

SCHEDULE 3
DESIGN AND CONSTRUCTION SPECIFICATIONS

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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 7.5;

“**Building**” means the building(s) to be constructed on the Site under this Agreement, and includes all additions and improvements thereto over the term of this Agreement;

“**Clinical Specification**” has the meaning set out in Section 2.2.1 of this Schedule;

“**CPTED**” means Crime Prevention Through Environmental Design;

“**Data Room**” means the website established by the Authority and containing documents related to the Project;

“**Hospital**” means the existing University Hospital of Northern British Columbia (formerly Prince George Regional Hospital);

“**Indicative Design**” has the meaning set out in Section 2.3.1 of this Schedule; and

“**Radiation Therapy Vaults**” means the radiation therapy vaults to be included in the Facility and within which the dual energy linear accelerators will be installed.

1.2 Overview

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

1.3 Interpretation

1.3.1 In this Schedule:

1.3.1.1 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 cancer facility who balances capital costs against maintenance, operations, clinical efficiency and other non capital costs over the life of the facility; and

- 1.3.1.2 the word “provide” is to be construed as including all necessary Design and Construction except to the extent the context or the express provision otherwise requires.

1.4 Acronym List

- 1.4.1 AFUE - Annual Fuel Utilization Efficiency
- 1.4.2 ANSI - American National Standards Institute
- 1.4.3 ASHRAE - American Society of Heating, Refrigerating and Air-conditioning Engineers
- 1.4.4 ASME - American Society of Mechanical Engineers
- 1.4.5 ASPE - American Society of Plumbing Engineers
- 1.4.6 ASTM - American Society for Testing and Materials
- 1.4.7 BCICA - British Columbia Insulation Contractors Association
- 1.4.8 BCLNA - British Columbia Landscape & Nursery Association
- 1.4.9 BCSLA - British Columbia Society of Landscape Architects
- 1.4.10 BICSI - Building Industry Consulting Service International
- 1.4.11 BMS - Building Management System
- 1.4.12 CCTV – Closed Circuit Television
- 1.4.13 CEC – Canadian Electrical Code
- 1.4.14 CGA - Compressed Gas Association
- 1.4.15 CISCA - Ceiling Interior Systems Construction Association
- 1.4.16 CPU – Central Processing Unit
- 1.4.17 CRTC – Canadian Radio-television and Telecommunications Commission
- 1.4.18 CSA - Canadian Standards Association
- 1.4.19 DDC - Direct Digital Controls
- 1.4.20 DISS - Diameter Index Safety System
- 1.4.21 EHR - Electronic Health Record
- 1.4.22 HAZMAT - Hazardous Materials
- 1.4.23 HEPA - High Efficiency Particulate Air

- 1.4.24 HVAC - Heating, Ventilating and Air-Conditioning
- 1.4.25 IEEE - Institute of Electrical and Electronic Engineers
- 1.4.26 LDRP – Labour Delivery Recovery and Post-Partum
- 1.4.27 MPI – Master Painters Institute
- 1.4.28 NEMA - National Electrical Standards Association
- 1.4.29 NFPA - National Fire Protection Association
- 1.4.30 NTSC – National Television Standards Committee
- 1.4.31 OS&Y - Open Stem and Yoke
- 1.4.32 PACS - Picture Archiving and Communication System
- 1.4.33 PBX – Private Branch Exchange
- 1.4.34 PoE – Power Over Ethernet
- 1.4.35 SMACNA – Sheet Metal and Air Conditioning Contractors National Association
- 1.4.36 STC – Sound Transmission Class
- 1.4.37 TTMAC – Terrazzo and Tile Manufacturers Association of Canada
- 1.4.38 TVOC – Total Volatile Organic Compounds
- 1.4.39 ULC - Underwriters’ Laboratories of Canada
- 1.4.40 UPS – Uninterruptible Power Supply
- 1.4.41 VFD - Variable Frequency Drive
- 1.4.42 VLAN – Virtual Local Area Network
- 1.4.43 VOC – Volatile Organic Compounds
- 1.4.44 VoIP – Voice Over Internet Protocol
- 1.4.45 WAP2 – Wireless Application Protocol 2

