms in accordance with ASTM E283 “Air Leakage Rate Testing” and ASTM E96” Water Vapour Permeance Rate Testing”.

6.13.2.6 Design ceiling panels with internal reinforcing to provide a maximum deflection of 1/240 of span under uniform loading of 20 psf and to support refrigeration systems.

6.13.2.7 Design room assembly to permit replacement of components.

6.13.2.8 Allow for ceiling, piping, conduit and other interior dead loads imposed on the structure.

6.13.2.9 Provide components and accessories as follows:

6.13.2.9(1) Floor, Wall and Ceiling Panels: fabricated from commercial grade galvanized steel conforming to ASTM A526M with zinc coating to ASTM A525M, designation Z275, and finished on exposed surfaces with manufacturer’s standard baked white enamel.

6.13.2.9(2) Panel Insulation: foamed-in-place polyurethane.

6.13.2.9(3) Doors: 915 mm x 2115 mm of same panel construction as panels, with soft perimeter gaskets, manufacturer’s standard pre-wired light switch, dial thermometer, heavy duty door closer, spring loaded and self-closing hinges, latch, pull handles, kickplate and threshold plate. Furnish freezer doors with anti-condensate heater, heated vent and pre-wired sill.

6.13.2.9(4) Provide self supporting steel shelving racks in cooler rooms.

6.13.2.9(5) Refrigeration System: self-contained air cooled condensing units mounted on walk-in units, and forced-air evaporators mounted on interior of units. Capacities, air delivery and dimensions to manufacturer’s design. The cooling units are to consist of minimum two separate units per room to provide full cooling capacity redundancy for servicing and maintenance.

6.13.2.9(6) Lighting: CSA approved vapourproof box with standard incandescent light fixture pre-wired to switch on door frame.

6.13.2.9(7) Alarms: Modulam MT, 1 local and remote to the BMS for each room.

## 6.14 Conveying Equipment (Division 14)

### 6.14.1 Elevators

6.14.1.1 Provide passenger and service elevators as required to meet the following performance requirements:

6.14.1.1(1) Population: Provide elevators to serve the number of beds and total occupancy above the main level of the Facility.

6.14.1.1(2) Handling Capacity: Passenger 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). Service elevators will be capable of transporting 4 full size ambulance stretcher per 100 beds, plus 12% of the staff population, in a peak 5 minute period.

6.14.1.1(3) Interval: For adequate elevator service, an interval of 30 to 50 seconds is required for both passenger and service elevators. The interval is defined as the average time between an elevator leaving a floor and the next elevator returning to the floor.

6.14.1.1(4) Waiting Time: Average waiting time will not exceed 30 seconds. Maximum waiting time will not exceed 180 seconds. Waiting time will be measured from the moment elevator call is registered until an elevator arrives at the designated level.

6.14.1.1(5) Load Factor: All 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).

6.14.1.1(6) Service Elevator Cabs: Non-public elevators used to transport patients will be able to accommodate a bariatric bed, up to four staff, four IV pumps, portable ventilator, oxygen tanks and monitors; and have enough space to allow for staff to carry out emergency procedures within the elevator.

6.14.1.2 Additional Requirements for Passenger Elevators: In addition to the requirements of Section 6.14.1, passenger elevators will, at a minimum, meet the requirements set out in the table below (without causing any passenger discomfort):

| | | | | |
|---|---|---|---|---|
| Number: | | 3 passenger elevators | | |
| Operation: | | Three car group | | |
| Type: | | Gearless Overhead Traction / Side Mount Traction / Machine room-less (MRL) | | |
| Speed: | | 500 fpm (2.54 m/s) | | |
| Maximum acceleration | | 3.9 ft / sec | | |
| Maximum jerk | | 5.9 ft / sec | | |
| Floor height basis for flight time | | 15’-0” (4572 mm) | | |
| Flight time | | 9.5 sec | | |
| Rated capacity: | | 4000 lbs. (1814 kg), Class A | | |
| Cab size: | | 7’-8” W x 5’-5” D x 8’-6” H (2337 mm x 1651 mm x 2591 mm) | | |
| Door type: | | Single speed, centre opening | | |
| Door size: | | 4’-0” W x 7’-0” H (1219 mm x 2134 mm) | | |
| Door open time | | 1.9 sec | | |
| Door close time | | 2.9 sec | | |
| Vibration Isolation | | Custom isolation required | | |
| Standby Power (Emergency Power) Operation | | Yes | | |
| Code Blue Operation | | Yes - Priority Call key switches at all levels | | |
| Cab finishes | | Glass covered wood veneer panels with stainless steel reveals, stainless steel panel ceiling with recessed LED illumination, tile floor, handrails and bumpers on all non-access walls | | |
| Security Card Readers | | Yes | | |
| Entrance Frame/Door Panel | Type | Standard | Finish | Brushed stainless steel #4 at all levels |
| Hall Pushbuttons | Qty | One (1) riser per floor | Finish | Brushed stainless steel #4 |
| Hall Entrance Sills Finish | Type | Aluminum | | |
| Car Sill Finish | Type | Aluminum | | |
| Lanterns | Qty/Type | One (1) hall lantern per elevator at all levels | Finish | Brushed stainless steel #4 |
| Position Indicators | Qty/Type | One (1) per elevator in-car<br>One (1) per elevator in hall at main level only | Finish | Brushed stainless steel #4 |
| Car Operating Panel | Qty | One (1) panels per elevator | Finish | Brushed stainless steel #4 |

6.14.1.3 Additional Requirements for Service Elevators: In addition to the requirements of Section 6.14.1, service elevators will, at a minimum, meet the requirements set out in the table below (without causing any passenger discomfort):

| | | | | |
|---|---|---|---|---|
| Number: | | 6 service elevators | | |
| Operation: | | Four car group (SE04 – SE07)<br>Two car group (SE08, SE09) | | |
| Type: | | Overhead Traction | | |
| Speed: | | 400 fpm (2.0 m/s) | | |
| Maximum acceleration | | 3.9 ft / sec | | |
| Maximum jerk | | 5.9 ft / sec | | |
| Floor height basis for flight time | | 15'-0" (4572 mm) | | |
| Flight time | | 11.1 sec | | |
| Rated capacity: | | 6000 lbs. (2722 kg), Class A | | |
| Cab size: | | 6'-4" W x 9'-4" D x 8'-6" H (1828 mm x 3353 mm x 2591 mm) | | |
| Door type: | | Two speed, centre opening | | |
| Door size: | | 6'-0" W x 7'-0" H (1828 mm x 2134 mm) | | |
| Door open time | | 3.0 sec | | |
| Door close time | | 3.9 ft / sec | | |
| Vibration Isolation | | Custom isolation required | | |
| Standby Power (Emergency Power) Operation | | Yes | | |
| Code Blue Operation | | Yes, Priority Call key switches at all levels, nurse call interface | | |
| Cab finishes | | Textured stainless steel finish (wall panels), stainless steel panel ceiling with recessed LED illumination, tile floor, handrails and bumpers on all non-access walls | | |
| Security Card Readers | | Yes | | |
| Entrance Frame/Door Panel | Type | Standard | Finish | Brushed stainless steel #4 at all levels |
| Hall Pushbuttons | Qty | One (1) riser per floor<br>One (1) discrete riser mounted in door frame at all levels | Finish | Brushed stainless steel #4 |
| Hall Entrance Sills Finish | Type | Nickel Silver | | |
| Car Sill Finish | Type | Nickel Silver | | |
| Lanterns | Qty/Type | One (1) hall lantern per elevator at all levels | Finish | Brushed stainless steel #4 |
| Position Indicators | Qty/Type | Two (2) per elevator in-car<br>One (1) per elevator in hall at main level only | Finish | Brushed stainless steel #4 |
| Car Operating Panel | Qty | Two (2) panels per elevator | Finish | Brushed stainless steel #4 |

6.14.1.4 Elevator Control System:

6.14.1.4(1) Provide a non-proprietary elevator control system that is microprocessor-based with sophisticated group dispatching capability.

6.14.1.4(2) Provide custom programming, as directed by the Authority, to interface operation of the code blue call switches at all times, including when a fire alarm signal is present.

6.14.1.5 Elevator Doors and Door Detectors: For all passenger and service elevators, provide:

6.14.1.5(1) high speed electrically driven closed loop door operators that are capable of:

6.14.1.5(1)(a) meeting the door opening times (from closed to 3/4 open) and closing times as shown in the tables set out in Sections 6.14.1.2 and 6.14.1.3;

6.14.1.5(1)(b) adjustment of speed, acceleration and slowdown, independently in each direction and of giving smooth and quiet operation;

6.14.1.5(2) infrared type detector edges that:

6.14.1.5(2)(a) are of three dimensional type, with the depth of the infrared zone field adjustable; and

6.14.1.5(2)(b) reliably detect carts, wheelchairs, etc. of varying heights and finishes, including chrome.

6.14.2 Escalators

6.14.2.1 Provide two escalators (one ‘UP’ and one ‘DOWN’) between main entry and level 2 of the Facility.

6.14.2.2 Basic Requirements: The escalators will:

6.14.2.2(1) be designed to operate 24 hours per day, seven days per week;

6.14.2.2(2) have reversible direction of travel;

6.14.2.2(3) have a rated capacity of 133 persons per minute at 27.4 meters per minute;

6.14.2.2(4) be at least 4’-0” (1200mm) nominal in size; and

6.14.2.2(5) have a step width of at least 3’-4” (1000mm).

6.14.2.3 Sound Level: The escalators will be designed to operate at or below 60 dBA sound level measured 1500mm from the escalator at any location with the escalator operating normally, free running or under load at the designated speed.

6.14.2.4 Brake: The escalators will be provided with an electro-mechanical brake designed to bring the escalator and its live load to a gradual stop whenever power is interrupted, a stop button is pressed, or any of the safety devices are actuated. If the main shaft is driven by chains, provide a brake mounted on this

main shaft which will operate, stop and hold the escalator and its load should the main drive chain fail.

6.14.2.5 Motor: The electric motor will be integrally mounted on the drive machine, have ball bearings, be designed and manufactured for use with escalators, and develop adequate starting torque.

6.14.2.6 Controller: The controller will be of the microprocessor type and designed for escalator use. The controller will be non-proprietary.

6.14.2.7 Drip Pan: The escalators will have an oil tight drip pan under the entire length and width of the assembly.

6.14.2.8 Steps: The escalators will have one piece cast aluminium steps.

6.14.2.9 Treads: Treads will be die cast aluminium or stainless steel, non-slip construction. Aluminium tracks are not acceptable.

6.14.2.10 Floor Plates: Provide removable aluminium floor plates with stainless steel frames.

6.14.2.11 Handrail: The handrail will be laminated canvas or other fabric with steel reinforcing to minimize stretch, and will be standard black colour.

6.14.2.12 Balustrades: Provide complete tempered glass balustrades. Glass colour will be standard clear glass.

6.14.3 Vertical Layout of Elevators and Escalators

6.14.3.1 Elevators and escalators will, at minimum, serve the Facility levels shown in the table below:

| Group | All Passenger Elevators | Four out of six Service Elevators | Two out of six Service Elevators | Up and Down Escalators |
|---|---|---|---|---|
| Helipad Level | | ■ ■ | | |
| Mech | | ■ ■ | | |
| Top Level | ■ ■ ■ | ■ ■ ■ ■ | | |
| Intermediate Level(s) | ■ ■ ■ | ■ ■ ■ ■ | | |
| 2 | ■ ■ ■ | ■ ■ ■ ■ | ■ ■ | ■ ■ |
| 1 | ■ ■ ■ | ■ ■ ■ ■ | ■ ■ | ■ ■ |
| 0 | ■ ■ ■ | ■ ■ ■ ■ | ■ ■ | |
| Parking Level(s) | ■ ■ ■ | ■ | | |

6.14.4 Pneumatic Tube Systems

6.14.4.1 Project Co will provide a computerized Pneumatic Tube System (PTS) that interconnects and serves Facility departments with automated secure on-demand transport of light materials and health care products. The PTS will be a six-inch Swiss Log Translogic system that is seamlessly integrated into the Hospital's existing Swiss Log Translogic PTS.

6.14.4.2 Project Co will connect the PTS to the Authority's existing PTS at the South Building Service Connection Room. The Authority will provide PTS tubing from the existing system to the Service Connection Room, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's PTS tubing at this location. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in the existing Hospital.

6.14.4.3 The PTS will include:

6.14.4.3(1) all necessary transfer units, user stations and carriers through a strategically designed network of six inch tubing in a configuration that is optimized for overall PTS performance. "Transactions Times" will be at a minimum as supported through a pre-installation "Virtual System Simulation" conducted by Swiss Log Translogic; and

6.14.4.3(2) at a minimum, stations located at each of the locations described in the Clinical Specification, including in each patient care zone (all stations will be of the recessed type; no virtual stations will be allowed). Provide an appropriate number and logical distribution of stations in order to minimize staff travel. Determine the final number of stations in consultation with the Authority as part of the design process;

6.14.4.3(3) no more than ten stations per zone;

6.14.4.3(4) four carriers for each station included in the Facility; and

6.14.4.3(5) at least one spare port at each transfer unit.

## 6.15 General Administration and Support Offices - Demountable Partitions and Sound Masking

6.15.1 Applicability

6.15.1.1 This Section 6.15 is applicable only to the General Administration component of the Facility.

6.15.2 Rooms Requiring Demountable Partitions and Sound Masking

6.15.2.1 Project Co will provide demountable partitions for those rooms indicated in the "Schedule of Accommodation" for General Administration (included in Section 12.0 of the Clinical Specification) as requiring demountable partitions.

6.15.3 Noise Criteria

6.15.3.1 Project Co will provide demountable partitions in conjunction with a sound masking system so that the overall NC rating in each of the rooms referred to in Section 6.15.2.1 will not exceed NC 30 -35.

6.15.4 Demountable Partitions

6.15.4.1 General

6.15.4.1(1) All demountable partitions will:

6.15.4.1(1)(a) be DIRTT Environmental Solutions (Moveable Solid and Glass Walls) demountable partitions or a product of equivalent quality that is approved by the Authority);

6.15.4.1(1)(b) include sliding, butt hinge, pivot, aluminum with glass lite, wood with optional glass lite, frameless glass doors and glazing, and double sliding barn doors, all sourced from a single manufacturer;

6.15.4.1(1)(c) have an STC rating of 37 minimum (determined using ASTM E90).

6.15.5 Electrical, Communications, and Security System Requirements

6.15.5.1 Integrate voice, data and security system components into demountable partitions.

6.15.5.2 Provide conduit, boxes and electrical duplexes and integrate into electrical and communication components.

6.15.5.3 Provide for installation of electrical, communications, and security system items arranged so that wiring can be readily removed and replaced.

6.15.5.4 Boxes: Provide outlet and pre-wired device boxes in cavity of demountable partitions for all outlets and devices. Provide metal junction and pull boxes where required. Must offer plug and play electrical solution.

6.15.5.5 Conduit: Provide option for metal conduit in cavity of demountable partitions, from outlet and device boxes to top or bottom of demountable partitions to permit wiring installation and connections.

6.15.5.6 Components: Provide all cutouts and reinforcements required for demountable partitions to accept electrical, communications, and security system components.

6.15.6 Demountable Unitized Panel Partitions

6.15.6.1 Solid Panels

6.15.6.1(1) Aluminum Framing: Aluminum extrusions will be 6063-T54 or 6061-T6 aluminum alloy;

6.15.6.1(2) Face Mounted Tile Attachment: Provide unitized frame assembly to accept face mounted tiles;

6.15.6.1(3) Frame Accessibility: Provide up to 75 mm (3 inches) clear wall cavity for distribution of utilities accessible from either side of wall by removable face panels. The wall cavity must also accommodate plumbing.

6.15.6.1(4) Face Panels: The following face tiles and finishes may be used:

6.15.6.1(4)(a) Paint Finish: Factory-applied paint finish;

6.15.6.1(4)(b) Wood Veneer Finish: Factory-applied wood veneer finish;

6.15.6.1(4)(c) Upholstered Fabric Finish: Factory-applied Fabric finish;

6.15.6.1(4)(d) Frameless Back Painted Glass: Factory-applied paint finish on frameless glass;

6.15.6.1(4)(e) Solid Write Away Tile (for dry eraser): Factory-applied finish on tiles;

6.15.6.1(4)(f) Magnetic Whiteboard;

6.15.6.1(4)(g) Custom material.

6.15.7 Glass Panels

6.15.7.1(1) Glass included in partitions will have aluminum glazing framing with aluminum extrusions, 6063-T54 or 6061-T6 aluminum alloy. Frame Finishes will be one of the following.

6.15.7.1(1)(a) Clear Anodized aluminum; AAMA 611, AA-M12C22A31, Class II;

6.15.7.1(1)(b) Powdercoat Color: Factory-applied powdercoat to match paint finish;

6.15.7.1(1)(c) Wood Veneer Wrapped Finish: Factory-applied wood veneer finish.

6.15.7.1(2) Frame Bases:

6.15.7.1(2)(a) Provide frame bases with provisions for height adjustment to accommodate floor slab variances;

6.15.7.1(2)(b) Provide a leveling mechanism for making fine adjustment in height over adjustment range of the product.

6.15.7.1(3) Connections and Supports: Provide manufacturer's standard connections and supports that connect and release from floor and ceiling without damage using carpet grippers and ceiling track clips, with exception of the following conditions: bulkhead (drywall ceiling), seismic conditions, electrical or service feeds, physical connections to base building (where required).

6.15.7.1(4) Panel Joint Closure: Will be manufacturer's standard, capable of closing up to a 25 mm (1 inch) gap between demountable partitions and base building elements.

6.15.7.1(5) Trim: Will be continuous and modular, factory-finished, snap-on type; adjustable for variations in floor and ceiling levels.

6.15.7.1(5)(a) Base Trim Profiles: Recessed; removable to access leveling mechanisms.

6.15.7.1(5)(b) Ceiling Trim Profile: Recessed; adjustable to accommodate up to a 12 mm (1/2 inch) gap between demountable partitions and base building elements.

6.15.7.1(5)(c) Wall Trim Profile: Recessed; adjustable to accommodate up to a 12 mm (1/2 inch) up to 25 mm (1 inch) gap between demountable partitions and base building elements.

6.15.8 Doors

6.15.8.1 For all standard offices, provide flush wood doors that meet the following requirements:

6.15.8.1(1) manufacturer's standard solid core door, butt hinge operation;

6.15.8.1(2) door thickness: 43 mm (1-11/16 inches) thick;

6.15.8.1(3) pressed high density fibreboard skin on both sides of door on particleboard core;

6.15.8.1(4) edging: solid edging.

6.15.8.2 For all conference and meeting rooms, provide frameless glass pivot doors that meet the following requirements:

6.15.8.2(1) Manufacturer’s specified glass with top rail and bottom aluminum rails;

6.15.8.2(2) Door Glazing: 13 mm (1/2 inch) tempered glass;

6.15.8.2(3) Stile Width: None;

6.15.8.2(4) Hardware Reinforcement: Factory milled to suit hardware.

6.15.9 Door Frames

6.15.9.1 Pivot Door Frames: Provide manufacturer's standard aluminum frame, reversible, factory milled to receive hardware. Door frames will be capable of reconfiguration without part replacement or damage to wall components;

6.15.9.2 Frame Finishes: Provide clear-anodized aluminum, powdercoat (paint match), or wood veneer wrapped;

6.15.9.3 Hardware Reinforcement: Provide frames that are milled, reinforced, drilled and tapped at factory to receive hardware.

6.15.9.4 Seals: Manufacturer’s standard.

6.15.10 Accessories

6.15.10.1 Provide manufacturer's brackets, supports and accessories for complete installation of system's furniture components, architectural millwork, audio visual equipment, and paper accessories.

6.15.10.2 Provide bracket design to enable other system furniture to mount to the walls, on or off module.

6.15.11 Fabrication

6.15.11.1 Demountable Unitized Panels:

6.15.11.1(1) Provide factory-assembled frames with 25 mm (1-inch) insulation, base track and levellers; face mounted tiles installed to frames on site.

6.15.11.1(2) Fabricate panels for installation with concealed fastening devices and pressure-fit components that will not damage ceiling or floor covering exceptions.

6.15.11.1(3) Fabricate panels with continuous light-and-sound seals at floor, ceiling, and other locations where panels abut fixed construction.

6.15.11.1(4) Factory glaze panels to the greatest extent possible.

6.15.11.2 Components:

6.15.11.2(1) Fabricate components for installation with concealed fastening devices and pressure-fit members that will not damage ceiling or floor coverings. Exceptions: Drywall ceiling, seismic applications and doors against base building require screw holes in base building for proper fastening.

6.15.11.2(2) Fabricate for installation with continuous seals at floor and other locations where partition assemblies abut fixed construction and for installation of sound attenuation insulation in partition cavities.

6.15.12 Training

6.15.12.1 Engage a factory-authorized service representative to demonstrate and train the Authority's personnel to adjust, operate, and maintain all demountable partitions.

6.15.13 Sound Masking

6.15.13.1 General

6.15.13.1(1) Provide a digital centralized, dual networked sound masking system. The system will be a Vibra-Sonic Control and Materials Handling Inc. system or a system of equivalent quality that is approved by the Authority.

6.15.13.1(2) The sound masking system will include the following:

6.15.13.1(2)(a) strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling;

6.15.13.1(2)(b) speaker assemblies generating unique, diffuse and unobtrusive sound with spatial and temporal uniformity, and having a spectrum shape designed to mask speech and low level unwanted noise;

6.15.13.1(2)(c) the following system components: a DP 8807 processor or equivalent self-contained multi-zone digital DSP-GUI controlled processor with Digital Class D Amplifiers, Third Octave 31 Band Equalizers, Ambient Sensing Components, Clock, Ramping, Power, Telco Paging, Music Inputs, an IP

Addressable Network, an AVB (Audio-Video-Bridge) compliant Network Port, all onboard;

6.15.13.1(2)(d) processor housed in a 19”w x 3.5”h (48.3 cm x 8.9 cm) - (2 Rack Units high) rack or wall mount chassis that is black powder coat CRS cold roll steel;

6.15.13.1(2)(e) adjustable brackets for 19” (48.3 cm) rack or wall mounting;

6.15.13.1(2)(f) 8 independent programmable channels with capability to support up to 2,048 channels within one networked system; and

6.15.13.1(2)(g) independent equalization for each channel allowing separate sound masking spectrums for each zone.

6.15.13.2 Performance Requirements

6.15.13.2(1) Provide sound masking in areas with demountable partitions, including as many units as are necessary to meet the acoustical performance requirements specified in this Section 6.15.

6.15.13.2(2) Octave band sound pressure levels in open areas, closed offices, conference and meeting rooms will be as follows:

| Octave Band Centre Frequency(Hz) | Average Sound Pressure Level(dB) | | | Tolerances(dB) |
|---|---|---|---|---|
| | Open Areas | Closed Offices | Conference and Meeting Rooms | |
| 125 | 52 | 49 | 46 | +4 -4 |
| 250 | 49 | 46 | 43 | +2 -2 |
| 500 | 45 | 42 | 39 | +1 -1 |
| 1000 | 40 | 37 | 34 | +1 -1 |
| 2000 | 33 | 30 | 27 | +1 -1 |
| 4000 | 26 | 23 | 20 | +1 -1 |
| 8000 | 18 | 15 | 12 | +3 -2 |
| *******Spatial Average Overall Sound Pressure Level: Minimum 45 for open areas, 42 for closed offices and 39 for conference and meeting rooms; Maximum 48 for open areas, 45 for closed offices and 42 dB for conference and meeting rooms, A-weighted in accordance with ASTM E1573. | | | | |

6.15.13.3 Noise Generation: The sound masking system will meet the following requirements:

6.15.13.3(1) 8 channel independent, uncorrelated full random non - repeating noise generation with constant energy per octave bandwidth.

6.15.13.3(2) Minimum spectrum accuracy: 1 dB from 40-10,000 Hz

6.15.13.3(3) Repetition Rate: non repeating

6.15.13.3(4) Mounting: Integrated within Digital Signal Processing

6.15.13.3(5) Ducking/mute controls on all zones for page over masking noise. System capable of 3 different dB levels per zone

6.15.13.3(6) Alarm: 4 distinct tones with variable frequency assignable to any zone.

6.15.13.3(7) Ramping clock: 1 to 30 day clock with 0.5dB to 3dB incremental steps adjustable per zone for masking level.

6.15.13.3(8) Page tones: Tone generators for Telco confirmation, busy tone and pre-announce tone for paging.

6.15.13.4 System Inputs: The sound masking system will be capable of receiving the following inputs:

6.15.13.4(1) Telco: RJ45 and RJ11 compatible

6.15.13.4(1)(a) Input: transformer coupled at 600Ω impedance

6.15.13.4(1)(b) Frequency: 250Hz – 4 kHz

6.15.13.4(2) Data: RJ45 input for LAN Ethernet for connection to desktop PC/Computer com port for software download and GUI control

6.15.13.4(3) Network Paging: RJ45 connecting to Enterprise Network Switch for IEE802.1 AVB (Audio-Video-Bridge) functionality.

6.15.13.4(4) Paging: 3-pin phoenix connector at over 2KΩ

6.15.13.4(4)(a) Microphone pre-gain: 30-60dB

6.15.13.4(4)(b) Frequency: 80Hz – 18kHz

6.15.13.4(5) Background Music: RCA terminations at over 10KΩ

6.15.13.4(5)(a) Frequency: 50Hz – 20 kHz

6.15.13.4(6) Audio – 8 Channels

6.15.13.5 Equalizer Filters: The sound masking system will include equalizer filters:

6.15.13.5(1) on each output channel with control over 31 - 1/3 octave bands on each channel.

6.15.13.5(2) that are integrated within the digital signal processing unit.

6.15.13.5(3) that meet the following requirements:

6.15.13.5(3)(a) Equalization: 1/3 octave using ISO standard frequencies from 63-12,500 Hz minimum.

6.15.13.5(3)(b) Output: 600 ohms balanced and adjustable.

6.15.13.5(3)(c) Filters: adjustable minimum 20 dB adjustment per band.

6.15.13.5(3)(d) Level Tolerance: +/- 1 dB from 200-4000 Hz.

6.15.13.5(3)(e) Total Harmonic Distortion: less than 0.5% at full rated output.

6.15.13.5(3)(f) Equivalent Input Noise: less than –85 dBA from 20-20,000 Hz unweighted.

6.15.13.5(3)(g) Output: transformer isolated.

6.15.13.5(3)(h) Front panel security cover.

6.15.13.5(3)(i) Mounting: Integrated in self contained unit to be mounted in 2 RU chassis

6.15.13.6 Amplifiers: The sound masking system will include amplifiers that meet the following requirements:

6.15.13.6(1) Channel, CLASS D solid state, EIA rated

6.15.13.6(2) Audio power handling: continuous for speaker load plus minimum 3 dB margin (single or multi-channel).

6.15.13.6(3) Frequency response +/- 0.3 dB 20Hz – 20kHz at 100 Ω

6.15.13.6(4) Total Harmonic Distortion: less than 1% at 1kHz at rated output.

6.15.13.6(5) Transformer Output: 70.7volt line and audio line level.

6.15.13.6(6) Automatic and manual gain control adjustable to 34 dB

6.15.13.6(7) Output Regulation within 2dB, from no load to full load.

6.15.13.6(8) Power Supply: self-contained and CSA approved.

6.15.13.6(9) Mounting: Integrated in self contained unit to be mounted in 2RU chassis

6.15.13.6(10) Input impedance: 50KΩ

6.15.13.6(11) Output impedance: 0.08Ω

6.15.13.6(12) Carrier Frequency: 400kHz

6.15.13.6(13) Constant voltage at 50W

6.15.13.6(14) +/- 15VDC and 100kHz square sine wave

6.15.13.6(15) Peak current: 1.2 Amps

6.15.13.7 Ambient Sensing Optimizer – Onboard: The sound masking system will include an onboard ambient sensing optimizer that:

6.15.13.7(1) will dynamically adjust masking/paging levels real time within 6 dB @ 45dB nominal + - 3dB (range from 42-48dB) while allowing paging to be used in the same zone; and

6.15.13.7(2) include one Model CLM8 (current loop microphone) in a 2- gang plate for easy mounting into a 2-gang electrical box (by others) for use up to 1,000 feet from the DP8807 unit via CAT 5e cabling.

6.15.14 Materials

6.15.14.1 All electronic components will be ROHS and UL recognized

6.15.14.2 All plastics will meet UL94VO flammability rating

6.15.14.3 Cold roll steel - 18 AWG - .047" nominal

6.15.14.4 Black powder coat paint

6.15.14.5 All materials will be corrosion resistant

6.15.14.6 Provide a white silk screen on rear

6.15.14.7 Provide a molex front cover with LCD Lights

6.15.15 Testing, Adjusting, And Balancing

6.15.15.1 Calibrate the microphone and related test equipment prior to testing.

6.15.15.2 Test, adjust, and balance the sound masking system with the mechanical system and other noise generating equipment shut down in areas receiving sound masking.

6.15.15.3 Test, adjust, and balance system until sound spectrum and levels meet performance requirements specified in this Section 6.15. Adjust settings of installed units, relocate installed units, or add additional units, if and as required.

6.15.15.4 Upon completion of tests:

6.15.15.4(1) perform walk-through verification of areas that will be covered by sound masking. Adjust and re-test areas having abnormal characteristics or levels; and

6.15.15.4(2) submit copies of all final sound pressure levels readings taken, including accurate description of reading locations and test methods and equipment used.

## PART 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

### 7.1 Mechanical Systems Design Principles

7.1.1 General Design Principles

7.1.1.1 Project Co will provide mechanical systems (including HVAC, fire protection, medical gas and other systems) that:

7.1.1.1(1) are designed to provide a healing, comfortable and productive environment for the Facility Users, meet the required environmental conditions for all Equipment and meet the requirements set out in CSA

Z317.2-10 (Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities).

7.1.1.1(2) are designed not to have an adverse effect on the Hospital;

7.1.1.1(3) are located and designed to minimize sound transmission to outdoor spaces/places of respite intended for patient/staff use;

7.1.1.1(4) minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems;

7.1.1.1(5) are configured and located in such a way to avoid, as much as possible, entry into regularly occupied areas to perform maintenance and repairs;

7.1.1.1(6) are developed to provide reliability of continual operation. Adequate standby capacity and redundancy will be included in system design;

7.1.1.1(7) are vibration isolated to minimize noise and vibration through the structure or other components of the Facility;

7.1.1.1(8) comply with all applicable standards, including acoustic requirements in CSA Z107-06 and ASHRAE standards;

7.1.1.1(9) incorporate flexibility and adaptability for future expansion without major disruption or alteration to the Facility infrastructure, including by designing and sizing all systems to suit the consumption and discharge needs of:

7.1.1.1(9)(a) the Facility as at the Effective Date, plus:

(a).1 sizing distribution piping and ducting systems including air terminal boxes, grilles and diffusers for 15% additional capacity; and

(a).2 sizing fans and pumps with the capacity to deliver 5% additional flow through installed distribution systems without changing motors and with the capability to deliver 15% additional capacity through existing distribution systems by changing motors; plus

7.1.1.1(9)(b) the future alterations contemplated in Section 2.5.1 of this Schedule.

7.1.2 Additional Requirements

7.1.2.1 Steam, water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, build up of deposits, disease, bacteria and will prolong the equipment life.

7.1.2.2 Pipes, ducts and fittings will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns. All plumbing will be routed away from core communication rooms and server rooms.

7.1.2.3 Refer to Appendix 3B [UBC Videoconference Room Specifications] for additional requirements applicable to the UBC Videoconference Rooms.

## 7.2 Fire Suppression (Division 21)

7.2.1 Fire Protection

7.2.1.1 Basic Requirements

7.2.1.1(1) Provide all required fire protection for the Facility, including the Helipad.

7.2.1.1(2) Provide a sprinkler system and equipment that is designed for the applicable occupancy classification.

7.2.1.1(3) Provide a double check valve assembly on the sprinkler system take-off connection from the water supply. The assembly will be complete with OS&Y gate valves on both sides and tamper proof switches.

7.2.1.1(4) Provide a fire pump, if required, with a transfer switch that is part of the fire pump controller. Mount the switch package in a separate mechanically attached enclosure that is approved by UL, ULC, FM and CSA and built to NFPA 20 standards for this application.

7.2.1.1(5) Provide a dry type sprinkler system or anti-freeze sprinkler system in areas that may be subject to freezing temperatures.

7.2.1.1(6) Provide a preaction sprinkler system in critical rooms where water damage may affect the operation of key areas/equipment, including:

7.2.1.1(6)(a) the CT Scanner;

7.2.1.1(6)(b) digital imaging equipment in the ER Satellite DI and in the trauma rooms;

7.2.1.1(6)(c) the Mass Spectrophotometer; and

7.2.1.1(6)(d) the Auto-line in the Lab Services area.

7.2.1.1(7) Sprinkler heads in areas subject to vandalism will be vandal proof.

7.2.1.1(8) Provide standpipes in all stairwells as required.

7.2.1.1(9) Provide fire extinguishers complete with semi-recessed or fully recessed cabinets. Each fire extinguisher will be located and approved for the hazard and classification of the space that it serves.

7.2.1.1(10) Provide zone shut-off valves that are readily identifiable and accessible from the floor level, but not located in patient care areas.

7.2.1.1(11) Provide fire department connections at a location that is approved by applicable Governmental Authorities.

7.2.1.2 Performance Criteria

7.2.1.2(1) Fire protection systems will comply with all applicable standards, including the applicable NFPA standards.

7.2.1.2(2) All equipment will be ULC and FM approved.

7.2.1.2(3) Equipment installation will comply with manufacturers' requirements.

7.2.1.2(4) Fire protection systems and equipment will be installed, tested and certified by a qualified and licensed contractor, who is regularly engaged in such installations.

## 7.3 Plumbing (Division 22)

7.3.1 Site Services

7.3.1.1 Provide individual water, fire protection, natural gas, sanitary, medical gas and storm services as required and sized to suit the usage needs of the Facility.

7.3.1.2 Provide a water meter, reduced pressure backflow preventer and independent shut-off valve on the main water supply to the Facility. Calculate and submit to the Authority the estimated maximum flow requirement for the domestic water supply.

7.3.1.3 Basic Requirements

7.3.1.3(1) Domestic water systems will be to American Water Works Association (AWWA) standards. Provide water treatment, as required to meet CSA/AWWA standards. Provide an exterior domestic water connection to enable domestic water connection to an exterior source if water main service is not available from the City main.

7.3.1.3(2) Refer to Section 5.3 regarding post disaster requirements for services.

7.3.1.3(3) Provide utilities-commission approved meters for domestic water and natural gas. The meters will be used to accurately measure water flow and natural gas consumption in all flow conditions. Refer to Appendix 2D [Energy].

7.3.1.3(4) Provide the HVAC, plumbing, fire protection, and medical gas systems to avoid disruption to the operation of the Facility during maintenance or repairs. Design the systems so that, as much as possible, the rooms do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be accessible.

7.3.1.3(5) Distribute plumbing by means of risers to each floor to a maximum of 25% of the floor area. Provide isolation valves to each area.

7.3.1.3(6) Incorporate flexibility in the system designs to accommodate future alterations and allow for future expansion in accordance with Section 7.1.1.1(9).

7.3.1.3(7) Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage.

7.3.1.3(8) Provide all fixtures and equipment to manufacturer's specifications and standards.

7.3.1.3(9) Provide the water systems to ensure that water is supplied at the required pressures to all water outlets. Minimum water pressure will be maintained at 35 PSI to the most remote fixture.

7.3.1.3(10) Provide durable materials to allow for 24 hour a day operation with minimal downtime.

7.3.1.3(11) Provide services with easy access and serviceability and to avoid interference with other services during operation and maintenance activities.

7.3.1.3(12) Provide floor drains in all mechanical rooms and for all devices requiring these drains including but not limited to emergency showers, reverse osmosis systems and backflow prevention devices. Ensure all drain piping is terminated in floor drains.

7.3.1.3(13) Provide interceptors to intercept oil, grease, dirt, solids and aircraft fuel (from the Helipad).

7.3.1.3(14) Provide a domestic water strainer at the incoming service into the Facility.

7.3.1.3(15) Provide the domestic water booster pumping system with 100% redundancy (one redundant unit for each active unit) and a connection to emergency power. The system shall provide uninterrupted water service and constant pressure under all conditions.

7.3.1.3(16) Provide a domestic water storage and pump system for the Emergency Department to meet the requirements of Section 5.3.4 (Post Disaster Requirements). Design the system so that water in the storage tank does not remain stagnant and flows continuously in non essential situations, and so that water delivered to the Facility will meet the water quality requirements of all applicable Laws, including the Drinking Water Protection Regulation (British Columbia).

7.3.1.3(17) Provide all systems to meet the infection control requirements of this Schedule.

7.3.1.3(18) All piping will be accessible. No in-slab piping is allowed.

7.3.1.3(19) Provide a central reverse osmosis filtered water system for hemodialysis as follows:

7.3.1.3(19)(a) to supply hemodialysis machine connection points at each patient bed in the HCU, ICU and HDCU;

7.3.1.3(19)(b) include a single central water filtration package with separate continuously circulating distribution loops to each of the 3 units;

7.3.1.3(19)(c) install distribution piping in accessible locations to allow replacement with minimal disruption of patient care areas;

7.3.1.3(19)(d) provide piping and outlets that are suitable for a system with an automated heat sterilization method of disinfection;

7.3.1.3(19)(e) the connection points will be specific for dialysis machine connection and will be of a type that ensures complete continuous water circulation through the assembly when not connected to a dialysis machine;

7.3.1.3(19)(f) the system will be sized for simultaneous use of 25% of all dialysis machine connection points on each floor; and

7.3.1.3(19)(g) the system, including water filtration equipment, distribution system, and dialysis machine connection

points, will be a packaged system provided by a company specializing in dialysis water systems.

7.3.1.3(20) Provide drainage from each dialysis connection point using plastic drainage piping up to the point where the drain branch connects to a main drain line where suitable dilution will ensure the branch effluent is not corrosive to the main drain piping material.

7.3.1.3(21) Provide a centralized acid and bicarbonate delivery system for hemodialysis. Refer to the Equipment List and the Equipment Data Sheets for the minimum requirements for this system.

7.3.1.4 Performance Criteria

7.3.1.4(1) Provide all drainage systems such that the system connects to the Site drainage services, utilizing gravity drainage wherever possible.

7.3.1.4(2) If pile foundations are used to support the structure, all underslab piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and be installed at intervals to carry the pipe and load and maintain the required slope. Hangers and rods will be corrosion resistant. Install light-weight fill above all piping that is supported (hung) from the concrete slab above.

7.3.1.4(3) Pumping systems for subsurface, storm, or sanitary drainage shall include 100% redundancy (one redundant unit for each active unit) and related equipment will be supplied with emergency power. The sump will have twin compartments for settling and pumping and will be sized to prevent short cycling of the pump. Provide local alarm and outputs to the BMS for high water levels and pump failure.

7.3.1.4(4) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout per BCICA quality standards. Where piping and/or piping components are subject to freezing, provide insulation and heat tracing. Ensure life-safety systems are not installed in locations subject to freezing.

7.3.1.4(5) Provide drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs.

7.3.1.4(6) All plumbing drainage for acidic fluids will be of ‘acid’ resistant material to a point where dilution, as a result of additional discharge from other sources, reduces the acidity of the discharge to a neutral pH.

7.3.1.4(7) Provide flushing and disinfection of domestic water systems. Provide independent testing of piping systems once flushing and cleaning has been completed.

7.3.1.4(8) Provide automatic trap primers in drains that are subject to losing the trap seal.

7.3.1.4(9) Provide electronic trap primers with solenoid valves where usage of plumbing fixtures is infrequent.

7.3.2 Plumbing Fixtures

7.3.2.1 Basic Requirements

7.3.2.1(1) All plumbing fixtures will be suitable for a hospital facility. Fixtures selected must have proven acceptable hospital performance from previous installations.

7.3.2.1(2) Consult with the Authority on the selection of fixtures, and give particular attention to performance relative to infection prevention and control. To this end, the size and depth of fixture basins must be considered. The depth will be at least 170 mm [6 ¾"] at the deepest part. Small 'bar' type sinks are not acceptable.

7.3.2.1(3) Provide security fixtures where needed.

7.3.2.1(4) Provide flush valves for toilets.

7.3.2.1(5) Barrier-free plumbing fixtures and fittings provided where required will be suitable for use by bariatric users.

7.3.2.1(6) Bariatric plumbing fixtures will be provided in the patient rooms designated for bariatric patient use.

7.3.2.1(7) Provide anti-splash, anti-aerosolizing, faucet fittings (i.e. laminar flow) that do not retain air. Provide gooseneck faucet fittings. Avoid low profile gooseneck faucet fittings.

7.3.2.1(8) Fixtures will not have an overflow.

7.3.2.1(9) Public toilets will consist of wall hung elongated bowls with an open front seat and wired electronic flush valves.

7.3.2.1(10) Patient toilets will consist of wall hung or floor mounted elongated bowls, an open front seat and manual high/low dual flow flush valves.

7.3.2.1(11) Showers and bath tubs shall be provided with pressure balanced and high temperature limit shower valves, metal shower heads will be utilized. Shower bases will ensure that the water is contained within the shower area.

7.3.2.1(12) Urinals will be wall-hung and low-consumption with electronic hands-free flush valve operation.

7.3.2.1(13) Public washroom lavatory fixtures will be made of an impervious, durable material and will have electronic hands-free type faucets with single temperature supply that can be adjusted and set to the desired temperature.

7.3.2.1(14) Patient washroom lavatory fixtures will be made of an impervious, durable material and will have electronic hands free faucets.

7.3.2.1(15) Staff handwash sinks for nursing stations, patient care areas, examination rooms, and other similar function rooms will be made impervious durable material or other suitable material and will have electronic hands-free type faucets with gooseneck spouts and single temperature supply that can be adjusted and set to the desired temperature.

7.3.2.1(16) ICU, ED and procedure room lavatories shall be stainless steel adequately sized for proper washing and scrubbing of hands. Hands free electronic faucets with gooseneck spouts will be provided.

7.3.2.1(17) Equipment cleaning sinks will be made of stainless steel with blade handle faucets and gooseneck spout. Sinks will be large and deep to accommodate proper washing of equipment.

7.3.2.1(18) In NICU, Paediatric Pharmacy, ICU and HDCU, provide for every 4-6 patient rooms, in accessible locations, a stainless steel surgical scrub sink with integral splash back for hand hygiene for conducting surgery or other sterile procedures such as mixing medication within pharmacy. Hands free wired electronic faucet will be mounted on the back splash.

7.3.2.1(19) Toilets will be of a type that can be used with portable bariatric commode chairs as required.

7.3.2.1(20) Provide electronic trap primers with automatic solenoid valves at p - traps in negatively-pressurized rooms.

7.3.2.1(21) Provide suitable quantities of janitors' sinks, hose bibs, eye wash stations and drinking fountains (or other sources of potable water acceptable to the Authority acting reasonably) to provide sufficient service to the Facility.

7.3.2.1(22) Provide all appropriate services and connections to all equipment for patient care, laboratory and all other areas. Provide all accessories as needed.

7.3.2.1(23) Sinks will be stand-alone wall hung type or have bowls integrally formed into countertops. Drop-in or under-mount style countertop sinks will not be used.

7.3.2.2 Performance Criteria

7.3.2.2(1) Provide isolation valves for all plumbing services and clearly identify the location of all valves.

7.3.2.2(2) Provide accessible clean-outs for all sinks and lavatories below the flood-level rim of the sink. Also include provisions for clean outs for future sinks and lavatories.

7.3.2.2(3) Construct working mock-ups (at appropriate heights) of all sinks with faucets for review by the Authority during the design process.

7.3.2.2(4) Select toilets that will reduce the spread of infection. Size flush valves for the water consumption of the bowl. Toilet bowls will not splash or spray water onto the toilet rim or anywhere outside of the toilet bowl and will be designed to minimize the aerosolization of the toilet contents.

7.3.2.2(5) All electronic sensor-activated fixtures will be hardwired.

7.3.2.2(6) If system pressure exceeds the acceptable delivery pressure, then provide pressure reducing valves with 100% redundancy. Place the valves in accessible locations.

7.3.3 Domestic Hot Water Systems

7.3.3.1 Basic Requirements

7.3.3.1(1) Provide a domestic hot water system with sufficient capacity and recovery rate for the hot water requirements of the Facility. Allow for expansion capacity within each system in accordance with Section 7.1.1.1(9).

7.3.3.1(2) Calculate domestic hot water demand in accordance with ASPE Plumbing Engineering Design Handbook.

7.3.3.1(3) Domestic hot water supply will be of adequate temperature to serve the needs of the Facility at not less than a 60ºC supply temperature. Provide automatic mixing valves where temperatures are required to be less than 60ºC at point of use as required by CSA Z317.1-99 Standards.

7.3.3.1(4) Ensure timely delivery of hot water to all fixtures.

7.3.3.1(5) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the piping, fixtures, or any other component. Design methods may include eliminating dead-leg piping and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

7.3.3.2 Performance Criteria

7.3.3.2(1) Provide the hot water generating equipment with 100% redundancy.

7.3.3.2(2) Generate domestic hot water at 60ºC to minimize conditions for Legionella bacteria.

7.3.3.2(3) Recirculate domestic hot water from the distribution system(s) back to the generating equipment.

7.3.3.2(4) Monitor hot water supply temperatures via the BMS and provide alarm outputs when the temperature exceeds the design setpoint.

7.3.3.2(5) The domestic hot water generating equipment will meet the energy efficiency requirements of ASHRAE 90.1.

7.3.3.2(6) Domestic water heating systems will not use storage tanks.

7.3.4 Medical Gas Systems

7.3.4.1 Basic Requirements

7.3.4.1(1) Project Co will provide medical gases for the Facility as required by Appendix 3C [Medical Gas Requirements].

7.3.4.1(2) Project Co will provide oxygen to the Facility by connecting to the oxygen distribution piping at the South Building Service Connection Room. The Authority will provide oxygen service to the Service Connection Room complete with an isolation valve and flow meter at the point of connection in this room, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's piping at this location and to connect the BMS to the flow meter. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in the existing SMH buildings.

7.3.4.1(3) Project Co will:

7.3.4.1(3)(a) provide centralized duplex bottle manifold supply systems for the following medical gases: medical air (reserve supply only), nitrogen, nitrous oxide, carbon dioxide;

7.3.4.1(3)(b) design the centralized duplex bottle manifold supply systems so that they will, when required, automatically switch to the spare bank of bottles (and that switching to the spare bank is alarmed at the master alarm); and

7.3.4.1(3)(c) include in the Facility an enclosed room with adequate space for the storage of medical gas bottles, including bottles of gases supplied by the centralized supply systems described above and bottles of the following additional medical gases: argon, helium, oxygen mix and rare gas/oxygen mix.

7.3.4.1(4) Provide new central medical air and medical vacuum systems with redundancy so that if 50% of the units in either system were to fail or be shut down, there will be no degradation of the systems ability to meet the capacity requirements of the Facility.

7.3.4.1(5) Connect new central medical air and medical vacuum systems to emergency power.

7.3.4.1(6) Locate all medical gas outlets in a head wall system that incorporates medical gases, electrical and data outlets.

7.3.4.1(7) All pipe and pipe fittings will be in accordance to ASTM 88, de-greased copper Type 'L'.

7.3.4.1(8) Service Outlets

7.3.4.1(8)(a) Provide recessed service outlet boxes designed for concealed piping and fabricated for straight insertion of secondary equipment.

7.3.4.1(8)(b) Each recessed wall outlet will have a permanently marked, colour-coded non-interchangeable index system to prevent connection to the wrong gases. Provide a secondary check valve to maintain the line pressure if the primary valve is removed for maintenance.

7.3.4.1(8)(c) Provide 2-part DISS type outlet connections for each medical gas.

7.3.4.1(9) Ball type shut off valves will be U.L. labelled showing the appropriate gas service & pressure rating. Valves will swing out during installation and have a quarter turn from full open to close.

7.3.4.1(10) Area zone shut off valves will be housed in a single box comprised of multiple shut off valves with tube extensions, lexan glass door with hinges and pull out opening ring. Provide pressure / vacuum gauges for each service.

7.3.4.2 Performance Criteria

7.3.4.2(1) Provide the medical gas system so that there is minimum of one zone shut off valve per programmed area and a local alarm panel for each zone.

7.3.4.2(2) All medical gas piping in normally inaccessible areas (e.g. behind walls and boarded ceilings) will be clearly identified.

7.3.4.2(3) Provide the medical gas system such that each program area will have its own valve box and alarm panels. Alarm panels will be connected to emergency power.

7.3.4.2(4) Provide an alarm interface signal to the BMS for critical alarms such as low or high pressure.

7.3.4.2(5) All piping, valves and filters will be factory cleaned and capped or sealed to prevent contamination.

7.3.4.2(6) All departments will be provided with local valve boxes and alarm panels.