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;
 - 2.1.1.3(3) the community; and
 - 2.1.1.3(4) the Hospital.
 - 2.1.1.4 in accordance with Good Industry Practice; and
 - 2.1.1.5 to the same standards that an experienced, prudent, and knowledgeable long term owner of a first class health care facility in North America, whether to be operated publicly or privately, would employ.
- 2.1.2 If more than one of the above standards is applicable then the highest of 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 the standards listed in this Section, which is not intended to be an exhaustive list:
- 2.1.4.1 BCICA Quality Standards Manual for Mechanical Insulation, latest edition
 - 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;
 - 2.1.4.2(7) 135-2004: Data Communication Protocol for Building Automation & Control Networks; and

- 2.1.4.2(8) 52.1-1992: Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
- 2.1.4.3 ASHRAE:
 - 2.1.4.3(1) Handbooks: 2005 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 ASPE Plumbing Engineering Design Handbook, Volumes 1-4
- 2.1.4.6 ASTM:
 - 2.1.4.6(1) A185-06 - Standard Specification for Steel Welded Wire Fabric;
 - 2.1.4.6(2) A82/A82M-05 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement;
 - 2.1.4.6(3) ASTM C568-03 - Standard Specification for Limestone Dimension Stone;
 - 2.1.4.6(4) ASTM C615-03 - Standard Specification for Granite Dimension Stone;
 - 2.1.4.6(5) ASTM C503-05 - Standard Specification for Marble Dimension Stone;

- 2.1.4.6(6) ASTM C616-03 - Standard Specification for Quartz-Based Dimension Stone;
- 2.1.4.6(7) BCSLA and BCLNA - BC Landscape Standard – Current Edition; and
- 2.1.4.6(8) ASTM B88-03 Standard Specification for seamless copper water tube.
- 2.1.4.7 CGA - P-2.1: Standard for Medical / Surgical Vacuum Systems in Hospitals
- 2.1.4.8 CSA
 - 2.1.4.8(1) B52-05: Mechanical Refrigeration Code;
 - 2.1.4.8(2) B51-2003: Boiler, Pressure vessel and Pressure Piping Code;
 - 2.1.4.8(3) B139-04: Installation Code for Oil Burning Equipment;
 - 2.1.4.8(4) B149.1-05: Natural Gas and Propane Installation Code;
 - 2.1.4.8(5) B651-95: Barrier Free Design;
 - 2.1.4.8(6) Z7396.1-06 “Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases and Vacuum;
 - 2.1.4.8(7) Design the medical gas systems to meet the most current CSA standard except where certification under CAN/CSA – Z305.1-92 is/or can be compromised;
 - 2.1.4.8(8) Z7396.2-06 “Medical Gas Pipeline Systems – Part 2: Anaesthetic Gas Scavenging;
 - 2.1.4.8(9) Z317.2-01: Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities;
 - 2.1.4.8(10) Z318.0-93: Commissioning of Health Care Facilities;
 - 2.1.4.8(11) Z318.1-95: Commissioning of HVAC Systems in Health Care Facilities;
 - 2.1.4.8(12) A23.4-05 - Precast Concrete - Materials and Construction;
 - 2.1.4.8(13) W186-M1990 (R2002) - Welding of Reinforcing Bars in Reinforced Concrete Construction;
 - 2.1.4.8(14) A370-04 - Connectors for Masonry;
 - 2.1.4.8(15) A23.1-04/A23.2-04 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete; and