7.3.4.2(7) Provide a master medical gas alarm panel to monitor all medical gas functions. Remote alarm annunciation will be provided at a location with 24 hour continuous monitoring by personnel. Provide an inter-connected status and alarm point and signal to the BMS.

7.3.4.2(8) Individually connect all master alarm panels to the BMS.

7.3.4.2(9) All medical gas systems will be certified in accordance with CSA standards by an independent and qualified testing agency.

7.3.4.2(10) All systems components requiring electrical power will be on emergency power.

7.3.4.2(11) The medical gas supply system will be for patient consumption only. If equipment and/or procedure(s) require medical grade gas supply, then provide separate dedicated source equipment, piping, valving and monitoring to accommodate that application.

7.3.5 Specialty Systems

7.3.5.1 Provide all specialty systems required for the operation of the Facility, including:

7.3.5.1(1) acid waste piping and venting; and

7.3.5.1(2) oil, grease, dirt, and solids interceptors.

7.3.5.2 Interceptors will be provided in accordance with manufacturer's specifications.

7.3.5.3 Acid waste, vent piping, and fittings will be suitable for the pH levels of the waste system.

## 7.4 Heating, Ventilating and Air Conditioning (Division 23)

7.4.1 Building Heat Source

7.4.1.1 Project Co will provide heating for the Building either by connecting to the SMH central plant or by providing a stand-alone heat source for the Building.

7.4.1.2 If Project Co elects to provide heating for the Building by connecting to the SMH central plant then the following will apply:

7.4.1.2(1) Project Co will provide steam to the Facility by connecting to the SMH central plant distribution piping at the South Building Service Connection Room. The Authority will provide an isolation valve and flow meter at the point of connection in this room, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's piping at this location and to connect the BMS to the flow meter.

7.4.1.2(2) Project Co will provide for the return of condensate from the Facility by connecting to the condensate piping at the South Building Service Connection Room. The Authority will provide an isolation valve and flow meter at the point of connection in this room, and Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's piping at this location and to connect the BMS to the flow meter.

7.4.1.2(3) The Authority intends to increase the existing SMH steam plant capacity to meet additional demand from the Facility.

7.4.1.2(4) Project Co will provide the Facility's steam system so that it:

7.4.1.2(4)(a) uses no more than 20,000 lb/hour of steam at a pressure no more than 80 psi; and

7.4.1.2(4)(b) returns all condensate to the central plant.

7.4.1.2(5) Project Co will notify the Authority within 3 months after the Effective Date of the estimated maximum steam flow rate to the Facility.

7.4.1.2(6) Project Co will consult with and obtain approval from the Authority before performing any work that may affect the operation or capacity of the existing central plant. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and

Construction Protocols] regarding Work Plan and other requirements regarding work in the existing Hospital.

7.4.1.2(7) Performance Criteria

7.4.1.2(7)(a) Provide all piping for appropriate pressures.

7.4.1.2(7)(b) Provide adequately sized and durable piping interconnections from the termination point to the new piping system so that the steam service is delivered without extensive pressure drop. Refer to Section 2.5 regarding conversion of one non-clinical level of the Facility to surgical/treatment type functions. Size main service piping to allow for this conversion.

7.4.1.2(7)(c) Provide for adequate pipe expansion from the last anchor of the termination point onwards to the Facility's systems.

7.4.1.2(7)(d) Provide dedicated steam pressure reducing valve stations and condensate return pumping stations inside the Facility.

7.4.1.2(7)(e) Provide steam, regardless of the steam quality level in the existing central plant, for humidification and process such that the level of impurities will comply with CSA Z317.2 and that the chemical concentrations in the air stream will not exceed acceptable levels set out in applicable Law (including occupational health and safety regulations).

7.4.1.2(7)(f) Reduce the steam pressure where required for supply to equipment. Pressure reducing stations will be provided for high and low demand situations. Manual by-pass valves and piping will also be provided at each station.

7.4.1.2(7)(g) Provide condensate return pump systems with the appropriate pressure and temperature rating. The pump and storage units will be sized to prevent hunting. 100% pump redundancy will be provided.

7.4.1.2(7)(h) Utilize screw fittings for piping that is 50mm and smaller and welded fittings for piping that is 65mm and larger.

7.4.1.2(7)(i) Piping will be arranged for ease of operation, accessibility for maintenance, safety considerations and appearance.

7.4.1.2(7)(j) Provide expansion compensation for steam and condensate piping. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices will be based upon a thorough review of the piping layout, and piping stress analysis.

7.4.1.2(7)(k) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement.

7.4.1.2(7)(l) 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.

7.4.1.2(7)(m) Select steam condensate pumps to operate at the system fluid temperature without vapour binding and cavitation. Pumps will be non overloading in parallel or individual operation, and will operate within 25% of the mid point of published maximum.

7.4.1.2(7)(n) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.

7.4.1.2(7)(o) Discharge from steam safety valves and vents will be individually piped to the outdoors in suitable locations.

7.4.1.2(7)(p) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal or no disruption to the delivery of health care services.

7.4.1.2(7)(q) Insulate all steam and condensate piping, equipment and accessories.

7.4.1.2(7)(r) Provide seismic mitigation and building separation devices for all piping that crosses buildings and utility corridors.

7.4.2 Heating

7.4.2.1 Basic Requirements

7.4.2.1(1) Provide appropriate steam to water heat exchangers to provide all necessary heating for the Facility if Project Co elects to provide heating for the Building by connecting to the SMH central plant.

7.4.2.1(2) Sources of ventilation and/or heating that serve the patient rooms and service spaces located in the acute care areas will be connected to the emergency power supply.

7.4.2.1(3) Provide adequate expansion compensation for heating piping. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices shall be based on a thorough review of piping layout, and piping stress analysis.

7.4.2.1(4) All high points in piping will be equipped with air removal devices such as air collection chambers and air vents.

7.4.2.1(5) Equipment and piping will be installed with adequate service space, access panels and the ability to remove equipment for servicing or replacement.

7.4.2.1(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.

7.4.2.1(7) Balancing valves, flow-measuring devices, temperature and pressure sensors will be provided throughout the system to facilitate system balancing.

7.4.2.1(8) Design pumps to operate at the system fluid temperature without vapour binding and cavitation. Pumps, will be non- overloading in parallel or individual operation, and will operate within 25% of the midpoint of published maximum efficiency curve. Where there is more than 40% variation in flow, variable frequency drives shall be provided.

7.4.2.1(9) Pump construction and installation will permit complete pump servicing without disrupting piping or motor connections.

7.4.2.1(10) Locate services that require access for regular maintenance above non-critical spaces such as corridors to minimize or eliminate disruptions to the delivery of health care services.

7.4.2.1(11) Insulate all heating water piping, equipment and accessories in accordance with all applicable standards, including applicable BCICA and ASHRAE standards.

7.4.2.1(12) Utilize screw fittings for piping 50mm and smaller and welded fittings for piping 65mm and larger.

7.4.2.1(13) Design seismic mitigation and building separation devices for all piping that crosses buildings and/or utility corridors.

7.4.2.1(14) All piping will be accessible. No in-slab piping is allowed.

7.4.3 Air Conditioning

7.4.3.1 Basic Requirements

7.4.3.1(1) Provide all necessary space, ventilation and process cooling for the Facility.

7.4.3.1(2) The design and installation will comply with all applicable standards, including CSA B52, Mechanical Refrigeration Code.

7.4.3.1(3) Equipment will be CSA approved, and will meet all applicable standards, including applicable sections of the ASME Code.

7.4.3.1(4) Welding materials, fabrication standards, and labour qualifications will comply with all applicable standards, including applicable ANSI and ASTM Codes.

7.4.3.1(5) Chillers will be rated in accordance with ARI 550/590-98. No absorption chillers may be used.

7.4.3.1(6) Chillers will have multiple individual refrigerant circuits. Prime mover nameplate ratings for each circuit will not exceed 200 KW for groups Al, A2 or B1 refrigerants.

7.4.3.1(7) Cooling towers performance will be certified in accordance with CTI (Cooling Tower Institute) Standard STD-201. No open type cooling towers are allowed except the following:

7.4.3.1(7)(a) spray coil (closed circuit evaporative fluid cooler) type cooling towers; and

7.4.3.1(7)(b) conventional open type cooling towers, if such towers:

(b).1 are located away from fresh air intakes; and

(b).2 do not emit water vapours that interfere or could interfere with helicopter operations.

7.4.3.1(8) Chillers and cooling towers will be designed and located so as not to have an adverse effect on SMH's mechanical systems or the Helipad's landing pattern.

7.4.3.1(9) Provide chillers and cooling towers for ease of operation, accessibility for maintenance, safety and appearance.

7.4.3.1(10) Installation will comply with ASHRAE Guideline 12-2000 for Minimizing the Risk of Legionellosis Associated with Building Water Systems.

7.4.3.2 Performance Criteria

7.4.3.2(1) Provide dedicated and continuously available condensing water systems for all areas containing specialized medical equipment, walk in coolers, server rooms and electrical rooms where heat rejection to outdoors is not possible for managing continuous internal heat gains. Provide a dedicated condensing water system with 100% standby capacity for the fluid coolers.

7.4.3.2(2) Provide water cooled refrigeration systems where required for the medical needs connected to the dedicated condensing water system.

7.4.3.2(3) Provide sufficient space cooling capacity to meet the required indoor design temperatures outlined in applicable CSA Standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code.

7.4.3.2(4) Provide 100% outdoor air for free cooling as the first means of space cooling.

7.4.3.2(5) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dewpoint temperature.

7.4.3.2(6) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.

7.4.3.2(7) Design piping to be installed in an orderly manner (aligned with structural elements and at right angles). Slope piping to permit complete drainage of the system.

7.4.3.2(8) All high points in the closed loop piping will be equipped with air removal devices, such as air collection chambers and air vents.

7.4.3.2(9) Provide equipment and piping with adequate service space, access panels and ability to remove equipment from the Facility for servicing or replacement. Refer to Section 2.5 regarding conversion of one non-clinical level of the Facility to surgical/treatment type functions. Provide chilled water risers with sufficient capacity to accommodate this conversion.

7.4.3.2(10) Provide isolation valves, unions and bypass piping to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.

7.4.3.2(11) Select pumps that operate without vapour binding or cavitation, be non-overloading in parallel or individual operation, and operate within 25% of the mid-point of published maximum efficiency curve.

7.4.3.2(12) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.

7.4.3.2(13) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal to no disruption to the delivery of health care services.

7.4.3.2(14) Insulate all chilled water piping, equipment and accessories to all applicable standards, including BCICA and ASHRAE standards.

7.4.3.2(15) Utilize screw fittings, welded fittings or roll grooved mechanical couplings for all piping.

7.4.3.2(16) Provide seismic mitigation and building separation devices for all piping that cross buildings and/or utility corridors.

7.4.4 Ventilation

7.4.4.1 Basic Requirements

7.4.4.1(1) Provide all necessary ventilation for the Facility.

7.4.4.1(2) Design all ICU rooms to support invasive procedures as per applicable CSA guidelines. Design isolation rooms in the ICU to support bronchoscopy procedures as per applicable CSA guidelines and as follows:

7.4.4.1(2)(a) design each of the ten isolation rooms in the ICU so that the Authority's nursing staff may change the function of the room from normal (isolation room) mode to bronchoscopy mode using a key switch at the room, and provide visual indication at each room to annunciate when the room is in bronchoscopy mode; and

7.4.4.1(2)(b) design the ventilation system so that any two out of the ten isolation rooms may be operated simultaneously in bronchoscopy mode.

7.4.4.1(3) Design the ventilation systems to mitigate the spread of infections during an outbreak by creating negative pressure zones as follows:

7.4.4.1(3)(a) configure the ventilation systems serving outbreak control zones described in Section 5.5.1.1(4) of this Schedule to allow the building operator to easily move each zone into a negative pressure condition with respect to adjacent floor areas by proportionately changing the supply and return air ratio for all rooms within the zone; and

7.4.4.1(3)(b) configure the ventilation systems to ensure that no airborne infection can be re-circulated into any ventilation system from any outbreak control zone.

7.4.4.1(4) Provide an HVAC system that maintains appropriate pressure relationships between various areas of the Facility and provides necessary outdoor air quantity, air filtration, cleansing and exhaust to control the transmission of infection. Refer to applicable infection control standards and CSA Z317.2-10 (Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities) for the relative pressurization and other minimum indoor air quality requirements for the Facility.

7.4.4.1(5) Provide HVAC systems with adequate backup capacity and equipment redundancy to ensure continuous Facility operations at all times.

7.4.4.1(6) Provide air handling units with sectional heating and cooling coils and manual isolation valves that will enable isolation and repairs to the damaged sections of coils without stoppage of the system.

7.4.4.1(7) For Class II and Class III areas, air handling units will provide redundant capacity so that, in the event of a failure or scheduled shutdown of one unit for servicing, the remaining unit will continue to run and provide approximately 70% capacity to the affected area.

7.4.4.1(8) Provide air filtration in accordance with all applicable standards, including CSA Z317.2-01.

7.4.4.1(9) Provide dedicated supply air with HEPA filters for spaces as required by applicable CSA standards.

7.4.4.1(10) Provide the ventilation system and all components in accordance with all applicable standards, including ASHRAE and CSA standards.

7.4.4.1(11) Refer to Section 2.5 regarding conversion of one non-clinical level of the Facility to surgical/treatment type functions. Size main service piping to allow for this conversion. Include capability to add air handling equipment, air intake louvers and space for equipment.

7.4.4.1(12) Provide fans with Variable Frequency Drives (VFDs) for energy savings under part-load conditions. Motor loads of 100 hp or greater will be provided with reduced voltage motor starter acceptable to BC Hydro.

7.4.4.1(13) Provide an indirect and/or direct heat recovery system on the general exhaust air systems where energy savings are possible.

7.4.4.1(14) Provide an exhaust air system suitable for the laboratory requirements and any other special venting requirements as per CSA standards. These systems will be interlocked with the supply air systems.

7.4.4.1(15) Laboratory ventilation systems will supply 100% outdoor air.

7.4.4.2 Performance Criteria

7.4.4.2(1) Incorporate a strategy to allow the installation and removal of major building equipment such as fans without disrupting Hospital operations.

7.4.4.2(2) Locate fans, common filters (e.g. HEPA), and other equipment in the central mechanical rooms. Allow for adequate clearance for service access.

7.4.4.2(3) Provide exhaust systems with bag in – bag out filters and 100% redundancy for isolation room exhaust systems.

7.4.4.2(4) All equipment for supply air, return air and general exhaust systems that will be located exterior to the Building and will be designed and constructed to with-stand the exposure to outdoor conditions.

7.4.4.2(5) Make allowances in duct sizing and equipment selections to provide flexibility for future changes in spaces. Allow for a future increase in capacity of 25% on branch lines and 10% on the capability of the air handling units.

7.4.4.2(6) Refer to Section 2.5 regarding conversion of one non-clinical level of the Facility to surgical/treatment type functions. Make allowances as required to allow for this conversion, including providing chilled water piping from chiller to the mechanical room.

7.4.4.2(7) Provide fresh air intakes, cooling coil drain pans, air handling units, duct mounted humidifiers, ductwork, and all other interconnected components to prevent moisture or contaminants from collecting within the system. Provide sufficient access panels to allow for inspection and cleaning.

7.4.4.2(8) Fresh air intakes will be located to not entrain contaminants from outdoor sources including existing Hospital exhaust points. All intakes will be located in areas that are not accessible by the public and will not be located near exhaust air outlets. Take into account the location of the Helipad and ensure that fumes from the Helipad are not introduced into the Building or adjacent buildings' fresh air intakes. Perform computer modelling to support the placement of intakes.

7.4.4.2(9) All supply, return, and exhaust air will be fully ducted to the space being served. Ceiling area may not be used as return air plenums.

7.4.4.2(10) Locate services that require access for regular maintenance above non-critical spaces so that there is minimal disruption to the delivery of health care services.

7.4.4.2(11) Insulate all ductwork to all applicable standards, including BCICA and ASHRAE standards.

7.4.4.2(12) Provide seismic mitigation and building separation devices for all ductwork that crossings buildings and/or utility corridors.

7.4.5 Exhaust Systems

7.4.5.1 Design Principles

7.4.5.1(1) All exhausted air will be discharged to ensure that there is no cross contamination with outdoor air intakes for the Building and for existing SMH buildings.

7.4.5.1(2) Provide exhaust fans and locate them at the end of the exhaust ductwork systems. Ensure that the fans will be readily serviceable and are separated from spaces that house other mechanical equipment.

7.4.5.1(3) Provide exhaust systems for enclosed parking areas controlled by co-monitors tied to BMS.

7.4.5.2 Performance Criteria

7.4.5.2(1) Isolation rooms and their associated washrooms will be provided with dedicated exhaust systems with 100% redundancy. HEPA filters will be provided in the exhaust ductwork in readily accessible locations for servicing.

7.4.5.2(2) Biosafety cabinets will be provided with dedicated exhaust systems that are appropriate for their class and type. Where multiple cabinets are tied into a common system, a 100% redundant central exhaust system shall be provided.

7.4.5.2(3) Fume hoods and other smoke/fume generating process booths/space will be provided with dedicated exhaust systems that are corrosion/ chemical resistant to the exhaust media.

7.4.5.2(4) Dedicated exhaust systems will be provided as required for the medical equipment.

7.4.6 Metering Requirements for Energy Measurement and Verification

7.4.6.1 Provide all required system meters, and trend logging equipment sensors to comply with and fulfill the energy measurement and verification requirements set out in Appendix 2D [Energy].

7.4.6.2 Metering intervals will be one hour or less.

7.4.7 Sound Attenuation and Vibration Isolation

7.4.7.1 Basic Requirements

7.4.7.1(1) Provide all mechanical systems to prevent sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces. Provide sound attenuation to limit sound levels in accordance with Appendix 3D [Sound Transmission Ratings] and CSA Z317.2-01. Design and install mechanical systems located at or near any exterior wall to minimize sound transmission to the neighbouring residential community.

7.4.7.1(2) Provide vibration isolation devices on all equipment with rotating components.

7.4.7.1(3) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.

7.4.7.1(4) Provide flexible connections where needed to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

7.4.7.2 Performance Criteria

7.4.7.2(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

7.4.7.2(2) Utilize fibre free internal insulation.

7.4.8 Testing, Adjusting, Balancing and Commissioning

7.4.8.1 Without limiting Project Co's commissioning obligations under Section 12 (Commissioning) of Schedule 2 [Design and Construction Protocols], demonstrate to the Authority that the mechanical and electrical systems are

substantially operational by testing, adjusting and balancing the systems in accordance with Good Industry Practice.

## 7.5 Reserved for Future Expansion (Division 24) – NOT USED

## 7.6 Integrated Automation (Division 25)

### 7.6.1 Controls

#### 7.6.1.1 Basic Requirements

7.6.1.1(1) Provide a building management system ("**BMS**") for the Facility that performs the following functions:

7.6.1.1(1)(a) automatically operates, monitors and manages the Facility's mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the delivery of clinical and patient treatment services;

7.6.1.1(1)(b) provides an internet based means of external monitoring for the Authority, including all associated hardware and software;

7.6.1.1(1)(c) interfaces with the building mechanical, electrical and communication systems and controls;

7.6.1.1(1)(d) meters, trends and archives all data related to the flow of services into and out of the Facility, including domestic water, steam, condensate, medical oxygen, and electricity and takes into account seasonal variations in flow rate;

7.6.1.1(1)(e) annunciates building and equipment alarms, including fire alarm, security alarms, freezer alarms, lab alarms, medical equipment alarms, lighting, UPS, emergency power systems and switchgear alarms;

7.6.1.1(1)(f) monitors the status, temperature, humidity and alarms for equipment identified in consultation with the Authority, including freezers, coolers, labs and medical equipment; and

7.6.1.1(1)(g) acquires and collates all data associated with energy measurement and verification as required by Section 7.4.6 of this Schedule and Appendix 2D [Energy].

7.6.1.2 Design the controls systems to allow monitoring and operation of the Facility from a BMS location in the Facility. Display building related alarms at the Help Desk.

7.6.1.3 The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.

7.6.1.4 The BMS will be non-proprietary and designed with open protocol.

7.6.1.5 The BMS will optimize the system performance under all operating conditions to minimize Facility energy usage.

7.6.1.6 The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion of the system for future renovations.

7.6.1.7 The BMS will be an independent system separate from the fire alarm and other control systems.

7.6.1.8 The BMS will be provided as a complete package from one manufacturer, not a composite system from several manufacturers and will be compatible with the existing SMH system.

7.6.1.9 Provide airflow sensors and infectious control isolation dampers in ductwork to ensure isolation can be achieved for each of the care team station zone. Provide local audio and visual alarms at these stations in addition to the BMS alarms.

7.6.1.10 Provide a separate physical network and any required network equipment for the BMS.

7.6.2 Performance Criteria

7.6.2.1 Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and room heating and cooling loads. Provide independent zone for each patient care room. For non patient care areas, a maximum of 3 rooms will be on one zone. Configure zoning to minimize reaheat/recool.

7.6.2.2 Zone floor areas to provide control of smoke in a fire situation as required by B.C. Building Code. Zone floor areas to ensure infection control for each of the care team stations.

7.6.2.3 Provide adjustable type thermostats (of a type approved by the Authority) in all patient rooms with temperature read out. The temperature range will be controlled by the BMS.

7.6.2.4 Provide local pressure control for each isolation room and anteroom. Provide a local annunciator panel located in the corridor outside each of these rooms.

7.6.2.5 Failsafe components will be hard-wired to provide reliable operation in all circumstances.

7.6.2.6 Refer to Section 7.7.14 of this Schedule regarding energy management system, which may be connected to the BMS.

7.6.2.7 The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.

7.6.2.8 The BMS will be connected to emergency power.

7.6.2.9 The BMS will monitor critical alarms for essential building and life safety systems. Critical alarms include:

7.6.2.9(1) fire alarm system for alarm, supervisory and trouble;

7.6.2.9(2) all temperature alarms resulting from setpoint deviations;

7.6.2.9(3) failure of any major HVAC or plumbing equipment;

7.6.2.9(4) medical gas system high and low pressure alarms; and

7.6.2.9(5) all alarms relating to the fire protection system.

Upon activation of a critical alarm, Project Co will notify the Authority.

7.6.2.10 The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

7.6.2.11 User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.

## 7.7 Electrical (Division 26)

### 7.7.1 General

#### 7.7.1.1 Basic Requirements

7.7.1.1(1) All electrical systems, materials and equipment will be of a type and quality intended for use in a health care facility. Configure electrical systems to meet requirements of the identified program and patient care needs in an efficient manner, with optimal utilization of space, staff and equipment resources.

7.7.1.1(2) Provide electrical systems that: allow the Authority to deliver the program described in the Clinical Specification; and provide redundancy, protection, continuity of service and a comfortable and safe working environment for patients, visitors, and staff.

7.7.1.1(3) Integrate systems where integration provides efficiency, operational and cost advantage.

7.7.1.1(4) Incorporate into the design and construction the principle that change will be a constant and inevitable fact within the Facility. Completed electrical systems will permit change while minimizing the cost of change and the amount of interruption to the regular Facility activities.

7.7.1.1(5) Include systems and equipment coordinated to provide synergy and reliable electrical performance for the various Facility functions.

7.7.1.1(6) Ensure all new electrical systems and equipment are compatible with the existing SMH systems.

7.7.1.1(7) Provide provisions to minimize the noise and vibrations of electrical equipment/ components (transformers, luminaries, cables etc.) to below an acceptable level as required in a health care facility.

7.7.1.1(8) Locate electrical rooms and power distribution equipment in order to minimize the distances for feeder runs, to provide easy access for equipment move and to avoid interference with other services and equipment.

7.7.1.1(9) Incorporate energy management systems to minimize demand pressures on the building systems and minimize the anticipated increase to energy costs.

7.7.1.1(10) Refer to Section 2.2 of Appendix 2D [Energy] regarding energy incentive programs. Integrate any requirements of those programs into the electrical systems.

7.7.1.1(11) Refer to Appendix 3B [UBC Videoconference Room Specifications] for additional requirements applicable to the UBC Videoconference Rooms.

7.7.1.2 Performance Criteria

7.7.1.2(1) Install electrical systems and equipment in a fixed and permanent manner, seismically restrained to meet post-disaster building standards. Plan installation of equipment to allocate space for future additions and to facilitate easy access to other systems and equipment which may require inspection or maintenance.

7.7.1.2(2) Implement the latest proven technologies in the design of the electrical systems and equipment.

7.7.1.2(3) Incorporate redundancy into the electrical system design such that failure of any electrical equipment or feeder will not impair Facility

operation or leave any patient treatment room or area of the Facility without at least one active light and one active receptacle.

7.7.1.2(4) Design and construct all systems with protection, grounding, isolation and control to address the functional requirements where they are located.

7.7.1.2(5) Power throughout the building will comprise of a combination of 347/600V and 120/208V for all power, lighting and equipment loads.

7.7.1.2(6) In addition to allowing for known future requirements, design and construct the Facility electrical systems with a minimum 25% spare capacity.

7.7.1.2(7) Provide capacity in distribution equipment to serve any shelled spaces in the Facility. Allow 40watts/sq.m for lights and receptacles in shelled space with 50% of load on emergency power. Indicate on floor plans all assumed locations of future vital and conditional 120/208 volt panelboards that will serve the shelled spaces. Indicate future panelboards such that no point in the shelled space is more than 15 metres away either vital or conditional panelboard. Provide independently metered electrical services with sufficient panelboard and breaker capacity to serve the shelled space. Indicate on drawings all provisions allowed for shelled spaces, including the transformers from which panels will be fed. Provide 100 Amp 3 pole (or larger) circuit breakers in distribution panels which will serve future panels.

7.7.2 Wiring Methods, Materials and Devices

7.7.2.1 Basic Requirements

7.7.2.1(1) Use wiring methods, materials and devices that result in a safe reliable and flexible electrical power, lighting control, communication, data, and life safety system.

7.7.2.1(2) Install all wiring in a neat and secure manner so that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.7.2.1(3) Colour of standby and Hydro main power receptacles will be determined and implemented in consultation with the Authority. All power receptacles will be identified with panel and circuit number.

7.7.2.2 Performance Criteria

7.7.2.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment, which form part of the Facility's wiring systems. Minimum conductor size will be #12AWG. Aluminum

conductor installed in conduits may be used for feeders greater than 100 Amp current rating.

7.7.2.2(2) Do not install TECK cable unless approved by the Authority.

7.7.2.2(3) Provide panel boards, feeders and branch circuiting with double neutral(s) capacity where significant non-linear load(s) are anticipated. This includes open office and other areas with a medium to high density of personal computers.

7.7.2.2(4) Conceal all wiring and wiring support systems from public view except where approved by the Authority.

7.7.2.2(5) Separate all wiring for systems of different voltages and from different sources and do not run in common raceways. Maintain adequate shielding and separation between wiring for power and communication systems to prevent interference.

7.7.2.2(6) Identify system voltage, phase, neutral and grounding of all pull boxes, junction boxes, conduits and wiring. Provide additional colour coding for wiring and “P Touch” self adhesive labelling for receptacles and switches.

7.7.2.2(7) Provide hospital grade receptacles in patient rooms and medical / treatment areas. Receptacles in all other areas will be specification grade. Use colour coded receptacles to identify circuits for emergency power, UPS (Uninterruptable Power Supply), and normal power circuits. Use red receptacles for emergency power (Vital and Delayed Vital), orange receptacles for UPS, and ivory or other specified receptacles for normal power circuits as required in the Clinical Specification.

7.7.2.2(8) Utilize smooth nylon cover plates for receptacles and switches. Grouped receptacles and switches will have a single cover plate for the whole group.

7.7.2.2(9) Provide minimum quantity of receptacles as indicated in CSA Z32-04, unless a higher quantity is indicated in this Schedule.

7.7.2.2(10) Unless otherwise requested by the Authority or elsewhere in this specification, provide emergency power for 75% of the receptacles within the Emergency Department. The remainder of the receptacles in the Emergency Department will be provided with conditional emergency power.

7.7.2.2(11) Allow a maximum connection of six general use receptacles to one 15 amp circuit.

7.7.2.2(12) Provide duplex convenience receptacles rated at 15A, 125V in all rooms. This is in addition to all other receptacles identified in this Schedule.

7.7.2.2(13) Utilize NEMA 5-20RA 15/20Amp style receptacles for fax machines, printers and copiers. Provide separate dedicated circuits for each fax machine, printer and copier.

7.7.2.2(14) Utilize NEMA 5-20RA 15/20Amp style receptacles for housekeeping staggered on alternate sides of the hallways spaced a maximum of 10 meters apart.

7.7.2.2(15) Provide a minimum of one power outlet on each wall in all offices and rooms and no less than 3 receptacles in each office and room.

7.7.2.2(16) Provide a minimum of one 15Amp circuit per four open office workstations.

7.7.2.2(17) Provide a minimum of one 15Amp circuit per two enclosed offices for workstations.

7.7.2.2(18) Provide each single occupancy office with a minimum of three duplex receptacles.

7.7.2.2(19) In each multi-occupancy office provide a minimum of two duplex receptacles for each desk or workstation and a minimum of one duplex receptacle spaced every 3 meters of open wall space.

7.7.2.2(20) Each administration workstation will have a minimum of two duplex receptacles.

7.7.2.2(21) Provide a minimum of five duplex receptacles in each exam treatment room, two of which will be fed from emergency power (vital).

7.7.2.2(22) Provide a minimum of six duplex receptacles at each clean utility room, 50% of which will be fed from emergency power (vital) and the remainder connected to conditional power.

7.7.2.2(23) In each care team station, provide one double duplex receptacle spaced 1m on centre below work counters in knee space or above counter if no knee space is provided. 50% of these receptacles will be fed from emergency power (vital) and the remainder connected to conditional power.

7.7.2.2(24) In each conference or meeting room provide a minimum one duplex receptacle spaced every 2 meters of wall space and one duplex receptacle spaced a maximum every meter above work counters. In addition, provide receptacles for all dedicated equipment such as

microwaves, coffee makers, refrigerators, etc. At all locations with overhead projectors provide 15Amp 120 volt receptacle located at ceiling and run 25 mm conduit to floor and/or wall outlet for remote control signal.

7.7.2.2(25) Provide each patient room with special purpose receptacles for LASER equipment or other special equipment and connect to emergency power (vital).

7.7.2.2(26) Provide two duplex receptacles at each patient treatment bed or care location in patient care areas defined by CSA Z32 as Basic Care Area, and connect one of the receptacles to emergency power (vital).

7.7.2.2(27) Provide six duplex receptacles per patient care location in patient care areas defined by CSA Z32 as Intermediate Care Area, and connect three of the receptacles to emergency power (vital).

7.7.2.2(28) Provide twelve duplex receptacles per patient care locations defined by CSA Z32 as Critical Care Area, and connect 75% of these receptacles to emergency power (vital). Remainder of receptacles will be connected to conditional power.

7.7.2.2(29) Provide one duplex receptacle for each electric bed where applicable in all patient care areas and connect to emergency power (vital).

7.7.2.2(30) Provide a minimum of four duplex receptacles at each medication room, connect 50% of these receptacles to emergency power (vital).

7.7.2.2(31) Provide one duplex receptacle for every 35 square meters, or portion thereof, of service, housekeeping and storage space. A minimum of one duplex receptacle will be provided per room.

7.7.2.2(32) Provide special receptacles for fixed and moveable equipment as defined in the Equipment List.

7.7.2.2(33) Provide a minimum of two duplex receptacles for each equipment alcove and connect to emergency power (vital).

7.7.2.2(34) Install approved fire stopping to maintain all fire separations and as required by local Governmental Authorities.

7.7.3 Raceways

7.7.3.1 Basic Requirements

7.7.3.1(1) Provide raceways for all wiring and cabling to support, protect and organize all wiring and cabling systems.

7.7.3.1(2) Design raceways to provide ease of access and install with capacity for expansion and change, consistent with the requirements of the equipment and systems that they serve.

7.7.3.1(3) Install all raceways in a neat and secure manner in such a way that it is protected from damage, is not in conflict with mechanical or architectural components and allows for future changes and additions.

7.7.3.1(4) Except as noted in Section 7.7.3.1(12), install power wiring in EMT with steel couplings and connectors.

7.7.3.1(5) Install low tension wiring (unless otherwise required by applicable Laws) in EMT with steel couplings and connectors and cable trays. Install EMT (or flex) conduits with low tension conductors between individual backboxes of devices (on walls or ceilings) and cable tray. Provide conduits and cable trays for low tension system wiring such that the maximum length of exposed wire between tray and conduit is less than 200mm.

7.7.3.1(6) EMT is to be surface mounted in service rooms and concealed in ceiling spaces and partition walls. Do not encase EMT in concrete, unless such installation is:

7.7.3.1(6)(a) for power wiring to lighting fixtures and receptacles located in the parkade; or

7.7.3.1(6)(b) approved by the Authority as necessary to achieve a concealed installation in finished spaces such as exposed concrete stairwells.

7.7.3.1(7) If EMT conduit is encased in concrete, such conduit runs will:

7.7.3.1(7)(a) be as short as possible; and

7.7.3.1(7)(b) emerge from the concrete in the closest adjacent space above suspended ceilings.

7.7.3.1(8) Minimum EMT conduit size is 21mm (3/4”), except that minimum EMT conduit size for telephone and data drops is 27mm (1”).

7.7.3.1(9) Use flexible conduit for all final connections:

7.7.3.1(9)(a) to devices located on suspended ceilings; and

7.7.3.1(9)(b) to vibrating equipment, such as transformers and motors.

7.7.3.1(10) Minimum flexible conduit size is 21mm (3/4”) and maximum length of any flexible conduit run is 1.5 metres.

7.7.3.1(11) Armoured cable (BX) may be used only for final connections from concealed junction boxes to lighting fixtures on suspended ceilings. The maximum length of any individual piece of BX cable is 3.0 metres.

7.7.3.1(12) Use rigid PVC conduits for the underground portion of services to lighting and power outlets located outside of the Building.

7.7.3.1(13) Install individual ground conductor in each conduit and/or raceway.

7.7.3.1(14) Provide cable trays for installation of all low tension wiring for data, telephone, public address and other such systems. Install cable trays from communication rooms and above all corridors. If cable trays pass through walls with fire resistance ratings, provide removable “pillow type” or “brick type” fire stopping to allow easy installation of cables in the future.

7.7.3.1(15) Cable tray will be aluminum or steel wire mesh, ladder type with manufactured fittings. Provide continuous #6AWG minimum bare copper ground wire in the tray. Provide #6AWG bare copper bonding jumper between the cable tray and every associated conduit to ensure continuous bond between tray and low tension raceways.

7.7.3.1(16) Identify all conduits, raceways, pull boxes, and junction boxes using painted colour bands. Colouring scheme will be determined by the Authority at a later date. Provide power, lighting, fire alarm, Nurse Call, paging, BMS, 600 volt systems etc. with unique colours in accordance with the colouring scheme. Major colour to be 100 mm wide and minor colour to be 50 mm wide. Identify raceways with coloured bands (using either spray paint or coloured duct tape) at intervals of 6 m, plus at the point where the raceway enters a wall or floor (i.e. raceway is identified on both sides of a penetration to facilitate tracing of raceway). Colour-code all junction boxes using spray paint on the cover. Neatly identify the relevant system and circuit ID using permanent marker pen. Identify parallel conduit runs at common locations. Indicate the location of conductors encased or embedded in concrete or masonry by acceptable permanent markers set in the walls, floors, or ceilings.

7.7.3.2 Performance Criteria

7.7.3.2(1) Construct separate raceways or barriered raceways to isolate systems of different voltages and prevent magnetic interference.

7.7.3.2(2) Design and install raceways without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables.

7.7.3.2(3) Provide all cable trays with minimum 70% spare capacity for the installation of future cables. If multiple raceways are required in a group, such as a duct bank or tray system interconnecting two or more major areas, provide matching empty raceway equal to a minimum of 50% of the capacity of the total installed group.

7.7.3.2(4) Provide a minimum of two spare 103 mm conduits from the main electrical room to each sub-distribution room.

7.7.3.2(5) Install all conduits in finished areas within finished walls and above finished ceilings.

7.7.3.2(6) Provide bonding conductor within the metallic raceways and bond raceways continuously.

7.7.4 Electrical Utilities (Underground Distribution)

7.7.4.1 Basic Requirements

7.7.4.1(1) Provide electrical power to the Facility via three services from the existing South Building's main electrical room. One service will provide utility power while the other services will provide vital and delayed vital power.

7.7.4.1(2) Design and provide switchgear and substations for incoming services (normal – 25KV, vital and delayed vital – 5KV) with manual tie-switch over to the alternate supply should the primary supply fail.

7.7.4.1(3) Provide conditional power distribution for the Facility with the ability to transfer the load onto the emergency distribution(s) in accordance with CSA Z32 requirements.

7.7.4.1(4) The capacity and design of services will anticipate the need for future expansion to accommodate projected future growth of the Facility and the connected load. Include six spare conduits from the Authority's junction boxes to the Facility's service transformer location.

7.7.4.1(5) The Authority will provide metering for normal and emergency power services for the Facility at the main electrical room of the South Building.

7.7.4.1(6) Do not exceed the following values for maximum electrical demand requirements without power requirements without the Authority's prior approval:

7.7.4.1(6)(a) 1,400KW for normal power;

7.7.4.1(6)(b) 1,600KW for emergency power (consisting of 700 kW vital and 900 kW delayed vital).

7.7.4.1(7) The main electrical service will consist of three transformers of equal kVA capacity, namely – normal, vital and delayed vital. Base transformer size on the maximum anticipated demand load plus 45% spare capacity (to allow for a potential 20% expansion plus 25% spare as required by Section 7.7.1.2(6)). Additionally, size transformers such that each of the three transformers is capable of providing 70% of ultimate building power demand. Within 3 months after the Effective Date, notify the Authority of the anticipated power requirements for the Facility.

7.7.4.2 Performance Criteria

7.7.4.2(1) Provide a service transformer (25KV / 347-600V) complete with switchgear in the Facility's main electrical room for the Facility's normal power needs.

7.7.4.2(2) Provide service conduits from the Facility's main electrical room to the junction boxes located in the South Building Service Connection Room, and provide wiring for utility and emergency power services from the Facility to the service termination points located in the South Building's main electrical room.

7.7.4.2(3) Make final connection to the load side of Authority-provided high voltage switches for normal (25kV), vital (5kV) and delayed vital (5kV) services. Provide complete fault current and overcurrent coordination study prior to connection of services.

7.7.4.2(4) Provide concrete encased PVC conduit duct banks for service conduits and major feeders outside the footprint of the Building.

7.7.4.2(5) Identify the location of existing underground service lines in the area to avoid interference with proposed routing of new services and future services for known expansions. Use latest techniques (ground penetration radar test) to verify and confirm all existing underground services in the direction of service lines to the Facility.

7.7.4.2(6) Coordinate with the Authority for the performance of emergency generator tune-up and setting adjustment prior to connection of emergency services (vital and delayed vital). The Authority will engage the testing and commissioning agent for the work on the existing emergency generators.

7.7.4.2(7) Obtain prior written authorization from the Authority for all service connections. Service connections must be installed to the Authority's reasonable satisfaction. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing SMH buildings.

7.7.4.2(8) Prepare and submit to the Authority a detailed Arc Flash study signed and sealed by a professional engineer registered in British Columbia and provide equipment labelling indicating available energy levels and level of PPE required when servicing the equipment.

7.7.4.2(9) Prepare and submit to the Authority a detailed distribution coordination study signed and sealed by a professional engineer registered in British Columbia that:

7.7.4.2(9)(a) indicates all new and relevant existing service equipment from the point of utility supply and standby generators; and

7.7.4.2(9)(b) includes all transformers, distribution equipment and panelboards.

7.7.5 Emergency Power

7.7.5.1 Performance Criteria

7.7.5.1(1) Provide two oversized transformers (5KV to 600V) and high voltage switchgear and distribution complete with tie-back breakers for redundancy for vital and delayed vital emergency power. Locate equipment in the main electrical room.

7.7.5.1(2) Provide a complete essential electrical system including tie breakers between vital, delayed vital, conditional and normal distribution, equipment and transformers to back up lighting, equipment and receptacles as indicated, to maintain Facility operations in the event of a power outage.

7.7.5.1(3) Implement redundancy such that if emergency power from the Energy Centre fails, there is a manual means to restore power to the essential loads in the Facility.

7.7.5.1(4) Design the system to maintain continuous service to clinical operations at all times, including during system maintenance.

7.7.5.1(5) SMH's existing generator plant will provide emergency power to serve essential loads as defined by CSA Z32-04 and as required to meet the Clinical Specifications, including:

7.7.5.1(5)(a) vital branch loads:

(a).1 Path of egress lighting.
(a).2 Exit signs.
(a).3 Stair and ramp lights.
(a).4 Receptacles and lights at service rooms for emergency distribution.

(a).5 Medical gas alarm panels.
(a).6 Elevator cab and machine room lighting.
(a).7 Fire alarm and medical gas alarm systems.
(a).8 Telecommunications systems.
(a).9 Public address systems.
(a).10 50% of receptacles and lights in all patient care rooms, other than patient care areas in ICU, NICU and HDCU.
(a).11 50% of lights and outlets in care team stations, other than patient care areas in ICU, NICU and HDCU.
(a).12 Nurse call system power supplies.
(a).13 Medical vacuum pumping systems.
(a).14 50% of receptacles and lights in laboratories.
(a).15 Pharmacy dispensing areas.
(a).16 Equipment indicated on Equipment List.
(a).17 Emergency Department, 75% vital
(a).18 ICU department, 75% vital
(a).19 HDCU and NICU department, 75% vital
(a).20 Lab analyzers.

7.7.5.1(5)(b) delayed vital branch loads:
(b).1 Ventilation systems serving patient care rooms.
(b).2 Sump pumps and sewage ejector pumps.
(b).3 Medical air pumping systems.
(b).4 Fire pump and jockey pump if provided. (via integral transfer switch).
(b).5 Fume hoods.
(b).6 One elevator in each elevator bank.
(b).7 Essential heating, ventilation and plumbing systems.
(b).8 Radiology, Ultrasound and CT Scan equipment as per Equipment List and Clinical Specification.
(b).9 Alarmed freezers and refrigerators.

7.7.5.1(6) The BMS will monitor and record emergency loads.

7.7.5.1(7) Elevator indication while the Facility is on emergency power:

7.7.5.1(7)(a) The Authority will provide 4 dry contacts to indicate the following:
(a).1 automatic transfer switch (ATS) connected to utility;
(a).2 ATS connected to generator;
(a).3 ATS pre-transfer to generator; and

(a).4 ATS pre-transfer to utility.

These dry contact connections will be in a junction box located in the South Building Service Connection Room.

7.7.5.1(7)(b) Project Co will perform all work and provide all wiring and conduit required to connect to the above contacts at this location. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing SMH buildings.

7.7.6 Uninterruptible Power Supply (UPS) Systems

7.7.6.1 Basic Requirements

7.7.6.1(1) Provide common / centralized Uninterruptible Power Supply (UPS) systems for all essential areas, equipment and systems that require a continuous and uninterrupted source of power as per the requirements of this Schedule, the Clinical Specification, the Equipment List (Central UPS systems are required where “Central UPS” is indicated on the Equipment List) and for the following additional equipment and systems:

7.7.6.1(1)(a) the BMS;

7.7.6.1(1)(b) panic duress system;

7.7.6.1(1)(c) electronic access control systems;

7.7.6.1(1)(d) intrusion detection system; and

7.7.6.1(1)(e) all equipment and systems located in communications rooms, including:

(e).1 network equipment for the wired and wireless networks;
(e).2 wireless access points;
(e).3 PBX and other telephone equipment;
(e).4 wireless communications system;
(e).5 nurse call system;
(e).6 paging system;
(e).7 RTLS system; and
(e).8 CCTV system.

7.7.6.2 Performance Criteria

7.7.6.2(1) UPS units for single isolated small loads of one kilowatt or less may be freestanding units located adjacent to the supplied equipment and rated for the connected load plus a minimum 25% spare capacity. Where there are multiple units in a location, mount the UPS in an electrical room and provide a separate UPS distribution panel with UPS receptacles provided for each UPS load.

7.7.6.2(2) UPS units for loads greater than one kilowatt will be circuited from a UPS distribution panel and will be rated for the connected load plus a minimum 25% spare capacity.

7.7.6.2(3) Connect UPS units to an emergency generator circuit and provide adequate batteries rated for a minimum of 15 minutes at full UPS capacity.

7.7.6.2(4) Where vital functions are connected to a UPS circuit, include an audible warning in the vital function area 5 minutes before the UPS battery supply is exhausted. Provide additional monitoring by the BMS.

7.7.6.2(5) UPS systems rated larger than 1.5 KW will have:

7.7.6.2(5)(a) external maintenance bypass switch for servicing;

7.7.6.2(5)(b) internal static bypass switch to bypass UPS in the event of UPS failure; and

7.7.6.2(5)(c) two battery strings (full redundant batteries).

7.7.7 Transmission and Distribution (Service Switchgear – Over 600 Volts)

7.7.7.1 Basic Requirements

7.7.7.1(1) Provide electrical equipment for the primary service switchgear system for normal and emergency power distribution for the Facility.

7.7.7.1(2) Utilize transmissions and distribution equipment that are robust, reliable, easily operated and maintained. Design with additional capacity to accommodate load growth and equipment additions.

7.7.7.2 Performance Criteria

7.7.7.2(1) Install service transformers indoors and coordinate with the Authority and BC Hydro. Service transformers will be cast coil, sub-station dry type transformer(s) with integral primary switch, expulsion fuses and integral intermediate class lightning arrestors.

7.7.7.2(2) Switchgear will be fused switch load interrupter type and will use HRC current limiting fuses.

7.7.8 Transmission and Distribution (Distribution Equipment – 600 Volts and below)

7.7.8.1 Basic Requirements

7.7.8.1(1) Provide electrical power transmission and distribution from the main sources of supply to meet all requirements of the Facility and the Clinical Specification. Provide electrical equipment including three main transformers: one normal power; one vital power; and one delayed vital power, each fed by the service switchgear.

7.7.8.1(2) Design and install (vital and delayed vital) main service transformers complete with tie breakers so that if one transformer or distribution equipment fails, the other transformer (by manual switching) will continue servicing all loads connected to the failed transformer.

7.7.8.2 Performance Criteria

7.7.8.2(1) Design and construct the Facility with a minimum of 45% spare capacity (to allow for a potential 20% expansion plus 25% spare as required by Section 7.7.1.2(6)) and include 25% physical space for future devices when sizing distribution equipment. Include provisions for fans that can be added to transformers in the future to serve the future growth needs in such a way as to prevent a major shutdown of the Facility.

7.7.8.2(2) Locate the main electrical room above the flood plain, which is no higher than elevation 58.67 m, and separate from plumbing and mechanical equipment. Design the electrical room to be readily accessible, well ventilated and free of corrosive or explosive fumes, gases or any flammable material.

7.7.8.2(3) Locate major electrical equipment to minimize run length of feeders and branch circuits, and locate within the Facility so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.

7.7.8.2(4) Locate and design electrical equipment for ease of maintenance and with due regard for future expansion and renovation.

7.7.8.2(5) The secondary main normal, conditional, vital and delayed vital distribution equipment will consist of motorized draw-out power circuit breakers, not fuses, for main transformer secondary, tie and all circuit breakers that exceed 400 Amp capacity. Provide all circuit breakers with electronic tripping and LSIG field adjustable settings.

7.7.8.2(6) Install 120/208V dry type transformers for small equipment loads in electrical rooms on concrete pads or suspend from structure. Install transformers so that removal can be facilitated without removal of any other equipment or conduit serving the room. This excludes luminaires.

7.7.8.2(7) Rate all distribution devices to handle available fault duty at line terminals. Perform a computer generated fault study to ensure that all devices are properly rated.

7.7.8.2(8) Design and install protection equipment so that the initial electrical installation, future additions and modifications will be fully coordinated to isolate only the faulty portion of the system.

7.7.8.2(9) Select, configure, locate and install all components of transmission and distribution systems to minimize the transmission of noise, vibration or unwanted heat into other parts of the Facility.

7.7.8.2(10) Provide a networked digital metering system to monitor electrical loads and quality of power in the Facility.

7.7.8.2(11) Provide power factor correction equipment within the Building to ensure the Building power factor does not fall below the 90% threshold established for BC Hydro surcharge. Coordinate capacitors with adjustable frequency drives and other harmonic generating equipment to avoid resonance conditions.

7.7.8.2(12) Provide transformation equipment for diagnostic imaging equipment as required by the imaging equipment vendors.

7.7.8.2(13) Provide circuit breaker type panelboards fully rated to handle calculated fault current level. Series rating of breakers and panel boards are not acceptable.

7.7.8.2(14) Oversize neutral(s) for panel boards, feeders and branch circuiting where significant non-linear load(s) are anticipated, such as in open office and other areas with a high density of personal computers.