- 2.1.4.8(16) S832-06 – Seismic Risk Reduction of Operational and Functional Components (OFCS of buildings).
- 2.1.4.9 NFPA
 - 2.1.4.9(1) 10-2002: Standard for Portable Fire Extinguishers;
 - 2.1.4.9(2) 13: Standard for the Installation of Sprinkler Systems
 - 2.1.4.9(3) 50: Bulk Oxygen Systems;
 - 2.1.4.9(4) 56F: Non-flammable Medical Gas System;
 - 2.1.4.9(5) 90A - Current Edition: Standard for Installation of Air Conditioning and Ventilation Systems;
 - 2.1.4.9(6) 92A - Current Edition: Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences; and
 - 2.1.4.9(7) 101 - Current Edition: Life Safety Code
- 2.1.4.10 Master Municipal Construction Document (MMCD) latest edition;
- 2.1.4.11 BC Supplement to TAC Geometric Design Guide latest edition;
- 2.1.4.12 the Authority's Design Criteria for High Energy Radiation Therapy Vaults;
- 2.1.4.13 Hand Washing Standards, BCCA Infection Control, September 30, 2008; and
- 2.1.4.14 Alcohol-based Hand Rub (ABHR) Dispenser Placement Guidelines, Appendix of PHSA Hand Hygiene Campaign Toolkit, PHSA Infection Prevention and Control.

2.2 Clinical Specifications

- 2.2.1 Attached as Appendix 3A is the "Northern Cancer Centre Clinical Specification" dated March 17, 2009 (the "**Clinical Specification**").
- 2.2.2 Project Co will design and construct the Facility:
 - 2.2.2.1 so that it accommodates all of the spaces, activities, functions, design features and agencies described in the Clinical Specification; and
 - 2.2.2.2 so that it meets or exceeds 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.
- 2.2.3 Notwithstanding anything in the Clinical Specification, Project Co will design and construct the Facility, including with sufficient space, as necessary for the operation and maintenance of the Facility and for Project Co to perform the Services in accordance with this Agreement.

2.3 Indicative Design

- 2.3.1 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.
- 2.3.2 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.
- 2.3.3 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.

2.4 Commercial Opportunities

- 2.4.1 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 and be capable of being cost effectively converted for healthcare use or readily demolished at the option of the Authority.

PART 3. DESIGN PRINCIPLES

3.1 Site Development

- 3.1.1 Address the following design principles in the Design of the Site:
- 3.1.1.1 physical safety and security;
 - 3.1.1.2 way-finding and legible connections between facilities;
 - 3.1.1.3 pedestrian and vehicular access and parking;
 - 3.1.1.4 the need for physical and visual access to nature from patient care areas, visitor areas and staff work areas;
 - 3.1.1.5 micro-climatic effects on patient, staff and visitor comfort and safety of building location and orientation, sheltering of building walkways and building entrances and access to daylight throughout the year in outdoor spaces;
 - 3.1.1.6 provide adequate space for snow dump and snow storage in areas adjacent to sloped roofs;
 - 3.1.1.7 safe and legible transitions between the Site and buildings, roadways and parking, and open space and public sidewalks;

- 3.1.1.8 access to the Facility and the Site to minimize interference with ambulance access to the adjacent Emergency Department and service and delivery vehicle access to the Hospital;
- 3.1.1.9 safe and well lit spaces for wheelchair bound individuals planned in conjunction with other outdoor waiting areas;
- 3.1.1.10 site the Facility to minimize impact on paths of travel from the remaining surface parking area to the Hospital. Locate Facility and Facility/Hospital link entrances to prevent pedestrian use of the Facility as a shortcut to the Hospital.

3.2 General Facility Design Characteristics

3.2.1 Consider the following characteristics in undertaking the Design of the Facility:

- 3.2.1.1 safe – employ strategies to reduce nosocomial infection, medical error and patient falls;
- 3.2.1.2 ease of access – both to the Facility and within the Facility for all segments of the patient and staff population;
- 3.2.1.3 equitable and respectful - with all Facility Users valued, and patient confidentiality and dignity maintained;
- 3.2.1.4 restorative – with patient care area and staff workspaces that are comfortable, peaceful, attractive, and that feel connected to the day and the seasons;
- 3.2.1.5 efficient - reducing Facility User travel distances within the Facility;
- 3.2.1.6 generative - of communication and knowledge transfer between caregivers and between caregivers and patients, and reasonably lively in its public spaces;
- 3.2.1.7 flexible - to accommodate continuous programmatic change and growth; and
- 3.2.1.8 benign – energy neutral, water balanced, toxin/carcinogen free, with minimal and well-managed waste.

3.2.2 Elder Friendly

- 3.2.2.1 Design the Facility to incorporate Elder-Friendly design principles in accordance with the design recommendations for an elder friendly hospital that are set out in “Code Plus: Physical Design for an Elder-Friendly Hospital” published by Fraser Health Authority.