7.7.8.2(15) Construct flush mounted panel boards with five spare 25mm conduits stubbed into ceiling space above and two spare 25mm conduits stubbed into ceiling space below.

7.7.8.2(16) Provide electronic grade panel boards to serve electronic equipment susceptible to electrical transients.

7.7.8.2(17) Install panelboards on the same floor as the loads they serve.

7.7.8.2(18) Components of the transmission and distribution systems in any public, clinical, administrative or staff area will have long life expectancy without perceptible deterioration and a good appearance. Design and install so as to permit easy and complete cleaning.

7.7.8.2(19) Provide individual enclosed motor starters for individual motors. Utilize motor control centers for groups of four or more motors that require individual motor starters.

7.7.8.2(20) Motor starters will be combination of magnetic MCP (Motor Circuit Protector) type with integral control power transformers, Hand-Off-Auto (HOA) or start/stop control and at least two auxiliary contacts in addition to seal-in contacts.

7.7.8.2(21) Provide combination starters for all motors 1/2 HP and larger that are not already controlled by adjustable frequency drive or include an integral control package. All motors of ½ HP or more will be 600 volt 3 phase.

7.7.8.2(22) Provide voltage transient / surge protection for the main 600V and 120/208V switchgear loads and all other panels serving sensitive electrical loads including diagnostic equipment, lab equipment and adjustable frequency drives.

7.7.8.2(23) Locations of receptacles will comply with all applicable codes and standards and the requirements for each program area as described in the Clinical Specification.

## 7.7.9 Metering

### 7.7.9.1 Basic Requirements

7.7.9.1(1) The Authority will meter normal and emergency power services for the Facility at the South Building.

7.7.9.1(2) Supply networked digital pulse metering to provide detailed information about power quality and power consumption at key points throughout the Facility. Key points include: motor control centres, panelboards feeding mechanical equipment and power consumed by elevators. Ensure that metering is provided to record total energy consumed by lighting fixtures and equipment. Integrate information from all meters on a common software platform residing on a dedicated electrical metering server.

7.7.9.1(3) Ensure that sufficient metering is provided to record the energy consumed by all major mechanical equipment including chillers, steam consumption, fan and pump motors, medical air and vacuum. Refer to Section 7.7.14 (Energy Management).

7.7.9.1(4) Implement a networked metering system with terminals for maintenance and plant administration, and data transfer to the BMS.

7.7.9.1(5) Connect electrical demand and consumption meters to the BMS.

7.7.9.1(6) Include trend logging equipment sensors to comply with and fulfill energy measurement and verification requirements. Logged information will not be overwritten and will be archived.

7.7.9.1(7) Metering intervals will be one hour or less.

7.7.9.2 Performance Criteria

7.7.9.2(1) Include display components for easily read local information for all distribution at primary voltage and for each secondary distribution switchboard.

7.7.9.2(2) Design the metering system network to store historical data and with the capability to generate user configurable electronic and printed reports on demand.

7.7.9.2(3) Support the metering system by a backup power source(s), which ensures operation when the metered circuit is de-energized. The metering system will not be dependent on power from the metered circuit for its operation.

7.7.9.2(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.

7.7.9.2(5) Utilize power quality type meters for monitoring harmonics and surges / sags. Provide power quality meters capable of monitoring harmonics on the normal, vital, delayed vital and conditional switchboards.

7.7.10 Grounding and Bonding

7.7.10.1 Basic Requirements

7.7.10.1(1) Provide grounding and bonding for all electrical equipment and systems in the Facility for the safety of people and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems. Install grounding as required by all applicable standards, including EIA/TIA standards for communications and security equipment and systems.

7.7.10.2 Performance Criteria

7.7.10.2(1) Utilize non-alloyed copper for all conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the Facility.

7.7.10.2(2) Provide solid or low resistance system grounding including conductors and bussing.

7.7.10.2(3) Provide equipotential grounding systems and equipment for all patient care areas.

7.7.10.2(4) Bond all exposed non-current carrying components of communication, radio or television equipment in patient care areas to ground using a properly sized equipment bonding conductor.

7.7.10.2(5) Complete a lightning protection study for the Facility, such study to be done by a specialist in lightning protection work and to be signed and sealed by a professional engineer registered in British Columbia. Implement a lightning protection study on any risk value of 4 or higher, as defined by CAN/CSA B72. Provide lightning protection if required by study.

7.7.11 Seismic Requirements for Electrical Systems

7.7.11.1 Basic Requirements

7.7.11.1(1) Provide seismic restraint for all electrical equipment and components of electrical systems which are part of the building electrical systems designed to meet the standards of a post disaster building as defined in the BC Building Code

7.7.11.1(2) Provide seismic restraint systems and methods that facilitate ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and building components.

7.7.11.1(3) Provide seismic restraint systems and methods that coordinate with the Facility's architecture and finishes. Wherever practicable, conceal components of seismic restraints from public view. Where concealment is not practicable, provide systems that complement the Facility's architecture and finishes.

7.7.11.2 Performance Criteria

7.7.11.2(1) Provide seismic support for all electrical equipment and components of electrical systems that have the potential to cause injury or damage during or following a seismic event.

7.7.11.2(2) Use seismic restraint systems that are designed by a professional engineer, registered in British Columbia, or, where an identified pre-designed standard restraint device or system exists for a particular item, that equipment may be used provided that written confirmation of its acceptability for the installation is provided by a professional engineer registered in British Columbia. Provide signed and sealed drawings as well as typewritten field reports from a professional seismic engineer, registered in British Columbia. Obtain certification of the main electrical distribution equipment for "seismic withstand capability" and, to maintain the certification, anchor such equipment according to the manufacturer's instructions.

7.7.12 Power Quality

7.7.12.1 Basic Requirements

7.7.12.1(1) Establish and maintain an overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the Facility.

7.7.12.1(2) Provide equipment and systems which assure that electrical equipment and systems will not be harmed or impaired either by external events or conditions, such as lightning and disturbances on the utility service, or by internal events or conditions generated within the Facility.

7.7.12.1(3) Meet or exceed relevant standards for power quality where deemed necessary by the Authority and IEEE.

7.7.12.1(4) Provide harmonic mitigation equipment, as necessary, to ensure that power quality meets or exceeds recommendations in IEEE, including standard 519. For the purposes of measuring the harmonic distortion, the "Point of Common Coupling" will be any of the three main transformers. As part of commissioning, confirm compliance to tables 10-2 and 10-3 of IEEE 519 by field measurements after building occupancy and under normal operating conditions.

7.7.12.1(5) Provide individual harmonic filters ahead of and coordinated with variable speed drive for every motor greater then 7.5 HP.

7.7.12.2 Performance Criteria

7.7.12.2(1) Provide equipment, such as filters, TVSS (Transient Voltage Surge Supression), etc, specifically designed to control and remove all adverse power quality conditions that could damage or impair function of sensitive electronic equipment used in the Facility. Adverse power quality conditions include voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference.

7.7.12.2(2) Provide the ability to demonstrate to the Authority at any time that there are no potentially harmful power conditions present and that equipment intended to guard against such conditions is in proper working order.

7.7.13 Lighting

7.7.13.1 Basic Requirements

7.7.13.1(1) Utilize premium grade quality luminaires with emphasis on energy efficiency (69 lumens/watt minimum) and high color rendition (.80 color rendering index minimum for fluorescent fixtures and .70 for metal halide lamps).

7.7.13.1(2) Provide luminaires and light sources that enhance safety and allow personnel to circulate throughout spaces and perform required tasks.

7.7.13.1(3) Design lighting with the objective of creating a comfortable working environment and an environment conducive to healing and recovery.

7.7.13.1(4) Utilize a combination of natural light, luminaries and controls to optimize daylight.

7.7.13.1(5) Provide lighting controls with flexibility to adjust lighting to suit functions and activities and permit simple and integrated control of lighting. Design controls to be easily operated and conveniently and appropriately located for each area and function.

7.7.13.1(6) 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(7) Lighting power density levels will comply with ASHRAE Standard 90.1-07 and the lighting installed will meet the requirements of the Clinical Specification.

7.7.13.1(8) An electrically powered "Laser In Use" sign will be located outside the procedure room in the NICU. The sign will be connected to an internally illuminated switch inside the room label "Laser". The switch will be interlocked with the laser equipment such that the equipment will not operate with the switch in the “off” position. Internal illumination of the switch will be on only when the “Laser in Use” sign is illuminated.

7.7.13.1(9) An electrically powered "X-ray In Use" sign will be located outside any room in which fixed x-ray equipment is anticipated to be used. The sign will be connected to an internally illuminated switch inside the room label "X-ray". The switch will be interlocked with the x-ray

equipment such that the equipment will not operate with the switch in the “off” position. Internal illumination of the switch will be on only when the “X-ray in Use” sign is illuminated.

7.7.13.2 Performance Criteria

7.7.13.2(1) Provide luminaires that require minimal cleaning and permit practical and easy access and disassembly. All lighting components will be hospital grade.

7.7.13.2(2) Utilize fluorescent lighting predominantly. Use compact fluorescent lighting for decorative purposes. Use high efficiency electronic fluorescent ballasts and linear T8 and T5 lamps when possible. Do not use incandescent lighting unless otherwise indicated in this Schedule.

7.7.13.2(3) Utilize electronic ballasts for fluorescent lamps with a THD of 10% and no more than 8% for third harmonic. Power factor will be .98 or greater and efficiency will be 90% or higher.

7.7.13.2(4) Minimize use of battery-operated unit emergency lighting. Battery-operated emergency lighting may be an acceptable alternative as a second level of emergency lighting in areas including inpatient areas, emergency distribution rooms, and mechanical areas.

7.7.13.2(5) Connect lighting in critical care rooms to the UPS system.

7.7.13.2(6) Utilize below glare, recessed indirect fluorescent luminaries specifically design to eliminate indirect glare in treatment rooms, offices, reception areas, care team stations and other areas where computer terminals and similar screens are available.

7.7.13.2(7) Design lighting in corridors to limit glare to patients being transported on stretchers.

7.7.13.2(8) Design lighting in technology conference rooms and video conferencing facilities to maximize viewing of monitors and screens and provide suitable illumination of people being viewed.

7.7.13.2(9) Provide special task lighting designed for the types of procedures conducted for rooms and areas where treatment is provided and rooms and areas where specialized analytical or diagnostic work is carried out.

7.7.13.2(10) As architectural features, design lighting in main lobbies, waiting areas and the main entrance with high quality products aesthetically pleasing to the public and staff.

7.7.13.2(11) Utilize vandal resistant and dark sky compliant exterior luminaires.

7.7.13.2(12) Utilize LED type exit signs.

7.7.13.2(13) Utilize lighting controls that comprise of a networked low voltage relay switching system with programmed ON/OFF operation and local manual override capabilities for corridor lighting. Provide local control from care team stations and reception desks where applicable.

7.7.13.2(14) Protect lighting controls from unauthorized operation when required to be located in areas accessible to the public.

7.7.13.2(15) Design all lighting in public and administration areas to be capable of being switched from a central location.

7.7.13.2(16) In open areas and common areas, zone and subdivide lighting to permit energy management and appropriate control and variation of light levels.

7.7.13.2(17) Provide local lighting control for each treatment room. Each room will have 2 or more levels of illumination in addition to the off position unless specified otherwise.

7.7.13.2(18) Multi-level switched lighting and controls will be provided in all patient rooms and other patient care areas. At minimum, provide the following lighting controls in all patient rooms:

7.7.13.2(18)(a) at the door: general light and night light;

7.7.13.2(18)(b) at the patient bedside: reading light, night light, exam light and general light;

7.7.13.2(18)(c) in the bathroom: night light and bathroom light; and

7.7.13.2(18)(d) in the family zone: reading light.

7.7.13.2(19) Provide each NICU room with multiple controlled illumination systems as follows:

7.7.13.2(19)(a) Provide ambient lighting in infant spaces adjustable through a range of 10 to 600 lux as measured at each bedside. This lighting system will be independently controlled within each room and have the ability to be manually adjusted and automatically operated in a diurnally controlled cycle when selected by the user.

7.7.13.2(19)(b) Provide a separately controlled procedure light capable of variable output between 0-2000 lux

measured at the plane of the infant bed. This light must be framed so that no more than 2% of the light output of the luminaire extends beyond its illumination task field to protect infant's eyes from direct exposure and provide the best visual support to staff.

7.7.13.2(19)(c) Provide a master off control to provide rapid room darkening to permit transillumination procedures when required by the users.

7.7.13.2(20) Dimmable lighting and controls will be provided in all rooms containing diagnostic imaging equipment.

7.7.13.2(21) Integrate controls in technology conference rooms, videoconference rooms and meeting rooms with equipment controls and control stations in the room so as to permit the conference manager to vary the lighting as required for different activities. Provide a minimum of 2 levels of lighting control.

7.7.13.2(22) Provide manually operated lighting controls of a type, which can be completely cleaned and disinfected without requiring any disassembly, and which will not deteriorate or be otherwise adversely affected by frequent cleaning and disinfection.

7.7.13.2(23) Install specifically rated lighting controls for the application/condition in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration.

7.7.13.2(24) Utilize occupancy sensors and daylight control systems to maintain light levels at appropriate levels based upon the occupancy of the room and the quantity of daylight. This will include occupancy sensors in offices, restrooms, support spaces, and storage rooms and daylight control systems at perimeter rooms where daylight contribution is significant.

7.7.13.2(25) Provide a time clock, photocell and contactors with HOA switch for control of site lighting. Submit a control plan to the Authority for approval.

7.7.13.2(26) Interface the lighting control system with the BMS.

7.7.14 Energy Management

7.7.14.1 Basic Requirements

7.7.14.1(1) Provide an integrated energy management system to monitor, record, analyze, report on and control energy consumption from all sources

that supply energy to the Facility. This system may be connected to the BMS. Refer to Section 7.7.9 of this Schedule.

7.7.14.1(2) Design the system to provide sufficient information to enable the Authority to make SMH-wide “demand-side management” decisions relating to overall energy demand, with the intent of reducing overall energy consumption and demand throughout SMH. Incorporate data from the digital meters required by Section 7.7.9 of this Schedule.

7.7.14.1(3) Provide a system and equipment that is flexible, controllable, and will form an integral part of the Facility.

7.7.14.2 Performance Criteria

7.7.14.2(1) Design the energy management system to be accessible from any networked computer using appropriate software.

7.7.14.2(2) Provide a minimum of five site software licenses if licensing is required.

7.7.15 Mechanical Equipment Connections

7.7.15.1 Basic Requirements

7.7.15.1(1) Provide electrical power control and monitoring connections to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe, reliable and serviceable mechanical equipment and systems in the Facility.

7.7.15.2 Performance Criteria

7.7.15.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment so as to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.7.15.2(2) Design connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration to accommodate the vibration.

7.7.15.2(3) Design connections to mechanical equipment to easily permit removal and replacement of the equipment.

7.7.15.2(4) Size motor control centres, main feeders to motor control centres, and mechanical distribution centres to accommodate the current mechanical equipment with an additional 50% spare capacity.

7.7.15.2(5) Utilize motor control centres when three 3-phase motors that require a starter are located within 50m of each other.

7.7.16 Specialty Systems

7.7.16.1 Basic Requirements

7.7.16.1(1) Special electrical and communications systems are required in the Facility (as described in this Schedule) and form essential parts of the Facility. Provide power supply, specially conditioned power and communication conduits and other electrical operational support equipment to meet all requirements of these special electrical and electronic systems.

7.7.16.2 Performance Criteria

7.7.16.2(1) Utilize institutional or industrial quality cables, connectors, conduit systems, fittings and hardware to make connection to special equipment and to provide for high levels of reliability, durability and ease of maintenance of the equipment.

7.7.16.2(2) Provide connections to special equipment that easily permit removal and replacement of the equipment.

7.7.17 Clock System

7.7.17.1 Basic Requirements

7.7.17.1(1) Provide a synchronized wireless clock system to assure accurate consistent time is available at key control and clinical spaces in the Facility.

7.7.17.1(2) Supply master time controllers and all clocks by a recognized industry leader with all components by the same manufacturer.

7.7.17.1(3) Wireless clocks within the Facility will be compatible with the existing SMH GPS wireless clock system and will work with the signal received from the existing central controller.

7.7.17.1(4) All synchronized clocks will incorporate the Authority's logo on the face to identify the clock as a synchronized clock.

7.7.17.2 Performance Criteria

7.7.17.2(1) Install battery-operated analog type synchronized clocks that will receive correction signals from the master clock. Use batteries rated to last a minimum of 5 years.

7.7.17.2(2) Provide synchronized clocks minimum 300 mm in diameter with sweeping second hand and 24 hour numbering. Numbering will include hours 1-12 in large numbers on outer ring and hours 13-24 in smaller numbers on inner ring.

7.7.17.2(3) Locate synchronized clocks in areas including:

7.7.17.2(3)(a) each patient care area including treatment rooms, patient rooms, care stations, patient therapy rooms, procedure rooms, interview/consult rooms, medication rooms, locker rooms, imaging rooms and corridors; and

7.7.17.2(3)(b) conference rooms, meeting rooms, care team stations, staff lounges, family rooms, reception desks and staff work rooms.

7.7.17.2(4) Provide local satellite transmitters to provide signals to all clocks in the Facility where required.

7.7.18 Helipad Lighting, Illuminated Signage and Lighting Control

7.7.18.1 Basic Requirements

7.7.18.1(1) Provide navigational aids for the Helipad in accordance with applicable standards based on the specified category, including inset lights for both Final Approach and Take-off Area (FATO) and Touchdown and Lift-off Area (TLOF) perimeters.

7.7.18.1(2) Utilize white or amber omni directional lighting, pending operator preference.

7.7.18.1(3) Inset lights and ARCAL lighting control (Aircraft Radio Control of Aerodrome Lighting), obstruction lights, SAGA (System of Approach Azimuthal Guidance) lights and beacons will comply with CAR (Canadian Aviation Regulations) 325 and other Transport Canada standards.

7.7.18.2 Performance Criteria

7.7.18.2(1) Connect all helipad lighting, signage and lighting control to emergency power sources.

7.7.18.2(2) Install inset lights for FATO comprising of seven lights on each side including two end lights. FATO lighting will be spaced 4m apart.

7.7.18.2(3) Install inset lights for TLOF comprising of nine lights on each side including two end lights. TLOF lighting will be spaced 2m apart.

7.7.18.2(4) Provide flood lighting for the Helipad and general lighting for the connection paths for patient transfer from the Helipad to the dedicated elevators on the roof.

7.7.18.2(5) Utilize manual lighting control switches in the Emergency Department for Helipad lighting control.

7.7.18.2(6) Provide Aircraft Radio Control of Aerodrome Lighting (ARCAL) system for Helipad lighting control.

7.7.18.2(7) Provide System of Approach Azimuthal Guidance (SAGA) lights for the Helipad, for threshold identification and azimuthal guidance.

7.7.18.2(8) Provide illuminated wind sock, obstruction lights and beacon lights as required for the Helipad.

## 7.8 Communications (Division 27)

### 7.8.1 General

#### 7.8.1.1 Principles and Guidelines

7.8.1.1(1) The Authority has an information management directional plan consisting of 3 core deliverables: provision and management of the technology, management and delivery of information and management and support for the core business. Project Co will support this plan using technology that seamlessly integrates with the Authority.

7.8.1.1(2) The Authority's patient health record is predominantly electronic in nature and a substantial amount of information related to patients is digital or has the ability to be converted to digital and reside on the network.

7.8.1.1(3) The full electronic health record (EHR) is the ultimate goal of the Authority when it comes to gathering, storing and transmitting patient information. The intent of the EHR is to allow health care providers the ability to make more accurate, faster decisions on courses of action for patients, provide efficiencies for staff and patients to reduce costs, and provide better privacy and security of the patient record by controlling where it is stored.

7.8.1.1(4) The Authority's primary Health Care Information System (HCIS) software application package is Meditech Magic for the North region and Meditech Client Server for South and East regions. Meditech Magic is a telnet based application and has to run on a secure, low latency network. All applications used in the Facility for clinical purposes will be provided by the Authority. Most applications will be

hosted on servers located either at a data centre located at SMH or in off-site data centres. Some applications may be hosted locally within the Facility. The management of all the Authority's employees and patient information is the responsibility of the Authority.

7.8.1.2 Basic Requirements

7.8.1.2(1) The communications systems in the Facility will be an extension of the SMH communications systems. Ensure all new technology systems and equipment are compatible with the existing systems and equipment used at SMH.

7.8.1.2(2) The communications systems will be proven technology for use in facilities similar to the Facility.

7.8.1.2(3) All communications systems infrastructure and equipment provided by Project Co will be the latest proven version of the equipment at the time of procurement.

7.8.1.2(4) The communications systems will be easy to operate, easy to maintain and adaptable to change, and expandable to accommodate growth.

7.8.1.2(5) Project Co will be responsible for all physical network design and installation.

7.8.1.2(6) Physical network design and installation will:

7.8.1.2(6)(a) accommodate multiple separate networks and VLANs administered by multiple Facility Users; and

7.8.1.2(6)(b) have high availability and security that meets or exceeds the industry standard for use in and support acute care hospital applications.

7.8.1.2(7) The Authority anticipates that the following networks will be required in the Facility:

7.8.1.2(7)(a) An administrative network for core health users, including the Authority's local area network, which will include the following applications:

(a).1 patient information systems;
(a).2 Meditech;
(a).3 PACS;
(a).4 financial information systems;
(a).5 human resource information systems; and
(a).6 electronic communications systems including e-mail, video conferencing and VoIP phones

and end-user resources including home drives and shared enterprise resources.

The administrative servers will be supplied by the Authority and are located off-Site. The network equipment will provide wide area network connections to these server farms to secure access to all levels of required information.

7.8.1.2(7)(b) A building systems network, which will include:

(b).1 the BMS (refer to Section 7.6 of this Schedule);

(b).2 security systems;

(b).3 alarm management systems; and

(b).4 internal/external overhead paging type communications systems.

These systems must integrate with other similar systems used at SMH. If the use of the administrative network is required, consult with the Authority;

7.8.1.2(7)(c) CCTV (refer to Section 7.9.3.5 of this Schedule);

7.8.1.2(7)(d) Nurse Call System (refer to Section 7.8.10 of this Schedule);

7.8.1.2(7)(e) Patient Entertainment System (refer to Section 7.8.15 of this Schedule); and

7.8.1.2(7)(f) as required by the relevant equipment manufacturer or vendor, patient monitoring equipment (refer to the Equipment List).

The above list is indicative only and does not limit Project Co's obligation to provide all physical networks required for the Facility.

7.8.1.2(8) Provide systems which promote operational efficiency and integrate systems where this integration provides efficiency and operational and cost advantages.

7.8.1.2(9) Provide a common pathway for all communications systems wiring referenced herein, including the BMS, and coordinate the requirements of the individual communications systems as established by the vendors of such systems e.g. clinical patient monitoring systems.

7.8.1.2(10) The communications systems will accommodate all media types, including data, voice, video and overhead paging.

7.8.1.2(11) Train the Authority's IT specialist(s) on configuration/setup and testing of the communication systems equipment in the Facility.

7.8.1.2(12) Design and install equipment and infrastructure to remain operational during and after disasters.

7.8.1.2(13) The Authority has two main data centres located off-Site where the core applications, communications services and storage facilities exist. These data centres will house the majority of server and storage infrastructure. The Facility will not have a significant server installation.

7.8.1.2(14) Provide all necessary infrastructure, including power, pathways, conduits, spaces and structured cabling, to support UBC's clinical academic program as outlined in Appendix 3B [UBC Videoconference Room Specifications].

7.8.1.3 Performance Criteria

7.8.1.3(1) Items critical for patient life safety will have built-in redundancy. Provide redundancy at each wall jack location and connect physically adjacent ports to different switches within the same communications closet.

7.8.1.3(2) IP Protocol will be used for data network based equipment. Telecom equipment will be a mix of VoIP, TDM and analog equipment.

7.8.1.3(3) All network protocols will be IPV4 compatible.

7.8.1.3(4) Project Co will maintain the manufacturer's warranties on all communications systems equipment and ensure that the warranties are assignable to the Authority.

7.8.1.3(5) All communications systems equipment provided by Project Co will support all applications run generally by the Authority, which include Meditech, PACS and Microsoft Office.

7.8.1.3(6) All applications, software modules and any related software installed, operated or used by Project Co will not interfere with the operation or performance of, or reduce the security or privacy of, any Authority applications or equipment.

7.8.1.4 Quality Requirements

7.8.1.4(1) Project Co will comply with all applicable standards and will:

7.8.1.4(1)(a) use the latest technology for transferring, securing, and storing information available at the date of procurement of the communications system for the Facility;

7.8.1.4(1)(b) comply with all applicable IEEE, CSA, TIA / EIA, and BICSI standards, including CSA C22.2 and CSA Z32.99;

7.8.1.4(1)(c) use equipment and materials that are certified and clearly sealed by CSA or ULC or other testing agency approved and accepted by the Safety Engineering Services (SES);

7.8.1.4(1)(d) comply with Appendix 3E [Cable Infrastructure Standard];

7.8.1.4(1)(e) comply with Appendix 3F [Wireless Infrastructure Standard];

7.8.1.4(1)(f) comply with Appendix 3G [Wireless Data Communications Policy];

7.8.1.4(1)(g) comply with Appendix 3H [A/V and Video Conferencing Standard]; and

7.8.1.4(1)(h) obtain any required network and communications systems equipment (including software and hardware) that will be utilized by or directly interface with the Authority's network environment from the list of approved/preferred vendors and products set out in Appendix 3I [IM/IT Preferred Vendors], or from another vendor approved by the Authority acting reasonably.

7.8.1.4(2) In the event of a conflict between applicable standards, the more stringent standard will apply.

7.8.2 Integration with the Authority Networks

7.8.2.1 Basic Requirements

7.8.2.1(1) Minimum requirements for inter-building cable infrastructure are set out in Appendix 3E [Cable Infrastructure Standard].

7.8.2.1(2) Provide 2N redundant outside plant cable infrastructure to connect the Facility's main communications room to the existing data centre communications room located in the South Building via physically diverse and redundant pathways. Terminate pathways in the South Building Service Connection Room. Outside plant cable infrastructure will be continuous and terminate in the existing data centre communications room in the South Building. Outside plant cable infrastructure will consist of multimode and single mode fibre optic

cable and multi-conductor copper tie cable. Project Co will perform all work (including providing all necessary parts and components) required to connect to the Authority's conduit in the South Building Service Connection Room. The Authority will provide for actual network connectivity. Refer to Section 6.10 (Connections and Integration to Existing Hospital) of Schedule 2 [Design and Construction Protocols] regarding Work Plan and other requirements regarding work in existing SMH buildings.

7.8.2.1(3) In consultation with the Authority, provide sufficient fibre pairs of outside plant multimode and single mode fibre optic cable and multi-conductor copper tie cable to support the networks, systems and equipment (including the Equipment) installed and used in the Facility.

7.8.2.1(4) Project Co will collaborate with the Authority to ensure that communications systems in the Facility are capable of being integrated with existing communication systems at SMH and other Authority facilities and with Province-wide communication systems between health authorities.

7.8.2.1(5) The communication systems will permit and facilitate the secure transmission, storage, and retrieval of electronic health records within the Facility and to and from all other Authority facilities.

7.8.2.1(6) The communications systems that will be integrated or interoperate with Authority systems will be compatible with the systems of the Authority's service providers as of the date of installation of the systems and be designed to integrate with the service providers' equipment and, as appropriate, to utilize the Authority's existing service agreements by extending them to the Facility.

7.8.3 Interface with Authority Systems

7.8.3.1 Basic Requirements

7.8.3.1(1) The Facility technology and communications systems that are in a digital format may operate on the Facility networks and integrate with the Authority's applications, subject to requirements of this Agreement and approval from the Authority.

7.8.3.1(2) Project Co will not, without the Authority's prior approval, install or use any software that resides on, accesses or otherwise interacts with the Authority's network. Project Co will complete, and submit to the Authority, the Authority's software assessment form for each such software installation (available in the Data Room).

7.8.3.1(3) The Authority intends that:

7.8.3.1(3)(a) electronic patient information should be available at the bedside to assist clinical staff in performing their duties, on portable devices, run over the wired or wireless network; and

7.8.3.1(3)(b) the portable device display information such as code blue, video conferencing, patient / staff education, and patient monitoring, if this creates efficiencies for clinical staff. These systems are to integrate with the IT applications and run over the common network platform.

7.8.3.2 Quality Requirements

7.8.3.2(1) The technology and communications system will be IP compatible and run over a standard Ethernet network.

7.8.3.2(2) Databases for these systems will be HL7 compatible with an SQL open system architecture to allow key fields to be read from and written to the Authority's information technology software applications.

7.8.3.3 Operating Requirements

7.8.3.3(1) Servers for the technology and communication systems will be Microsoft compliant (version acceptable to the Authority) and will be from a common manufacturer where possible.

7.8.3.3(2) The servers will be the latest technology, as of the date of installation (Intel processor latest model or similar acceptable to the Authority) and will interface to the Ethernet network via a 100Mb network interface card.

7.8.4 Structured Cabling

7.8.4.1 Basic Requirements

7.8.4.1(1) Provide and install a complete structured cabling solution for the Facility in accordance with Appendix 3E [Cable Infrastructure Standard].

7.8.4.1(2) Project Co will, in consultation with the Authority, assign each room and space in the Building a communications cable density ("High", "Medium" or "Low") in accordance with the ANSI/TIA-1179 Healthcare Facility Telecommunications Cabling Standard.

7.8.4.1(3) Notwithstanding the communications cable density assigned in the ANSI/TIA-1179 Healthcare Facility Telecommunications Cabling

Standard, assign the following rooms or spaces (as identified in that standard) a Low communications cable density:

7.8.4.1(3)(a) Patient Services – Patient Room;

7.8.4.1(3)(b) Emergency – Exam Rooms;

7.8.4.1(3)(c) Caregiver – Clean Utility;

7.8.4.1(3)(d) Medication Rooms; and

7.8.4.1(3)(e) Caregiver – Workroom.

7.8.4.1(4) At a minimum, provide a number of communications cables as follows:

7.8.4.1(4)(a) in each room and space in the Building assigned a Low cable density, 6 cables;

7.8.4.1(4)(b) in each room and space in the Building assigned a Medium cable density, 14 cables; and

7.8.4.1(4)(c) in each room or space in the Building assigned a High cable density, 15 cables or more as determined in consultation with the Authority.

7.8.4.1(5) In addition to the communications cables required by Section 7.8.4.1(4), Project Co will provide:

7.8.4.1(5)(a) any additional cables necessary to support all of the networks, systems and equipment (including the Equipment) to be installed or used in the Facility; and

7.8.4.1(5)(b) all cables required by other provisions of this Agreement.

7.8.4.1(6) Project Co will co-locate, at each communications outlet location, an appropriate number of power outlets.

7.8.4.1(7) The cabling infrastructure will be Category 6 and end to end infrastructure will conform to this standard, including all patch cables, jumper wires and equipment cords.

7.8.4.1(8) Provide separate physical networks, in accordance with Good Industry Practice or equipment vendor specifications and in consultation with the Authority, as required for the communications systems and equipment installed or used in the Facility. At a minimum, provide a separate physical network for each of the networks identified in Section 7.8.1.2(7) of this Schedule.

7.8.4.1(9) The cabling infrastructure will be universal and to support the networks and systems required in the Facility, including voice, data, video, CCTV and security systems and to allow all forms of end-use equipment, including computers, telephones, video conferencing equipment and other digital end-use equipment. access to the various IT, telecommunication, and digital video networks.

7.8.4.1(10) Project Co will cause:

7.8.4.1(10)(a) the cabling infrastructure to be designed by an RCDD;

7.8.4.1(10)(b) the RCDD to complete the physical network design in consultation with the Authority; and

7.8.4.1(10)(c) without limiting this Section 7.8.4.1(10), the RCDD to provide, as necessary, preliminary conceptual drawings of proposed communications outlet locations in advance of the first detailed room review meetings with the Authority.

7.8.4.1(11) The structured cabling system will be a complete end-to-end Belden system, and will be installed and tested by a Belden certified contractor approved by the Authority.

7.8.4.1(12) Provide a manufacturer's extended product, performance, application, and labour warranty that will warrant all passive components used in the technology infrastructure. Additionally, this warranty will cover components not manufactured by the technology infrastructure Manufacturer, but approved by the technology infrastructure manufacturer for use in the technology infrastructure.

7.8.4.1(13) The structured cabling will be neatly organised and clearly labelled for ease of use by the Authority and Facility Users.

7.8.4.1(14) Create, in consultation with the Authority, an operational plan for the cable infrastructure, including a management strategy and resource requirements for maintenance.

7.8.4.2 Performance Criteria

7.8.4.2(1) Utilize a star wired cabling approach to wire all communications outlet locations back to the floor communication rooms and all communication rooms back to the main communications room.

7.8.4.2(2) Project Co will cross-connect and test all cable infrastructure in consultation with the Authority.

7.8.4.2(3) Terminate all cables in telecommunication rooms in accordance with this Section 7.8 of this Schedule and Appendix 3E [Cable Infrastructure Standard].

7.8.4.2(4) Minimum size requirements for telecommunications rooms are included in Appendix 3E [Cable Infrastructure Standard]. Provide and size a main telecommunications room and local telecommunications rooms to accommodate the telecommunications requirements of the Facility, including all cabling systems and all active and passive network equipment.

7.8.4.2(5) As part of the design process described in Section 5.3 of Schedule 2 [Design and Construction Protocols], provide rack, equipment and wall layouts for telecommunications rooms.

7.8.4.2(6) In consultation with the Authority, provide physically diverse and redundant pathways between the main telecommunications room and the other telecommunications rooms in the Facility.

7.8.4.2(7) Utilize Belden FX2000 Fibre optic cabling to connect local communication rooms to the main communications room. Both multimode (local to main communications room) and single mode fibre will be provided. Provide at minimum 100% spare fibre strand terminations in each communications room. Fibre optic cabling will also be provided for rooms requiring video streaming, and areas where bandwidth requirements necessitate it be used.

7.8.4.2(8) Run category 5E multi-conductor twisted pair telephone style riser cables from the main communications room to each communications room to connect the telephone switch to the telephone handsets through the horizontal cables. The Authority will provide the telephone switch, which will be located at another location on the SMH Campus. Project Co will provide cabling to extend the existing telephone system into the Facility. Provide 100% spare capacity in each communications room.

7.8.4.2(9) Locate communications rooms:

7.8.4.2(9)(a) to serve the floor they are on and maximize the area they serve; and

7.8.4.2(9)(b) to minimize the distances for cable runs, to provide easy access for equipment modifications and to avoid interference with other services and systems.

7.8.4.2(10) Cable types will be unshielded twisted pair and fibre optic multimode and single mode. The bandwidth requirements and distance limitations will determine the type of cable installed.

7.8.4.2(11) All rooms that have or are anticipated to have data, phone, video, or other end-use equipment will have cable system drops ran back to the communication rooms. It is anticipated that storage, clean/dirty supply rooms, washrooms and some corridors will not have cable drops.

7.8.4.2(12) All conduit pathways will have spare capacity at least as per TIA/EIA standards, and all communications rooms will have physical floor and wall space to accommodate such expansion. For each GigaBIX wall, provide adequate space to accommodate 50% expansion on the same and adjacent wall. Provide adequate floor space to facilitate at least 2 expansion racks to be located adjacent to required racks.

7.8.4.2(13) All cabling will be run in conduit and cable tray.

7.8.4.2(14) All ceiling spaces will have cable drops for wireless network access points, information display systems, and other ceiling mounted digital devices.

7.8.4.2(15) Terminate all cable drops at both ends. Provide the proper flame spread rating for the cabling system.

7.8.4.2(16) Provide equipment cables for all end-use equipment in sufficient quantity to make each device operational plus 10% spare. Cross-connect cables, harness cables and equipment cords will allow complete connection from end to end. Channel Link testing performance and procedures to TIA/EIA-568-C.2 standard will be used to certify the cabling system (from harness cable to patch cord).

7.8.4.2(17) Develop the labelling approach in consultation with the Authority prior to labelling.

7.8.4.2(18) Implement a cable management labelling software and electronic drawing system (AutoCAD Version to be approved by the Authority) to track and manage the cable plant. For submitting as-built drawings to Authority, use Authority's AutoCAD drawing template layers and Standards Symbols (can be obtained from Authority-Facilities Planning). As-built drawings to show serving communications room ID, conduit sleeves and openings in the room, ceiling pathway route, work area cable IDs with associated serving room ID and boundary lines of the serving room. Test results, cable information records, Belden warranty certification and as-builds should be submitted to Authority in a timely manner to facilitate placement of end-use equipment. Turn over the cable management system along with all data to the Authority as part of the cable plant acceptance process.

7.8.4.2(19) Provide floor communications outlets and floor power to connect floor mounted self-registration systems, electronic directional systems and patient education kiosks, as approved by the Authority.

7.8.4.2(20) Specialized systems requiring multiple drops will have sufficient drops at each location to ensure system operation.

7.8.4.2(21) Provide cable for all public phones, minimum 1 per lobby area per department in the Facility.

7.8.4.2(22) Provide a dedicated outlet for all Authority end-use fixed equipment. In no case will a personal computer be wired through an IP telephone.

7.8.5 Network Equipment

7.8.5.1 Basic Requirements

7.8.5.1(1) For the Authority's network described in Section 7.8.1.2(7)(a) of this Schedule, the Authority will:

7.8.5.1(1)(a) provide to Project Co all required network equipment, including network switches;

7.8.5.1(1)(b) complete all logical network design and network equipment programming and configuration; and

7.8.5.1(1)(c) be responsible for all network management licensing.

7.8.5.1(2) For all other networks required in the Facility, including those described in Sections 7.8.1.2(7)(b) through 7.8.1.2(7)(f) of this Schedule, Project Co will:

7.8.5.1(2)(a) provide all required network equipment, including network switches;

7.8.5.1(2)(b) in consultation with the Authority, complete the logical network design and program and configure all network equipment;

7.8.5.1(2)(c) be responsible for all network management licensing; and

7.8.5.1(2)(d) locate network and other equipment in an equipment room(s) separate from the telecommunications rooms in the Facility or, if approved by the Authority, locate such equipment in the telecommunications rooms in the Facility and in racks separate from the Authority's equipment racks.

7.8.5.1(3) For all of the networks described in Sections 7.8.5.1(1) and 7.8.5.1(2) above, Project Co will mount and connect all network switches and pigtails and cross connect and test all network equipment and cable infrastructure in consultation with the Authority.

7.8.5.1(4) Install all network equipment in accordance with all applicable IEEE and EIA/TIA standards, including the 802.1 and 802.3 standards.

7.8.5.1(5) The Authority will provide and manage all firewalls, security and IDS/IPS systems for connections to the Authority's networks. Project Co is responsible for securing all networks in the Facility other than the Authority's network.

7.8.5.1(6) All network equipment will be open architecture.

7.8.5.1(7) Retain a certified network engineer trained on the network equipment.

7.8.5.1(8) Network equipment will support converged communications, a combination of the three media types of voice, video and data and all equipment will support the prioritization of traffic. The systems will include the main telephone system, video conferencing, CCTV, dictation, fax, transcriptions and all information systems.

7.8.5.1(9) Network equipment will function as part of the existing global network management system and will conform to standards and methods used by the Authority across its various sites.

7.8.5.1(10) Redundancy and security will be taken into account in all network designs.

7.8.5.2 Performance Criteria

7.8.5.2(1) End-use equipment will be connected to the edge communications closet layer 2 switch and a 10/100/1000 base T Ethernet 802.3 protocols run on Category 6 (or greater based on standard in place at the time of procurement) twisted pair, which will connect to the redundant 3COM layer 2/3 switches in the same communications room

7.8.5.2(2) The edge communication rooms will also support the 3COM 802.11a/b/g/n wireless access points and wireless telephones, both of which require PoE functionality and standards based QoS (Quality of Service) traffic prioritization.

7.8.5.2(3) All racks/cabinets requiring electrical power will be provided with a minimum of:

7.8.5.2(3)(a) 5 KW redundant power per rack for telecommunication racks; and

7.8.5.2(3)(b) 10 KW redundant power per cabinet for server cabinets.

Refer to Section 7.7.6.1(1) of this Schedule 3 for the UPS power requirements for communications rooms and systems.

7.8.5.2(4) In consultation with the Authority, prepare a network plan showing:

7.8.5.2(4)(a) the edge communication devices;

7.8.5.2(4)(b) the applications; and

7.8.5.2(4)(c) all connecting end-use equipment.

7.8.5.2(5) Network ports supplied with three drops will have two active ones. Where only one device is expected to be fielded at a specific location an additional inactive port will be provisioned for future use.

7.8.5.2(6) All network ports with network devices attached will be activated. A small percentage of ports, to be used for portable equipment or on an as required basis, will be designated as active. These ports will be designated by the Authority.

7.8.5.2(7) All switch infrastructures will support multiple VLAN functionality and multiple subnets per VLAN.

7.8.6 Telephone Equipment

7.8.6.1 Basic Requirements

7.8.6.1(1) Refer to the Fraser Health Telephone Standard for background information related to the telecom system used at SMH (available in the Data Room).

7.8.6.1(2) Have a public telephone company provide and install pay phones in consultation with the Authority.

7.8.6.1(3) Project Co may use the PBX system for its telecommunications needs. If Project Co intends to use the SMH PBX, Project Co will provide and, in consultation with the Authority, install additional capacity and functionality as required, including SMDR.

7.8.6.1(4) Ensure that cellular and paging services function effectively in all areas of the Facility, including underground parking.

7.8.6.2 Performance Criteria

7.8.6.2(1) Design and construct the Facility to support the Authority's IP and TDM phone technology, both wired and wireless.

7.8.6.2(2) Voice equipment will comply with all BICSI/IEEE and EIA/TIA standards.

7.8.6.2(3) Voice equipment will be fully integrated, and will operate seamlessly, with the Authority's existing voice network.

7.8.7 Authority's End-Use Equipment

7.8.7.1 Basic Requirements

7.8.7.1(1) Refer to Appendix 2E [Equipment and Furniture]. The Authority will provide its own non-clinical end-use equipment including:

7.8.7.1(1)(a) personal computers;

7.8.7.1(1)(b) laptop computers;

7.8.7.1(1)(c) tablet PCs;

7.8.7.1(1)(d) printers;

7.8.7.1(1)(e) photocopiers;

7.8.7.1(1)(f) facsimile machines;

7.8.7.1(1)(g) medication barcode scanners/CRT;

7.8.7.1(1)(h) registration kiosks; and

7.8.7.1(1)(i) PDAs,

(collectively, the "**Authority Supplied End-Use Equipment**").

7.8.7.1(2) Project Co will:

7.8.7.1(2)(a) include the installation of the Authority Supplied End-Use Equipment as part of the Move-in Schedule;

7.8.7.1(2)(b) assist the Authority to define locations for the Authority Supplied End-Use Equipment;

7.8.7.1(2)(c) provide adequate power and wired network drops for the Authority Supplied End-Use Equipment; and

7.8.7.1(2)(d) provide jack number information (on the Authority's cable information Excel spreadsheet) to the Authority to facilitate placement of the Authority Supplied End-Use Equipment.

7.8.8 Project Co's Own Equipment

7.8.8.1 Basic Requirements

7.8.8.1(1) Provide end-use equipment and communications equipment to provide a fully operational Facility and that Project Co may require for its own use for the performance of its obligations under this Agreement ("**Project Co's End-Use Equipment**").

7.8.8.1(2) Do not connect any of Project Co's End-Use Equipment to the Authority's network, both wired and wireless, without prior approval from the Authority. Project Co is responsible for paying any additional cost incurred by the Authority for Project Co's use of Project Co's End-Use Equipment on the Authority's network.

7.8.8.1(3) The Authority will install any of Project Co's End-Use Equipment that has been approved for connection to the Authority's network.

7.8.8.1(4) Servers and related equipment for Project Co's End-Use Equipment are to be located in a separate Project Co equipment room (or communications rooms if approved by the Authority). They are not to be located in edge closets.

7.8.8.1(5) Any wireless infrastructure or devices used by Project Co will not interfere with the Authority's wireless infrastructure or devices.

7.8.8.1(6) The Authority wishes to have a single communications infrastructure but where required this infrastructure may be physically separated with approval of the Authority.

7.8.8.1(7) If Project Co elects to reside on the Authority's network, Project Co will conform to all Authority network, end-use standards and will be subject to the Authority's Total Cost of Ownership (TCO) model.

7.8.9 Wireless Infrastructure

7.8.9.1 Basic Requirements

7.8.9.1(1) Subject to Section 7.8.9.1(2) of this Schedule, design and install a complete wireless network solution for the Facility in accordance with Appendix 3F [Wireless Infrastructure Standard] to support the extension of the wireless network located at SMH.

7.8.9.1(2) The Authority will:

7.8.9.1(2)(a) procure, provide to Project Co, program and configure all required network equipment for the wireless solution, including network switches and access points; and

7.8.9.1(2)(b) be responsible for all logical network design and network equipment configuration.

7.8.9.1(3) Project Co will install all network switches and pigtails and cross connect and test all network equipment and cable infrastructure for the wireless network in consultation with the Authority. Install all network equipment in accordance with all applicable standards, including the following IEEE and EIA/TIA standards: 802.1, 802.11 and 802.3.

7.8.9.1(4) The wireless infrastructure will service 802.11b (2.4Ghz DSSS), 802.11g (2.4Ghz OFDM) and 802.11a (5Ghz OFDM) and 802.11n Draft 2.0 or newer (5Ghz and 2.4Ghz MIMO) wireless communications and data transfer requirements for access by wireless devices to data and voice services within the Facility and across the Authority via the Authority WAN.

7.8.9.1(5) Provide a complete structured cabling infrastructure that will allow the installation of the complete wireless network, including PoE wireless access points. Project Co will locate data drops and access points in consultation with the Authority.

7.8.9.1(6) Setup and test of all aspects of the wireless network and provide heat maps for the Facility indicating the channel coverage, signal level, data rate and noise floor for 802.11b, 802.11g, 802.11a and 5GHz 802.11n wireless networks.

7.8.9.1(7) Ensure wireless management tools include access point locations mapped to a floor plan with RF characteristics defined for structural layers including glass, concrete, wood, drywall and metal permanently mounted RF obstacles

7.8.9.1(8) Provide the wireless network management tool configuration file to the Authority at the completion of the wireless network testing.

7.8.9.1(9) Provide support for integration with existing wireless management systems and wireless IDS/IPS systems. Ensure that WXM IDS features are part of site planning and configuration for the wireless network.

7.8.9.2 Design Requirements

7.8.9.2(1) Work with the Authority in creating an operational plan for the wireless network complete with management strategy alerts notification and resource requirements for maintenance.

7.8.9.2(2) Retain a certified network engineer with expertise and experience in working with the Authority approved equipment to design the wireless network.

7.8.9.2(3) All wireless network components will be 3COM as are currently managed by the Authority. Provide all required modular components in each switch to support all protocols and functionality as designed.

7.8.9.2(4) The 3COM Access Points will be part of a wireless switch infrastructure and will be serviced by 10/100/1000 base T Ethernet ports. The edge closet switch backbone to the core network room will provide enough bandwidth to allow wireless services to function as designed. The wireless switches will reside in the core communications room and be serviced by Gigabit Ethernet services as required by the wireless switches. The wireless switches will be deployed in a redundant fashion, with redundant power supplies, Ethernet feeds and switches. Closets will be dual 10GB to the core switches. All uplinks will terminate in a redundant core switch fabric. Ports on layer 2/3 edge switches will be capable of 10/100/1000 Mb, regardless of what is connected to them.

7.8.9.2(5) The access points will support redundant PoE connections and be connected to two physically separate PoE switches.

7.8.9.2(6) Deploy the wireless switches such that there is at a minimum 5% spare access point licenses per switch and an overall minimum of 15% spare access point licenses.

7.8.9.2(7) Include the switch ports required by the wireless network access points in the total port count for the Facility. The list of layer 2/3 switch ports will be provided indicating the ports connected to a given access point, and the power load on the switch with the remaining available PoE power on the switch. The wireless network documentation will include a list of access points with the switch identification and port number indicated in a spreadsheet.

7.8.9.3 Performance Criteria

7.8.9.3(1) The wireless network will support the five main services which will be active in the Facility:

7.8.9.3(1)(a) the Authority's administrative data services. These services do not require prioritization and will be on the default VLAN;

7.8.9.3(1)(b) the Authority's voice services which consist of 802.11a push to talk devices with multicast requirement. Voice traffic will be prioritized on the wireless and wired LAN. WMM and SVP protocols will be supported by the wireless infrastructure. Voice traffic will be on a separate VLAN(s);

7.8.9.3(1)(c) clinical wireless devices which consist of all handheld or mobile (cart based) wireless medical devices and include barcode scanners, bed site lab test equipment, mobile imaging systems and vital statistics gathering systems. clinical devices will be on a separate VLAN;

7.8.9.3(1)(d) equipment and patient location systems which use a triangulation method to locate devices that beacon a signal at regular intervals. If the patient location technology is used in the Facility, ensure that the network design is reviewed and approved by the equipment and patient location vendor; and

7.8.9.3(1)(e) non-Authority equipment.