3.3 Sustainable Design

3.3.1 Use the Green Guide for Healthcare Version 2.2 as a reference guide in the Design, and as a possible source of innovation credits toward LEED Gold Certification.

3.4 Safety and Security

3.4.1 Incorporate the following into the Design:

- 3.4.1.1 CPTED principles in site layout, building design, landscape development and lighting;
- 3.4.1.2 minimized visibility of security devices in patient care areas; and
- 3.4.1.3 guidelines for the physical security of drugs stored in hospitals, as produced by the College of Pharmacists of British Columbia.

3.4.2 Incorporate the following in the Design of the exterior of the Building:

- 3.4.2.1 provide appropriate exterior lighting levels near Building entrances and exits, walkways, public areas, and parking areas. Lighting will not cause glare, shadow, or high contrast with surrounding areas;
- 3.4.2.2 shrubbery within 2m of walkways will not exceed 50cm in height;
- 3.4.2.3 if the Design includes underground parking then provide:
 - 3.4.2.3(1) at least 1 emergency call box for every 30 parking spaces in underground parking areas (call box locations will be open and well lit); and
 - 3.4.2.3(2) video surveillance for the underground parking area.

3.4.3 Incorporate the following in the Design of the interior of the Building:

- 3.4.3.1 video surveillance at all main entrances to the Building so that surveillance equipment is visible to people entering the area;
- 3.4.3.2 access control at staff entrances, staff lounges, and clinical departments that are not operated on a 24/7 basis, and to all rooms that open directly off of public corridors within the Facility;
- 3.4.3.3 internal only telephones will be located in main lobbies and patient waiting areas; and
- 3.4.3.4 pay phones in the Facility's entry lobby.

3.5 Flexibility

3.5.1 Undertake the Design to accommodate future changes as follows:

- 3.5.1.1 all aspects of the Facility, including services distribution, building systems, footprint and mix of rooms will allow for efficient, economical and minimally-disruptive physical and operational changes throughout the life of the Facility;
- 3.5.1.2 allow for additions, deletions and relocations of services to clinical and non-clinical areas over the life of the Facility, including by consolidating risers and hubs in

strategically accessible and expandable locations and planning appropriate closets, cabinets, chases and shafts for access and growth;

- 3.5.1.2(1) locate permanent building elements such as stair, elevator and duct shafts to minimize constraints on configurational change;
 - 3.5.1.2(2) provide a simple building perimeter and non-restrictive fenestration pattern;
 - 3.5.1.2(3) minimize interior columns for ease of planning and re-planning of care areas;
 - 3.5.1.2(4) avoid interior shear walls;
 - 3.5.1.2(5) locate global circulation corridors to allow Facility expansion without increasing the complexity of the global circulation system as a whole;
 - 3.5.1.2(6) provide internal departmental corridors that link the fronts and backs of adjacent departments allowing border zone spaces to ebb and flow between departments and increase inter-departmental communication;
 - 3.5.1.2(7) provide standardized room layouts for repetitive rooms throughout the Facility; and
 - 3.5.1.2(8) rigorously control and record placement of in-floor reinforcing steel, radiant heating and cooling tubes, etc., to maximize the potential for and ease of future floor penetrations.
- 3.5.1.3 Health care practices and technologies are rapidly evolving, often requiring changes in both the delivery of care and the physical layout of any facility. Ensure that the Design minimizes the time, money, and waste associated with ‘churn’ over the Facility’s lifetime by incorporating integrated building systems in the Design that support a changing care delivery system and minimize the impact of changes on operations.
- 3.5.1.4 Consider “Open Building Principles” in the Design. (See Report on Open Building and Sustainable Environment September 20-22, 2004 Paris, France, http://www.open-building.org/archives/report_w104_2004.pdf [copy also available in the Data Room], and “Open Building: Healthcare Architecture on the Time Axis, A New Approach”, Stephen Kendall, PhD, in “Sustainable Healthcare Architecture”, Robin Guenther, Gail Vittori, John Wiley & Sons, Inc., 2008).
- 3.5.1.5 Consider the use of movable/demountable walls, an important component of open building. (See also “The benefits of movable/demountable walls”, a copy of which is available in the Data Room).

3.6 Existing Hospital and Site Services

- 3.6.1 Existing Hospital services, including the electrical service for the recent expansion of the Hospital, may be located within the Site. Other site services, including services for the existing parking lot and irrigation system, may also be located within the Site.
- 3.6.2 Project Co will relocate existing services as needed to accommodate construction of the Facility and will reconnect existing services to ensure that Hospital operations continue without interruption. Project Co will, as necessary, provide temporary services to ensure that the Hospital remains operational at all times. Any shut down of existing Hospital services 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].
- 3.6.3 Any services (existing or new) that cross a building or utilidor (existing or new) will be provided with seismic mitigation and building separation devices.
- 3.6.4 Connections into the existing Hospital are required and 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]. Project Co will mark all Facility services that connect to existing Hospital services (and any delineation points between Facility and existing Hospital services) so as to clearly distinguish all piping, parts and equipment installed by Project Co from piping, parts and equipment that are part of the existing Hospital.

3.7 Future Expansion

- 3.7.1 Design the Facility to allow for future expansion of the Radiation Therapy component by the addition of one Radiation Therapy Vault with dual energy linear accelerator, control work area and associated support spaces.
- 3.7.2 Design the Equipment Storage Room (Rm. 3.1.1.10 of the radiation therapy component of the Clinical Specifications) to allow future brachytherapy equipment (HDR) to be added within this room. The Equipment Storage Room will be large enough to accommodate the brachytherapy equipment and related support equipment. Provide the correct radiation shielding levels for the brachytherapy equipment, with the exception of a lead-lined door and frame. Size the building HVAC infrastructure to provide sufficient cooling for the room. Provide the following services for the brachytherapy suite:
- 3.7.2.1 In the Equipment Storage Room (Rm. 3.1.1.10):
- 3.7.2.1(1) Routing space for future exhaust ducts to extend to the roof;
 - 3.7.2.1(2) Plumbing for two sinks, capped at the corridor;
 - 3.7.2.1(3) A wet sprinkler system;
 - 3.7.2.1(4) Empty raceways for future equipment power and control connections;
 - 3.7.2.1(5) Utility lighting with local line voltage controls;

- 3.7.2.1(6) Basic receptacle layout;
- 3.7.2.2 In the Equipment Storage Room (Rm. 3.1.1.22, the future radioactive storage area) and the Seed Room (Rm. 3.1.1.34):
 - 3.7.2.2(1) Routing space for future exhaust ducts to extend to the roof;
 - 3.7.2.2(2) Utility lighting with local line voltage controls;
 - 3.7.2.2(3) Basic receptacle layout;
- 3.7.2.3 In the Work Area Physicist Assistant (Rm. 3.1.1.16, the future brachytherapy control room):
 - 3.7.2.3(1) Empty raceways for future equipment power and control connections;
 - 3.7.2.3(2) Utility lighting with local line voltage controls;
 - 3.7.2.3(3) Basic receptacle layout.
- 3.7.3 If the Facility has more than 1 storey, allow for future horizontal expansion of the upper storey(s) to infill any unused area above the footprint of the lower level(s).
- 3.7.4 Design office type spaces throughout the Facility to allow conversion to general clinic type functions with minimal disruption to ongoing operations.
- 3.7.5 Allow for an expansion of the Hospital contiguous with the link between the Hospital and the Facility. Allow access to the expansion of the Hospital from any point along the length of the link on both Level 0 and Level 1 of the Hospital.
- 3.7.6 All plans for future expansion of the Facility should maintain or improve the level of daylight penetration into the Facility.