7.8.9.3(2) Wireless network equipment will function as part of the existing network management tools and methods within the Authority.

7.8.9.3(3) Provide data rates consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.9.3(4) Provide channel dB separation consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.9.3(5) Provide an RF environment consistent with the noise floor and signal strength requirements (SNR) and consistent with the strictest specifications provided by the wireless end-use equipment.

7.8.9.3(6) Provide a minimum signal strength of 75Dbm at the boundaries of the Site.

## 7.8.10 Nurse Call Systems

### 7.8.10.1 Basic Requirements

7.8.10.1(1) The Authority received a proposal from Logical Solutions Ltd. dated October 1, 2009 to provide a Rauland Responder 5 nurse call system for the Facility (the "**Nurse Call Proposal**"). The Authority confirmed with Logical Solutions Ltd., by letter dated October 1, 2009, that the Authority wished to obtain the nurse call system pursuant to the Nurse Call Proposal. A copy of the Nurse Call Proposal and the Authority's subsequent letter are available in the Data Room.

7.8.10.1(2) Project Co will, further to the Nurse Call Proposal, purchase the Rauland Responder 5 nurse call system for the Facility, complete with all hardware and software necessary to meet or exceed the

requirements in this Section 7.8.10, and will cause Logical Solutions Ltd. and Rauland-Borg Corporation to:

7.8.10.1(2)(a) prior to designing and installing the nurse call system and as required by the Authority, review the technical capabilities of the nurse call system, hardware integration issues and system layout and functionality with the Authority and the Authority's clinical staff;

7.8.10.1(2)(b) design the nurse call system in consultation with the Authority's clinical staff, including hardware and software functionality;

7.8.10.1(2)(c) implement the nurse call system, including to install, program, test and commission the system; and

7.8.10.1(2)(d) train Authority staff on the nurse call system, training schedule to be determined in consultation with the Authority.

7.8.10.1(3) Configure and program the nurse call system as approved by the Authority.

7.8.10.1(4) Provide a full feature audio and visual nurse call system with full duplex communications in all inpatient rooms, and patient exam and treatment rooms in clinical areas including:

7.8.10.1(4)(a) NICU;

7.8.10.1(4)(b) ICU;

7.8.10.1(4)(c) Medical/Surgical Inpatient Nursing Units;

7.8.10.1(4)(d) Emergency Department; and

7.8.10.1(4)(e) HDCU.

7.8.10.1(5) The nurse call system will:

7.8.10.1(5)(a) be the primary emergency communication device for patients to contact staff in each patient care or treatment room;

7.8.10.1(5)(b) the primary communication device for Authority staff to alert other staff that they need assistance in a patient room; and

7.8.10.1(5)(c) promote efficient operation for Authority staff.

7.8.10.1(6) In consultation with the Authority integrate stand alone alarm systems, including patient wandering, infant tagging and code red (fire) signals with the nurse call system. In addition, the system will also annunciate code white (panic duress), code blue (cardiac arrest) and patient monitoring alarms with the nurse call system. The nurse call system will annunciate alarms from these systems in a seamless manner on the nursing station consoles and wireless handheld devices based on Authority requirements.

7.8.10.1(7) The nurse call system will integrate with an annunciator on wireless staff communication devices (PDA's or phones) for near instant alarm response. The nurse call system will operate seamlessly with the wireless staff communication devices and allow two-way voice communication into all patient locations.

7.8.10.1(8) Provide a separate physical network, as per the Rauland system requirements, and all network equipment for the nurse call system and integrate this network, in consultation with the Authority, with other Facility networks.

7.8.10.1(9) Utilize standard Category 6 (or greater based on standard in place at the time of procurement) cabling and connectors for nurse call cabling as applicable.

7.8.10.1(10) All nurse call network horizontal runs to telecommunications closets will be terminated in accordance with Appendix 3E [Cable Infrastructure Standard].

7.8.10.1(11) Install nurse call terminal cabinets in telecommunication rooms as approved by the Authority.

7.8.10.2 Quality Requirements

7.8.10.2(1) Comply with all applicable standards, including UL1069, CSA C22.2 and CSA Z32.99.

7.8.10.2(2) Reliability factor will be 99% or better.

7.8.10.3 Operating Requirements

7.8.10.3(1) Provide full duplex voice communication between master control stations and patient and staff locations.

7.8.10.3(2) At a minimum, provide a master control station in each clinical nursing station. Provide a full feature master control station at triage, every care team station and rapid access locations. Provide cabling for VoIP feature at every master control station.

7.8.10.3(3) Nurse call stations will be individually programmable to allow multiple call classification and priority levels. Nurse call alarms will include: normal patient call, staff emergency call, priority patient call, bathroom call, shower call, anaesthetic call, clean room call, porter call and will be located in the appropriate room types.

7.8.10.3(4) Allow for cascading of call to higher priorities if they are not answered, will have time out call cascading if the calls are not cancelled and will be able to be displayed on nurse call master stations, the wireless phone, and any other type of call display.

7.8.10.3(5) Provide nurse call cords for all patient beds. Call cords will be pillow speaker type with TV control (sound and channels), low voltage lighting (reading, ambient) and customized buttons for functions as determined by the Authority.

7.8.10.3(6) Provide multi-call classification dome light (minimum 4 LEDs) to annunciate calls in all rooms with nurse call devices. Locate dome lights in a manner that allow Authority staff the best possible view from the outside of the room where the nurse call device is located. Provide zone lights at corridor intersections and duty stations at staff work locations.

7.8.10.3(7) Provide staff emergency system with buttons located at all patient bed locations. When possible, incorporate button into bedside station.

7.8.10.3(8) Provide emergency pull cord stations at all patient toilets, shower rooms and dressing locations complete with audio and staff emergency alarms.

7.8.10.3(9) Provide the ability to program 3 levels of priority for each patient station from the nursing station console.

7.8.10.3(10) Provide code blue (cardiac arrest) system. Provide a code blue button at locations determined in consultation with the Authority including: each nurse station, reception desk and all patient rooms, patient therapy rooms, patient lounges, procedure rooms, exam rooms and inpatient rooms. Provide remote indication of specific alarm origin at a central control panel located at the main reception desk of the Facility or other location, as directed by Authority. Button may be incorporated into the bedside station.

7.8.10.3(11) Provide a VoIP staff terminal incorporated into every workflow station at locations determined in consultation with the Authority, including: each patient room (provide two workflow stations at semi-private rooms), staff locations, exam rooms, interview rooms, trauma rooms, secure rooms, treatment rooms, DI areas and Med/Surg beds. VoIP staff terminals will serve as patient or procedure room

communications tool while providing staff with “soft” touch-points to initiate an instantaneous notification of an in-room need. Additionally, the terminal may be used as a functional nurse call console. This programmable touch screen functionality will enable the Authority to program workflow applications.

7.8.10.3(12) Locate staff terminals separately from bedside stations. In all patient rooms, treatment rooms and exam rooms, locate staff terminals in close proximity to the room entrance, not at the patient bedside or at the side of the patient exam table. Exact location of staff terminals will be as directed by the Authority and determined in consultation with the Authority’s clinical staff and nurse call manufacturer

7.8.10.3(13) All patient care rooms and patient bed or stretcher locations will have a separate jack input with the ability to interface with relay/dry contact medical equipment alarms for medical equipment monitoring and patient monitoring (such as bed exit).

7.8.10.3(14) Provide workload and workflow management functionality to all areas.

7.8.10.3(15) Provide adequate duty stations for each nurse call system to ensure that tones are heard throughout each department, including at the following locations:

7.8.10.3(15)(a) clean utility rooms;

7.8.10.3(15)(b) soiled utility rooms;

7.8.10.3(15)(c) medication rooms;

7.8.10.3(15)(d) equipment storage rooms;

7.8.10.3(15)(e) technician workstation in Diagnostic Imaging satellite rooms;

7.8.10.3(15)(f) care team stations;

7.8.10.3(15)(g) meeting rooms; and

7.8.10.3(15)(h) staff lounges and staff locker rooms.

7.8.10.3(16) The nurse call system will provide open system and HL7 standard interfaces that can accommodate integration to Meditech system.

7.8.10.3(17) Interface the nurse call system with the Authority's “Connexall” system for additional monitoring and vectoring of calls.

7.8.10.3(18) Integrate the nurse call system with the existing PBX and provide sufficient audio channels, in consultation with the Authority, for the

requirements of the Facility. The nurse call system will be connected to the Authority's network and the central nurse call server to track calls via Rauland management software (this management software and the server are provided by the Authority). The call management software will record all calls from all departments, response time and allow trending and report generation.

7.8.10.3(19) Provide programming servers and staff communication device allocation server locally on the network to allow nursing station computer access to monitor status of the system and with the appropriate password implement programming changes.

7.8.11 Wireless Staff Communications Systems

7.8.11.1 Basic Requirements

7.8.11.1(1) Provide network infrastructure for a complete wireless staff to staff communication system that will allow staff to place calls from wireless handheld devices and initiate a two-way voice conversation. It is expected that this system will function over the wireless network described in Section 7.8.9 of this Schedule.

7.8.11.1(2) The Authority will provide all wireless end-use devices.

7.8.11.1(3) Project Co may use a different system for its own communication such as portable radios. Any such devices or system must not interfere with the Authority's wireless communication devices or systems or other devices or systems.

7.8.11.1(4) The wireless system will function throughout the Facility, including any underground parkade (subject to requirements of applicable Laws).

7.8.11.1(5) The wireless system will include additional antennas in sensitive areas as may be required to comply with this Section 7.8.11.

7.8.11.1(6) Each wireless device will offer the full functionality of a standard hardwired telephone handset. Ensure that the wireless network in the Facility will support all such functionality.

7.8.11.2 Quality Requirements

7.8.11.2(1) Comply with all applicable standards, including all applicable handheld communications standards and the Spectralink implementation standards for 802.11 networks.

7.8.11.3 Operating Requirements

7.8.11.3(1) Ensure that wireless devices may connect directly to the PBX telephone switch to allow each wireless handheld communication

device to have the same functionality as a wired phone. The Authority intends to include additional line cards for the PBX to provide the functionality. The Authority will be responsible for PBX connectivity.

7.8.11.3(2) Wireless handheld devices to automatically log onto system. No manual intervention is required.

7.8.11.3(3) Provide adequate space and power outlets for wireless device charging stations inside each department.

7.8.12 Public Address System

7.8.12.1 Basic Requirements

7.8.12.1(1) Provide cable infrastructure and equipment for a paging system in the Facility, including any underground parkade, and integrate the Facility's paging system with the Hospital public address system. This paging system is intended to be used for emergency pages only. Other communications systems will be used for routine communications between staff and patients.

7.8.12.1(2) The public address system will be separate from and act independently of the fire alarm system to ensure it is usable during a fire alarm. Provide interconnects between the systems as required by all applicable regulatory standards or codes.

7.8.12.1(3) Provide, in consultation with the Authority, seamlessly functioning with the telephone system.

7.8.12.1(4) Provide for paging at the switchboard by authorized Authority staff only. Paging will be done via a telephone interface to the phone system. In addition, provide a hard-wired backup microphone in emergency registration in the event the PBX fails. This backup microphone must be able to page the entire SMH.

7.8.12.1(5) No zone paging will be required or enabled.

7.8.12.2 Operational Requirements

7.8.12.2(1) Provide complete speaker coverage of the Facility so that emergency pages can be heard everywhere in the Facility, including any underground parkade, with high intelligibility and low loss of articulation of consonants (%ALCONS).

7.8.12.2(2) Provide sound levels as follows throughout the Facility:

7.8.12.2(2)(a) Normal paging: 60 dB minimum.

7.8.12.2(2)(b) Fire alarm messages: 75 dB minimum.

7.8.12.2(2)(c) Paging sound levels will be at least 10 dB above ambient noise levels in mechanical rooms and similar locations.

7.8.12.2(3) Provide all equipment necessary for a fully operational public address system, including:

7.8.12.2(3)(a) Paging amplifiers.

7.8.12.2(3)(b) Flush ceiling speakers in finished areas.

7.8.12.2(3)(c) Trumpet type speakers in mechanical and other high ambient locations.

7.8.12.2(3)(d) Microphone(s).

7.8.12.2(3)(e) Mixers.

7.8.12.2(4) Size amplifiers to handle total load plus 20% spare capacity.

7.8.12.2(5) Provide telephone access for paging with a maximum delay of 1 second between accessing system and ability to transmit page.

## 7.8.13 Clinical Camera System

### 7.8.13.1 Basic Requirements

7.8.13.1(1) Provide point-to-point cameras and viewing monitors for clinical purposes (these are not security cameras) at locations described in the Clinical Specification.

7.8.13.1(2) Recording is not required unless otherwise stated in the Clinical Specifications.

7.8.13.1(3) Clinical cameras are not to be viewable by site security staff or recorded on the building security system.

7.8.13.1(4) Coordinate viewing monitors with the millwork design to ensure ergonomic viewing and usage in conjunction with other systems.

7.8.13.1(5) In order to ensure patient safety, cameras required for specialized environments (e.g.: seclusion rooms) must be approved by the manufacturer for that specific use.

### 7.8.13.2 Performance Criteria

7.8.13.2(1) Provide color high-resolution, high sensitivity cameras with auto-iris lens operation. Mounting will be appropriate for the environment, unobtrusive, matching colour with hidden cabling. Camera will be

CCD image capture technology and will have at least 540 lines of resolution.

7.8.13.2(2) Infrared illuminated cameras are required for patient observation in low or no light (sleeping) environments.

7.8.13.2(3) Viewing monitors will be LCD type with CFL or LED backlit (LED is preferred) with a minimum of 17" diagonal viewing surface.

7.8.13.2(4) System will be IP based or NTSC base band. IP based systems will utilize the cabling infrastructure. Consult with the Authority for any required network access.

7.8.13.2(5) System will be real time viewing with extremely low to no latency or delay.

7.8.14 Video Conferencing

7.8.14.1 Basic Requirements

7.8.14.1(1) Design and construct the following spaces (including all necessary building infrastructure and, as applicable, video conferencing infrastructure) and install any required Category F2 Equipment, in accordance with the applicable requirements set out in Appendix 3H [A/V and Video Conferencing Standard] as follows:

7.8.14.1(1)(a) for rooms identified as "projection system room" in the Clinical Specification, Column 3 of Table 1 (Projector Only Meeting Room);

7.8.14.1(1)(b) for rooms identified as "small video-conference room" in the Clinical Specification:

(b).1 Section 4 (Video Conferencing Infrastructure); and

(b).2 Column 5 of Table 1 (Small Video Conference Room);

7.8.14.1(1)(c) for rooms identified as "large video-conference room" in the Clinical Specification:

(c).1 Section 4 (Video Conferencing Infrastructure); and

(c).2 Column 6 of Table 1 (Large Video Conference Room); and

7.8.14.1(1)(d) for rooms identified as "video-conferencing infrastructure" in the Clinical Specification:

(d).1 Section 4 (Video Conferencing Infrastructure); and

(d).2 Column 7 of Table 1 (Video Conferencing Infrastructure Only).

The above-noted rooms are identified in the “remarks” column in the relevant schedules of accommodation in the Clinical Specification.

7.8.14.1(2) Retain audio visual professionals with expertise and experience in the application, use and integration of audio/video conferencing systems for the design, configuration and integration of the required videoconference rooms and systems.

7.8.14.2 Quality Requirements

7.8.14.2(1) Comply with all applicable standards and codes, including the latest IP based video conferencing standards or the latest high speed common standard.

7.8.14.2(2) Audio quality will be comparable to voice quality found in typical PSTN voice networks. Video quality will be high definition (720p) and synchronized with the audio content. Video conference systems will allow for adjustments of compression and audio and video quality to accommodate for bandwidth management.

7.8.14.3 Performance Criteria

7.8.14.3(1) Design and construct videoconference rooms and locate microphones, video cameras, video monitors, lighting systems and sound attenuation structures/materials to optimize the performance of the video conferencing systems.

7.8.14.3(2) Coordinate with the Authority for network access. Video conferencing systems will be configured in consultation with the Authority and adhere to the Authority security and quality of service requirements so not to negatively impact the Authority’s network performance in any way.

7.8.15 Patient Entertainment System

7.8.15.1 Basic Requirements

7.8.15.1(1) The patient entertainment system will consist of televisions and integrated devices as described in this Section 7.8.15. Refer to the Appendix 2E [Furniture and Equipment] for information regarding televisions.

7.8.15.1(2) The patient entertainment system will operate over a physical network other than the Authority’s network described in Section 7.8.1.2(7)(a) of this Schedule. If required to meet the patient entertainment system

vendor's or manufacturer's specifications or necessary to provide system performance acceptable to the Authority acting reasonably, Project Co will provide a separate physical network for the patient entertainment system. Provide any required network equipment and all content, services and programming for the patient entertainment system. All cabling will be via the structured cabling system. The Authority prefers an IP based solution.

7.8.15.1(3) Arrange for the installation of local cable or satellite service (basic cable package) throughout the Facility. Project Co will responsible for the costs of cable installation and the Authority will be responsible for the ongoing cost of the cable service.

7.8.15.1(4) In public spaces and staff spaces:

7.8.15.1(4)(a) provide public television programming (basic cable) and patient education programming throughout the Facility at no charge to Authority staff and the public;

7.8.15.1(4)(b) Authority staff will control the channels/programming via remote control and will be able to change program channels or television inputs for access to patient education programming; and

7.8.15.1(4)(c) provide television outlets and associated power, as a minimum, in all waiting areas, family respite, family lounges and staff lounges.

7.8.15.1(5) At each patient location in all clinical areas including Emergency, NICU, ICU, HDCU, HCU and NU:

7.8.15.1(5)(a) provide an integrated device capable of receiving television programming, patient education resources, clinical applications, internet access; and

7.8.15.1(5)(b) enable integrated devices to access the Authority's network.

7.8.15.1(6) Provision of public television programming (basic cable), enhanced television/film services and internet access through integrated devices represents a revenue sharing opportunity. Provide integrated devices with functionality to allow patients to select and pay for such services.

7.8.15.2 Quality Requirements

7.8.15.2(1) The patient entertainment system will meet the CRTC standards and operate in the 8dBmv to 16dBmv range.

7.8.15.2(2) The minimum quality of integrated devices will be greater than or equal to the standard Authority computer display device at the time of procurement and will have enough processing power for 30 fps of video.

7.8.16 Patient Education System

7.8.16.1 Basic Requirements

7.8.16.1(1) The Authority intends to provide the application services, programs and electronic educational material that will be displayed via the Authority's network on televisions, video conferencing equipment, personal computers or integrated devices.

7.8.16.1(2) The patient education system will function over the TCP / IP Ethernet network and will be selectable via simple menu structure on all patient entertainment devices.

7.8.16.2 Performance Criteria

7.8.16.2(1) The Authority will provide the head end components for this system on the Authority's servers.

7.8.16.2(2) Provide for patient education programming to be displayed on all televisions, videoconference equipment, personal computers and integrated devices.

7.8.17 Central Dictation

7.8.17.1 Basic Requirements

7.8.17.1(1) The Authority intends to provide a central dictation system for the Facility, which will form part of the overall centralized system of the Authority. The file server and storage server is located off Site in the server farm.

7.8.17.2 Performance Criteria

7.8.17.2(1) All telephones will allow staff the ability to dictate onto the central Authority's dictation systems. An access code will be needed to access the dictation system. All dictation stations will be provided with a full featured phone and connect to the PBX via the structured cabling system.

7.8.18 Intercommunication System

7.8.18.1 Basic Requirements

7.8.18.1(1) Local Intercom systems are required at locked entrance doors that delivery personnel or the public will need access through.

7.8.18.1(2) An all-master intercom system will be provided for use in the Pharmacy area for hands-free communication.

7.8.18.2 Quality Requirements

7.8.18.2(1) The local intercom systems will be manufactured by recognized industry leaders in the intercom business.

7.8.18.2(2) All wiring for the intercom system will be part of the structured cabling system.

7.8.18.3 Performance Criteria

7.8.18.3(1) Provide local intercom systems at all locations requiring public or delivery access that may be locked. These systems will connect to the telephone system to allow the intercom to dial up the telephone at the nearest manned reception area. The telephone system will be able to remotely unlock the door.

7.8.18.3(2) Provide a video intercom system at all entrance locations needing more security as determined, in consultation with the Authority, based on the Facility Threat and Risk Assessment.

7.8.18.3(3) Provide programmable all-master intercom system with the following capabilities:

7.8.18.3(3)(a) Loud-speaking full-duplex, hands-free operation.

7.8.18.3(3)(b) Two or three-digit number series.

7.8.18.3(3)(c) Line lockout: A fault on line blocks only extension line concerned.

7.8.18.3(3)(d) Camp-on busy: Automatic recall when busy extension becomes free.

7.8.18.3(3)(e) Priority feature: Incoming calls prevented from being connected “direct-in” and are announced by repeated call tone and flashing pilot lamp until manually accepted.

7.8.18.3(3)(f) All-call: All extensions can initiate or receive all-call.

7.8.18.3(3)(g) Three-way conference call capability.

7.8.18.3(3)(h) Ability to create multiple groups on the same system with blocked access as required by users.

7.8.18.3(3)(i) Minimum of 8 channels or more to ensure no busy signals based on number of stations in system. Provide additional channels after the Facility is occupied if staff experience busy signals.

7.8.18.3(4) Provide desk loud-speaking master station with handset at locations as determined in consultation with the Authority, including:

7.8.18.3(4)(a) each imaging control room; and

7.8.18.3(4)(b) pharmacy dispensing area

7.8.18.3(5) Provide flush wall loud-speaking master station without handset at locations including but not limited to:

7.8.18.3(5)(a) Radiography rooms.

7.8.18.3(5)(b) CT major imaging rooms.

7.8.18.3(5)(c) Ultrasound rooms.

7.8.18.3(5)(d) Physician offices/reading rooms.

7.8.18.3(5)(e) IV mixture area

7.8.19 Real Time Location Systems ("**RTLS**") and Location Systems

7.8.19.1 Basic Requirements

7.8.19.1(1) The Authority is in process of implementing RTLS based applications for a variety of purposes at SMH. These systems will be used for various applications, including:

7.8.19.1(1)(a) equipment location;

7.8.19.1(1)(b) patient location;

7.8.19.1(1)(c) staff location;

7.8.19.1(1)(d) staff/patient interactions; and

7.8.19.1(1)(e) room utilization.

7.8.19.1(2) Project Co will design, procure, install and test systems and infrastructure to support a Facility-wide RTLS system.

7.8.19.1(3) The Authority's preference is that the RTLS system use software that is compatible with the other locating software in use at SMH. Refer to Appendix 3I [IM/IT Preferred Vendors].

7.8.19.1(4) Determine, in consultation with the Authority, the number of tags required for the RTLS system and provide all required RTLS tags. At a minimum, provide the following numbers of tags:

7.8.19.1(4)(a) 500 staff tags;

7.8.19.1(4)(b) 700 patient tags;

7.8.19.1(4)(c) 200 equipment tags; and

7.8.19.1(4)(d) 20 temporary tags.

7.8.19.2 Quality Requirements

7.8.19.2(1) Provide an RTLS manufactured by a recognized industry leader in the RTLS business.

7.8.19.2(2) All wiring for the RTLS will be part of the structured cabling system.

7.8.19.2(3) Tags must have a minimum of 12 months of battery life in a typical usage scenario.

7.8.19.3 Performance Criteria

7.8.19.3(1) The RTLS must provide the following functionality:

7.8.19.3(1)(a) tracking of patient locations in all areas within the Facility to room level;

7.8.19.3(1)(b) patient tags must be non-line of sight and must work when covered with bed sheets and shirt sleeves;

7.8.19.3(1)(c) alerting based on patient location, patient proximity to location, patient duration in location and patient proximity to other tagged items or persons;

7.8.19.3(1)(d) tracking of equipment within the Facility by floor, within a 4m x 4m or smaller area. The equipment tracking system must update every 20 seconds or better;

7.8.19.3(1)(e) alerting for equipment based on one or more of:
(e).1 location within the Facility;
(e).2 movement within the Facility;
(e).3 temperature outside defined bounds;

(e).4 quantity of devices or lack thereof within a given location/area in the Facility (for example a low number of wheelchairs or a large number of infusion pumps requiring cleaning);

7.8.19.3(1)(f) reporting on tag and RTLS infrastructure health and availability;

7.8.19.3(1)(g) reporting on tag movement and tag location relative to other tag locations;

7.8.19.3(1)(h) reporting on tag button press and alerting based on button press;

7.8.19.3(1)(i) tags must be submersible and cleanable within the Authority's infection control standards;

7.8.19.3(1)(j) tags must support configuration in "always on" mode;

7.8.19.3(1)(k) tags must have a visual alerting option (LED or light on tag);

7.8.19.3(1)(l) tags must have multiple attachment options, including integration with patient wrist bands and staff ID badge lanyards; and

7.8.19.3(1)(m) RTLS must integrate with Meditech systems, using HL7 messaging, to import/export patient information and location information.