3.8 Mechanical Engineering

General design principles:

- 3.8.1 All mechanical systems (including HVAC, plumbing, fire protection, speciality, medical gas and other systems) will:
 - 3.8.1.1 be designed to provide a healing, comfortable and productive environment for the Facility Users;
 - 3.8.1.2 be designed not to have an adverse effect on the Hospital;
 - 3.8.1.3 be located and designed to be inaudible from outdoor spaces/places of respite intended for patient/staff use;
 - 3.8.1.4 minimize impact on the natural and physical environment, through energy efficiency, optimization of resource use, and simplification of the systems;

- 3.8.1.5 be configured and located in such a way that maintenance and repair can be performed without entering regularly occupied areas;
 - 3.8.1.6 be developed to provide reliability of continual operation. Adequate standby capacity and redundancy will be included in system design;
 - 3.8.1.7 be vibration isolated to minimize noise and vibration through the structure or other components of the Facility;
 - 3.8.1.8 comply with standard acoustic requirements as per CSA;
 - 3.8.1.9 be sized to suit the consumption and discharge needs of the Facility, including allowances for future expansion as required by Section 3.8.2; and
 - 3.8.1.10 incorporate flexibility and adaptability for future expansion without major disruption or alteration to the Facility infrastructure.
- 3.8.2 Future Expansion
- 3.8.2.1 All mechanical systems (including HVAC, plumbing, fire protection, speciality, medical gas and other systems) and related site services (including any services from the Hospital) component selection, system design, and installation, will be planned for future expansion, while deferring the equipment cost until such expansion takes place. Allow for:
 - 3.8.2.1(1) all future expansions described in Section 3.7; plus
 - 3.8.2.1(2) an additional 30% expansion capability.
- 3.8.3 Additional Requirements
- 3.8.3.1 All services from the Hospital to serve the Facility will be monitored for pressures and flow rates. The BMS will meter and trend all data.
 - 3.8.3.2 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.
 - 3.8.3.3 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.
 - 3.8.3.4 Speciality systems may include acid waste and vent, radioactive waste and vent, laboratory air, laboratory vacuum, oncology pharmaceutical preparations, natural gas, and cooling water.
 - 3.8.3.5 All entrances to the Facility will be protected by vestibules and air curtain heaters.

- 3.8.3.6 Provide energy simulation and modelling in accordance with Appendix 3E [Energy Model].

3.9 Electrical Engineering

General design principles:

- 3.9.1 Provide lighting that is energy efficient and environmentally friendly.
- 3.9.2 Provide electrical systems which promote energy efficiency and adhere to LEED NC principles.
- 3.9.3 Provide communications systems which can be expanded as the Facility expands to meet population growth.
- 3.9.4 Integrate communications systems where this integration provides an efficiency advantage, operational advantage, and cost advantage.
- 3.9.5 Ensure a safe environment for both staff and patients by proper utilization of access control, video monitoring, and lighting;

3.10 Structural Engineering

General standard of design principles:

3.10.1 Design loads

3.10.1.1 Performance criteria

- 3.10.1.1(1) unless required by the specific use and occupancy, the following minimum floor design live loads will apply:
- 3.10.1.1(1)(a) if an underground parkade is provided, basement parkade: 2.4 kPa (50psf);
- 3.10.1.1(1)(b) main (ground) floor and upper floors: 4.8 kPa (100 psf); and
- 3.10.1.1(1)(c) mechanical/electrical service rooms: 6.0 kPa (125 psf);
- 3.10.1.1(2) upper floors will be designed to accommodate concentrated loads from equipment, fixtures, and machinery, whether floor, wall, or ceiling-mounted, including medical equipment and patient lifting devices;
- 3.10.1.1(3) floors will be designed for a minimum superimposed dead load allowance of 1.0 kPa to allow for partitions, ceilings and mechanical equipment;
- 3.10.1.1(4) roofs will be designed for a minimum net uplift wind load of 1.5 kPa for the minimum snow and rain loads required by the BC Building Code and the applicable local government by-laws. Notwithstanding other

requirements, the minimum 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;

- 3.10.1.1(5) roofs will be designed for the superimposed dead load of roofing materials, green roofs, ceilings, mechanical equipment, but will not be less than 1.5 kPa (30 psf) to allow for future re-roofing alternatives;
- 3.10.1.1(6) floors and roofs above mechanical and electrical service rooms will be designed for a superimposed suspended equipment dead load of 2.0 kPa (40 psf) in addition to the minimum dead load allowances specified above;
- 3.10.1.1(7) floors for rooms designated for medical records storage or compact mobile shelving will be designed for a minimum 12.0 kPa (250 psf) live load; and
- 3.10.1.1(8) Design all building elements, including overall building stability, for applicable wind and seismic loads specified in the BC Building Code and the applicable local government by-laws.
- 3.10.1.1(9) The Building is assigned as Normal Importance Category, determine snow, wind and earthquake loads based on this classification.

3.10.2 Flexibility for future change

- 3.10.2.1 The Building will be designed to readily accommodate renovations for changes in tenancy use and occupancy and changing technology, equipment, medical techniques, and building services, including the future expansions described in Section 3.7.
- 3.10.2.2 Performance criteria:
 - 3.10.2.2(1) The floor structure will be able to accommodate one 130mm diameter cored hole per structural bay at almost any location in the floor plate except the band beams and the design for the concrete floors should assume at least one reinforcing bar in each direction at each core location is cut. The floor structure will be designed 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 is to be capable of having a minimum of six additional core holes (100 mm diameter) per bay without additional reinforcing; and
 - 3.10.2.2(2) the selection of a structural system that will readily accommodate future changes for similar design load parameters without the addition of

structural members, welding, noise, dust, or demolition should be a primary structural design criteria.

3.10.3 Deflection limitations

- 3.10.3.1 The structure will be designed to minimize the effects of deflection and long-term creep.
- 3.10.3.2 The design of the structure is to meet the deflection limits of the BC Building Code, CSA 23.2-04, and CSA S16-01 as a minimum and as appropriate for the non-structural components of the Building. Notwithstanding the above, the deflection limit will not exceed the levels specified in this section.
- 3.10.3.3 Performance criteria:
- 3.10.3.3(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 will not exceed span/360;
 - 3.10.3.3(2) for steel floor construction, the maximum live load deflection will not exceed span/480 with the total load deflection not exceeding span/360. The total load deflection will include effects of shrinkage of concrete topping slabs;
 - 3.10.3.3(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;
 - 3.10.3.3(4) for wood floor and of construction, the maximum live load deflection will not exceed span/360 and the total load deflection will not exceed span/240.

3.10.4 Vibration limitations

- 3.10.4.1 The structural system will be designed to minimize the effects of floor vibration due to use, occupancy, and equipment. Vibration will be limited to acceptable levels for the use and occupancy of the floors.
- 3.10.4.2 Floor system vibration characteristics are to be in accordance with Commentary D of the BC Building Code or other industry accepted methods.
- 3.10.4.3 Performance criteria:
- 3.10.4.3(1) floor structural systems will be selected and designed to have a vibration acceleration maximum limit of 0.5%g with a damping ratio of 0.02 when an excitation force of 0.29 kN is applied;

- 3.10.4.3(2) machinery that could be a source of vibration will be mounted using vibration isolation techniques; and
- 3.10.4.3(3) in areas supporting C.T. scanners, microscopes, and other sensitive equipment and occupancies, the structure will be designed 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 will be carried out where specified by the equipment manufacturer.

3.10.5 Durability

- 3.10.5.1 The structure and structural components of the Building will be designed for a minimum 50-year life span.
- 3.10.5.2 Design the Building structure in accordance with applicable material standards, including:
 - 3.10.5.2(1) CSA A23.1/A23.2 Concrete Materials and Methods of Construction;
 - 3.10.5.2(2) CSA S478 Guideline on Durability of Buildings; and
 - 3.10.5.2(3) if an underground parkade is provided, CSA S413-94 (R2000) Parking Structures.
- 3.10.5.3 Design the structure and structural components of the Buildings to minimize the effects of corrosion and deterioration due to the environment and use in accordance with the following:
 - 3.10.5.3(1) adequate concrete crack control joints and expansion/contraction joints. Caulk exposed joints;
 - 3.10.5.3(2) high strength concrete mixes proportioned to CSA A23-1/A23-2 durability requirements for exposes class;
 - 3.10.5.3(3) reinforce concrete for crack control and repair exposed cracks;
 - 3.10.5.3(4) chamfer corners of exposed concrete where possible;
 - 3.10.5.3(5) hot-dip galvanize exterior exposed steel; and
 - 3.10.5.3(6) embedded steel protection angles and skid plates for loading docks and garbage compactors.