7.8.19.3(2) Design the RTLS to include features that assist the Authority to achieve the highest possible tag recovery rate.

7.8.19.3(3) For the Emergency Department only, the RTLS must:

7.8.19.3(3)(a) provide tracking of patients within specific care areas identified by the Authority within a 2m x 2m or small area (areas may not be separated by walls); tracking of patients must be 100% accurate and the patient tracking system must update every 3 seconds or better; and

7.8.19.3(3)(b) be flexible and allow for reconfiguration to respond to Emergency Department care space changes.

7.8.19.3(4) Provide a RTLS or threshold alarm based system capable of contributing to the prevention of infant abductions from the NICU and

maternity departments in the Facility, including the following capabilities:

7.8.19.3(4)(a) patient location tracking;

7.8.19.3(4)(b) patient location reporting; and

7.8.19.3(4)(c) integration with nurse call and BMS systems to allow activation of equipment and building systems, including alarms, lights and door locks.

7.8.19.3(5) Provide for staff work flow analysis by providing RTLS coverage in specific room locations (determined in consultation with the Authority) to enable time-in-room tracking for staff. Examples of rooms that should be considered for RTLS coverage include nursing stations, medication stations, utility rooms and patient rooms.

## 7.9 Electronic Safety and Security (Division 28)

### 7.9.1 General

7.9.1.1 Ensure a safe environment for staff, patients and visitors by proper utilization of electronic access control, video monitoring and intrusion detection systems.

### 7.9.2 Fire Alarm System

#### 7.9.2.1 Basic Requirements

7.9.2.1(1) Provide a Simplex 4100U fire alarm system for the Facility and ensure that that system meets or exceeds the requirements in this Section 7.9.2.

7.9.2.1(2) Provide a complete two stage (general and evacuation), supervised, 24 VDC fire detection and alarm system that includes addressable, intelligent, automatic and manual initiation devices and audio/visual alarm devices with voice evacuation capabilities. Alarm activation will be initiated by manual pull stations, smoke / heat detection, and fire sprinkler water flow devices. Alarm indication will consist of visual and combination visual/audible devices.

7.9.2.1(3) The fire alarm system will comply with all applicable standards, including:

7.9.2.1(3)(a) Can/UL S524 Standard for Installation of Fire Alarm Systems;

7.9.2.1(3)(b) Can/UL S537 Standard for Verification of Fire Alarm Systems;

7.9.2.1(3)(c) applicable NFPA Codes; and

7.9.2.1(3)(d) Elevator Code CAN3-B44.

7.9.2.2 Performance Criteria

7.9.2.2(1) Install all fire alarm wiring in conduit. Provide two hour rated cable where required to meet survivability requirements of NFPA 72.

7.9.2.2(2) Provide addressable smoke detectors as required, self correcting analog type to maintain consistent sensitivity.

7.9.2.2(3) All Facility addressable fire alarm devices, fire alarms and fire troubles will be incorporated on the Authority's network True Site computers. Ensure that the Facility's fire alarm panel devices and internal trouble condition details print out on the Authority's network True Site printers.

7.9.2.2(4) Provide manual pull stations at all exit doors and entrances to exit stairs as required.

7.9.2.2(5) Provide visual notification devices at all corridors, public spaces, public, patient and staff toilets and common use spaces.

7.9.2.2(6) Provide fire alarm speakers throughout the Facility as required. Speaker system will be available to announce alarm conditions and for use as public address announcements. Provide microphone at main reception desk, with telephone interface, for use of the speaker system. Pre-programmed messages will be transmitted over overhead paging system to annunciate origin of alarm. Any program sources on paging system will be muted while alarm messages are transmitted. Unless otherwise approved in advance by the Authority, make general public address announcements over the fire alarm paging system only for Facility evacuation purposes.

7.9.2.2(7) Use combination audible alarm and visual notification devices where applicable.

7.9.2.2(8) Include control devices and connection to close fire and smoke doors on activation of alarm condition.

7.9.2.2(9) Incorporate smoke control systems with control fans and dampers.

7.9.2.2(10) Provide a minimum of 2 isolation modules per floor for alarm circuits to isolate wire to wire shorts.

7.9.2.2(11) Provide a graphic annunciator complete with LCD display at the main reception area for the Facility, as required and approved by the local fire department. Upgrade all graphic annunciator panels and screens located at SMH to reflect the addition of the Facility. Ensure that the

SMH Campus mimic board displays the fire alarm and fire trouble conditions for the Facility. Replace the central fire response panel for SMH (as may be required by the fire department), at a location acceptable to the fire department and the Authority.

7.9.2.2(12) Provide LED type indicators for remote indication that a heat and/or smoke detector has been activated in a lockable room (located outside room adjacent to door), in an elevator shaft (located at elevator lobby ceiling) or duct sensors that are not readily visible (located on ceiling or at visible location nearest to sensor installation).

7.9.2.2(13) Provide a computer work station in maintenance department.

7.9.2.2(14) The fire alarm control panel (FACP), remote annunciators and printers will indicate general alarm and trouble conditions.

7.9.2.2(15) Provide gel electrolyte type batteries with overcharge protection for FACP and all transponders. Provide solid state battery charger(s) with capacity to recharge entire battery system in 4 hours. Batteries will have enough capacity (with 25 percent spare time) to operate entire system (except magnetic door holders) in accordance with the BC Building Code.

7.9.2.2(16) Include transmission of alarm signal to remote emergency response centre approved by the Authority.

7.9.2.2(17) Provide and connect interface to SMH's central monitoring system. The Facility's fire alarm system will be seamlessly integrated with the existing SMH fire alarm system.

7.9.3 Electronic Security Systems

7.9.3.1 General

7.9.3.1(1) Design, provide and install a security system to meet the Authority's security programs within a healthcare facility campus environment.

7.9.3.1(2) Provide fully networked integrated security systems to protect staff, patients, visitors and property. As part of this security management program, at a minimum, provide a closed circuit television system to view and record events, an access control system to restrict access to secure areas to authorized personnel only, intrusion alarm detection systems to detect and report unauthorized entry into protected spaces, and a Facility wide panic duress system (wired and wireless) to protect staff.

7.9.3.1(3) Develop the Facility design based on the Facility Threat and Risk Assessment (refer to Sections 4.10 and 5.3(d)(10) of Schedule 2 [Design and Construction Protocols]).

7.9.3.1(4) All security systems will reside on a VLAN as part of the Authority's information technology infrastructure connected via the structured cabling system and network devices to allow the Authority the opportunity to review events and monitor the status of security systems from off-site locations. The system will be fully accessible through the Authority's network.

7.9.3.1(5) Security system will be scalable to allow for future additions and interconnections of many devices and subsystems from different manufacturers.

7.9.3.1(6) The security system will incorporate commercial off-the–shelf equipment and proven designs from manufacturers regularly engaged in the production of models and types of equipment used in the security industry. Products will be quality control tested and verified for the intended operation prior to installation at site.

7.9.3.1(7) All materials, including hardware and software provided will be new and most current version or production model.

7.9.3.1(8) Electronic security systems will maintain dependability and reliability under all operational environmental conditions, capable of 24 hours per day, seven days per week continuous operation.

7.9.3.1(9) Interconnect security systems to the fire alarm system as required by applicable Laws or standards.

7.9.3.1(10) Arrange meetings with the Authority to coordinate system interconnections and programming requirements to integrate with the Authority’s Lenel equipment infrastructure.

7.9.3.1(11) Train Authority staff on the use and operation of security systems and location of all security devices. Coordinate and schedule training with the Authority.

7.9.3.2 Access Control

7.9.3.2(1) Basic Requirements

7.9.3.2(1)(a) The Authority intends to maintain and manage a central “off-site” Lenel access control head-end server and database for administration and programming of card access at various healthcare

facilities under the Authority's jurisdiction throughout the region.

7.9.3.2(1)(b) Provide an access control system for the Building and parkade that is PC based, interconnected and integrated to the Lenel card access system to lock and unlock doors via time schedule and card readers utilizing proximity field effect technology to grant or restrict access to employees via a programmable classification system with sufficient capacity to handle at minimum 25,000 regional employees down to the field panel level ,and operate over a standard TCP / IP Ethernet network.

7.9.3.2(2) Performance Criteria

7.9.3.2(2)(a) Card access system will utilize a file server and allow multiple workstations to access this file server for control and annunciation purposes. All alarms will be annunciated at the Building security call centre / alarm management centre (located off-site), but will allow concurrent remote monitoring capability both on and off-site.

7.9.3.2(2)(b) The access control system will be complete with mapping capability, which will be implemented.

7.9.3.2(2)(c) Each access controlled door will have a local sounder to enunciate door held open and door forced open alarms.

7.9.3.2(2)(d) The access control system will function at the field controller level without connection to the PC Host or gateway. All field controllers will be connected by TCP/IP using the structured cabling plant.

7.9.3.2(2)(e) The access control system will have the capability to lock down departments or other areas identified by the Authority (such as the acute zones, pediatrics, mental health and RAZ subdepartments in the Emergency Department) in the event of an emergency or per an established schedule on a door by door basis or global command. Determine and program final access control system configuration in consultation with the Authority.

7.9.3.2(2)(f) The access control system will use proximity type readers and will be capable of reusing all existing

cards presently distributed across the Authority. The access control system will be compatible with the Authority's existing systems to allow existing Authority cards to work on the system and allow new cards for the Facility to work on systems in the rest of the Authority's regions. Coordinate base programming requirements for access cards in the Facility's system with the Authority.

7.9.3.2(2)(g) Provide interconnectivity and interface access equipment panels and controllers to Lenel system and head-end equipment for seamless operation.

7.9.3.2(2)(h) Provide five hundred (500) blank HID ISO Prox II proximity cards for Authority staff. Consult with the Authority on card numbering sequence and format before ordering cards to ensure compatibility with existing cards and equipment.

7.9.3.2(2)(i) Determine, in consultation with the Authority, the location of access control doors and door alarms within the Facility. Provide card readers, locking hardware, request-to-exit devices, door position/alarm contacts with all associated mechanical and electric hardware and field devices, including power supplies for a fully operational system. Areas requiring access control doors and door alarms include:

(i).1 main entrances;
(i).2 pharmacy, drug storage & medication rooms;
(i).3 departmental main entrances;
(i).4 UBC Videoconference Rooms (refer to Appendix 3B [UBC Videoconference Room Specifications]);
(i).5 entrances to locker change rooms;
(i).6 telecom equipment/server rooms & equipment rooms;
(i).7 computer rooms;
(i).8 conference rooms;
(i).9 theatre;
(i).10 elevators (public & service);
(i).11 parking entrances;
(i).12 Helipad; and
(i).13 areas designated as high risk by the Authority.

7.9.3.2(2)(j) Provide combination pin code/proximity card readers at all access/egress locations to/from all strictly controlled areas identified by the Authority, such as:
(j).1 ambulance entrance(s);
(j).2 ambulance patient transport locations; and
(j).3 pharmacy/narcotic locations.
Combination pin code/proximity card readers will be fully integrated into the Facility's access control platform (stand alone, non-integrated pin pads are not acceptable). Combination pin code/proximity card readers will facilitate access by the following methods:
(j).4 pin code only;
(j).5 card read only; and
(j).6 pin code and card read.

7.9.3.2(2)(k) Provide pan/tilt colour video intercom communications between the secure side of main entry doors and reception/care stations in departments and areas that are strictly controlled. Provide momentary remote pushbutton operation to release main entry doors when activated by staff or security personnel.

7.9.3.2(2)(l) Provide delayed egress operation and alarms at emergency exit doors; alarms to annunciate both locally and via the integrated access system.

7.9.3.2(2)(m) Interconnect and interface all electronically controlled doors for remote "lock & unlock" capability through the Lenel access control system on a door-by-door or global command basis.

7.9.3.2(2)(n) Provide clear signage indicating entry procedures. Consult with the Authority for appropriate and acceptable wording.

7.9.3.2(2)(o) All security alarms will be logged for a minimum period of 30 days. Logging system will be capable of external archiving/backup on compact disc or DVD in order to extend the event info storage duration.

7.9.3.2(2)(p) Security recording will provide, as a minimum, the following information for each alarm:
(p).1 date;
(p).2 time;
(p).3 device identification;

(p).4 descriptive code;
(p).5 user/cardholder ID (when applicable); and
(p).6 acknowledgement and action taken (when applicable).

7.9.3.2(2)(q) Provide interconnection access to the applicable control and reporting capabilities included with the Continuum platform to security workstations located in:
(q).1 the Facility's main entrance lobby; and
(q).2 the Emergency Department.

7.9.3.2(2)(r) Provide a maintenance/administration workstation (MAW) PC complete with operating & application software, monitor, keyboard, mouse and interconnection to the security system network. Locate main MAW in a secure space, accessible to authorized personnel and Authority staff.

7.9.3.3 Panic Duress System

7.9.3.3(1) Basic Requirements

7.9.3.3(1)(a) Provide wired and wireless panic duress systems to operate in tandem in appropriate areas throughout the Facility in accordance with the level of security risk in each location.

7.9.3.3(2) Performance Criteria

7.9.3.3(2)(a) Provide wired panic duress system for staff with buttons to initiate emergency assistance calls in areas of the Facility as determined in consultation with the Authority, including:
(a).1 main lobby reception/security kiosk;
(a).2 each department nurse station and sub station;
(a).3 care/sub-care station reception desks;
(a).4 each strictly controlled clinical station & main reception area;
(a).5 medication rooms & narcotics vault;
(a).6 isolated work stations (night use);
(a).7 each interview room;
(a).8 imaging exam rooms (including but not limited to general radiology, CT and ultrasound;
(a).9 staff locker rooms and showers;

(a).10 seclusion and secure rooms;
(a).11 decontamination room;
(a).12 triage desks;
(a).13 trauma rooms;
(a).14 grieving rooms;
(a).15 parkade & parking lots (locate so that a button is within [30] meters of a person anywhere in the parking lot /parkade; parking lot duress alarms may be located on light poles); and
(a).16 areas designated as high risk by the Authority.

7.9.3.3(2)(b) Duress buttons will be strategically located, suitably sized and identified/clearly labelled for “security emergency”.

7.9.3.3(2)(c) Provide wireless systems, including all antennae/receivers to supplement the installation of fixed wired panic duress systems for reliable and dependable operation under all operational environmental conditions. Wireless systems will not be affected by or interfere with any equipment in use in the Facility or SMH. Provide six wireless transmitter pendants per Authority department.

7.9.3.3(2)(d) The panic duress system will report the alarm location to the remote Authority ULC central call centre and simultaneously enunciate a local audible and visual alarm sufficient so that it may be seen and heard by all staff throughout all areas of the applicable Authority department.

7.9.3.4 Intrusion Detection

7.9.3.4(1) Basic Requirements

7.9.3.4(1)(a) Intrusion detection systems will be installed in all areas where protection of physical assets is critical.

7.9.3.4(2) Performance Criteria

7.9.3.4(2)(a) The intrusion detection system(s) will utilize industry proven devices for intrusion alarm detection and reporting capable of 24 hours per day, seven days per week continuous operation, with battery backup operation in the event of power outages.

7.9.3.4(2)(b) Provide intrusion detection system(s) including alarm controllers, local keypads, motion sensors, shock sensors, glass break sensors, door contacts, strobes, sirens and other alarm initiating devices as needed for a reliable and fully operational system(s).

7.9.3.4(2)(c) Control each system with keypad(s) located inside the department or area being protected.

7.9.3.4(2)(d) Local alarm controllers will be integrated with the access control system as well as reporting off Site via standard telephone lines to the Authority's central monitoring building and / or to the Authority's choice of central monitoring building providers. Each panel will report via its own phone line through a B2 analogue DID.

7.9.3.4(2)(e) Install intrusion detection systems in all areas where protection of physical assets is critical including:

(e).1 pharmacy & narcotics rooms;
(e).2 office suites (human resources administration, etc);
(e).3 health records storage;
(e).4 stores (shipping/receiving);
(e).5 UBC Videoconference Rooms (refer to Appendix 3B [UBC Videoconference Room Specifications];
(e).6 videoconference rooms;
(e).7 data centers (server, telecom equipment & computer rooms);
(e).8 cash offices; and
(e).9 areas designated as high risk by the Authority.

7.9.3.4(2)(f) Duress alarm points will inter-connect to intrusion alarm system and separately report duress/panic alarms to the Authority’s contracted service provider’s central station to allow security monitoring staff to individually identify the location point and origin of the alarm.

7.9.3.4(2)(g) Intrusion alarm system and all associated alarm panels must be compatible and remotely programmable from existing Authority system equipment.

7.9.3.5 CCTV

7.9.3.5(1) Basic Requirements

7.9.3.5(1)(a) Provide CCTV throughout the Facility, including the underground parkade and exterior areas for the purpose of viewing and recording video to enhance the level of security and assist Authority staff in providing a safe environment for patients, staff, visitors and the general public while protecting the physical assets.

7.9.3.5(1)(b) Provide a separate physical network and any required network equipment for the CCTV system.

7.9.3.5(1)(c) Areas which have CCTV cameras installed will have signage posted at the main entrances to the Building. The signage will notify the public that this area is under video surveillance. CCTV processes will be governed by the Public Surveillance System Privacy Guidelines for the Province of BC as well as the Freedom of Information and Protection of Privacy Act (British Columbia).

7.9.3.5(1)(d) 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.

7.9.3.5(2) Performance Criteria

7.9.3.5(2)(a) Provide CCTV cameras at locations determined in consultation with the Authority, including:

(a).1 main entrances & exits to the Facility;
(a).2 entrance and exit corridors to all departments;
(a).3 public lobbies and waiting areas;
(a).4 pharmacy and associated entry doors;
(a).5 NICU;
(a).6 emergency department;
(a).7 elevator lobbies (public &service);
(a).8 parkade entrances and exits, exterior locations for viewing parking areas;
(a).9 perimeter walkways and walkways connecting to other buildings on campus;
(a).10 public thoroughfares and walkways;

(a).11 Helipad;
(a).12 high profile areas such as gift shops;
(a).13 cafeterias; and
(a).14 cash offices or areas where cash is exchanged.

7.9.3.5(2)(b) All entry and exit points to strictly controlled high risk departments and associated areas require recorded video surveillance integrated to the CCTV security system. Provide 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.

7.9.3.5(2)(c) Provide CCTV equipment to monitor and record the specific identity of all persons entering and exiting the Building's main entrance, corridor/links and utilizing elevators in strictly controlled high risk departments and associated areas, as identified in consultation with the Authority.

7.9.3.5(2)(d) System(s) will be a software-based virtual matrix using the structured cable plant for transmission and recording of images.

7.9.3.5(2)(e) Provide the appropriate encoding/decoding capability to support 2 way (video and control) communications with any and all CCTV camera, individually and/or in predetermined clusters via the security Ethernet infrastructure.

7.9.3.5(2)(f) Provide digital CCTV system consisting of digital colour CCTV cameras, colour monitors located as needed, digital PC based video recorder (network video recorder) 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 in real time. All cameras will be IP addressable or use protocol converters as required. At a minimum, the system will include super-dynamic digital cameras.

7.9.3.5(2)(g) Provide video storage capacity for minimum of 30 days at four frames per second, minimum 4CIF

resolution. Provide file servers, workstations, and optical storage devices 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.

7.9.3.5(2)(h) CCTV system will integrate with access control, panic stations, intercoms and intrusion detection to allow for higher recording rates during alarm conditions.

7.9.3.5(2)(i) CCTV display and review system will be network-based client application allowing for authorized users to remotely view, control and manage all aspects of the CCTV system across the network. System will have network and web access for remote monitoring, using predefined user authentification.

7.9.3.5(2)(j) Display and review for all the cameras will be accessible through dual screen workstations located in the security office/kiosk located in the Emergency Department, the security office/kiosk located in the Facility's main lobby and the backup position in the facilities management call centre. Provide CCTV workstations with all required operating and application software, monitors, keyboard, mouse with interconnection to security system network.

7.9.3.5(2)(k) Provide color high-resolution, high sensitivity (day/night) fixed smoke dome type with an auto iris fixed dome cameras with auto-iris lens operation. Mounting will be appropriate for the environment, unobtrusive, matching colour with hidden cabling. Fixed cameras will be vandal resistant wall mounted and / or mounted at protective locations and heights.

7.9.3.5(2)(l) 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.

7.9.3.5(2)(m) Outdoor cameras will be complete with weatherproof housing and internal heater/ defroster/blower/wiper

as required for suitable operation under varying environmental conditions.

7.9.3.5(2)(n) Cameras will not be set up in private areas such as patient rooms, treatment rooms or clinical areas (unless specifically identified for use by clinical department staff), locker rooms or washrooms. Cameras will not be placed or reviewed for the purpose of observing work performance of employees.

## PART 8. SITE AND INFRASTRUCTURE SUBGROUP SPECIFICATIONS

### 8.1 Exterior Improvements (Division 32)

8.1.1 Aggregate Base Courses

8.1.1.1 Basic Requirements

8.1.1.1(1) Utilize granular sub-base for stability of surface treatment through freeze thaw cycles and for its ability to store rainwater.

8.1.1.2 Performance Criteria

8.1.1.2(1) Exceed limits defined by regional average freeze thaw cycles averaged over a twenty year period.

8.1.2 Asphalt Paving

8.1.2.1 Basic Requirements

8.1.2.1(1) Utilize asphalt paving in areas where vehicle traffic and snow clearing equipment require a smooth surface for travel.

8.1.2.2 Performance Criteria

8.1.2.2(1) Asphalt mix is to be suitable for use in climatic conditions found at the Site.

8.1.3 Unit Paving on Sand Bed

8.1.3.1 Basic Requirements

8.1.3.1(1) Utilize unit pavers in areas where a high level of finish is desired and/or a requirement for removal and replacement of paved surface in the future.

8.1.4 Concrete Paving

8.1.4.1 Basic Requirements

8.1.4.1(1) Utilize concrete paving in areas that require firm, long lasting hard surfaces for activities such as pedestrian pathways, loading docks and Building entrances.

8.1.5 Exterior Site Furnishings

8.1.5.1 Basic Requirements

8.1.5.1(1) Provide the following exterior furnishings: wood benches, garbage containers, bicycle racks and wood landscape curbs.

8.1.5.2 Performance Criteria

8.1.5.2(1) Select products for their suitability and durability in the climatic conditions found at the Site.

8.1.6 Growing Medium

8.1.6.1 Basic Requirements

8.1.6.1(1) Provide a growing medium with a mixture of mineral particulates, micro organisms and organic matter which will provide a suitable medium for supporting plant growth.

8.1.6.2 Performance Criteria

8.1.6.2(1) Seed mix will have demonstrated suitability to the climatic and soil conditions found at the Site.

8.1.7 Sodding

8.1.7.1 Basic Requirements

8.1.7.1(1) Provide sod in areas near Building entrances, and outdoor patio spaces to provide a usable surface.

8.1.7.2 Performance Criteria

8.1.7.2(1) Use number one turf grass nursery sod that has been sown and cultivated in nursery fields as turf grass crop in climatic zone comparable to the Site.

8.1.8 Trees, Shrubs and Ground Cover Planting

8.1.8.1 Basic Requirements

8.1.8.1(1) Provide plantings to support the landscape design by reinforcing spatial relationships and way-finding. The plant selection and placement will address micro-climates surrounding the Facility and mitigation of heating and cooling loads.

8.1.8.2 Performance Criteria

8.1.8.2(1) Select and place trees, shrubs and ground covers to mitigate temperature fluctuations and winds.

8.1.8.2(2) Retain any healthy existing trees that do not conflict with the development and site grading.

8.1.8.2(3) Engage an arborist to evaluate existing trees.

8.1.8.2(4) Select trees, shrubs and ground covers from species that are indigenous or adapted to the region.

8.1.8.2(5) Plants will comply with the current edition of the BC Landscape Standard, published by the BC Society of Landscape Architects and the BC Landscape and Nursery Association. Plant material will be grown in Zone 5 in accordance with Plant Hardiness Zones in Canada.

## 8.2 Utilities (Division 33) – Not used