3.10.6 Medical equipment supports

- 3.10.6.1 Design will provide for support/anchorage of owner provided 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.

- 3.10.6.2 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.
- 3.10.6.3 Performance criteria
- 3.10.6.3(1) floor and roof assemblies will be designed to support the gravity and seismic loads for floor, wall, or ceiling-mounted medical equipment included on the Equipment List;
- 3.10.6.3(2) the structure will be designed 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;
- 3.10.6.3(3) where practical, supports for ceiling-mounted equipment, such as radiology gantries, will be designed to be universal for re-use with future equipment installations; and
- 3.10.6.3(4) drilled insert-type anchors for medical equipment supports and anchorage will be rated by the insert manufacturer for seismic and cyclic loading applications and drop-in sleeve anchors will not be used.

3.10.7 Above-Ground Parkade Structure (If an above-ground parkade is provided)

- 3.10.7.1 If an above-ground parking structure is provided, the following structural design principles will apply.
- 3.10.7.2 Codes and Standards
- 3.10.7.2(1) The design and construction of all structural elements for any above-ground parkade will conform to the following codes and standards:
- 3.10.7.2(1)(a) National Building Code of Canada, 2005 Edition;
- 3.10.7.2(1)(b) Canadian Foundation Engineering Manual, 1992, 3rd Edition;
- 3.10.7.2(1)(c) CSA Standard CAN/CSA S413-07, Parking Structures;
- 3.10.7.2(1)(d) CSA Standard A23.1-04/A23.2-04, Concrete Materials and Methods of Construction/Methods of Test and Standard Practices for Concrete;
- 3.10.7.2(1)(e) CSA Standard A23.3-04, Design of Concrete Structures;

- 3.10.7.2(1)(f) CSA Standard CAN/CSA A23.4-05, Precast Concrete – Materials and Construction;
 - 3.10.7.2(1)(g) Canadian Prestressed Concrete Institute Design Manual, Precast and Prestressed Concrete, 3rd Edition; and
 - 3.10.7.2(1)(h) CSA Standard CAN/CSA S16-01, Limit States Design of Steel Structures
- 3.10.7.3 Parkade Performance Criteria
- 3.10.7.3(1) Design Loads
 - 3.10.7.3(1)(a) Climatic and Seismic information for the determination of snow, wind, earthquake, and thermal loadings on the above-ground parkade structure is provided in Appendix C of the National Building Code of Canada and 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 Prince George area. Maximum exterior temperature ranges will be determined using the 2.5% January and July air temperatures.
 - 3.10.7.3(1)(b) The lateral load resisting systems for the structure will be designed based on the effects of the factored lateral wind pressures or seismic loads, whichever produces the more unfavourable effect.
 - 3.10.7.3(1)(c) The deflection requirements for all structural members will be based on the above noted climatic data and return periods.
 - 3.10.7.3(1)(d) The design loads for any above-ground parkade will be determined in accordance with the National Building Code of Canada, the BC Building Code and the Structural Commentary – Part 4.
 - 3.10.7.3(2) Member Design Criteria
 - 3.10.7.3(2)(a) All floor and roof structural framing members will be designed to have sufficient strength and stability so that the factored member resistance is equal to or greater than the effects of the factored loads.
 - 3.10.7.3(2)(b) All floor and roof structural framing members will be designed 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

3.10.7.3(3) Lateral Load Resisting System Design Criteria

3.10.7.3(3)(a) All floor and roof structural framing members will be designed 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.

3.10.7.3(3)(b) All floor and roof structural framing members will be designed to have sufficient stiffness so as to remain serviceable under the specified wind pressures. The maximum inter-storey drift under the 1 in 10 year service wind pressure and gravity loads shall not exceed 1/500 of the storey height.

3.10.7.3(4) Cladding Support Design Criteria

3.10.7.3(4)(a) If the cladding system is to be supported by the structural members, the members will be designed 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.

3.10.7.3(4)(b) Where the cladding system is to be supported by the structural members, the members will be designed to have sufficient stiffness so as to remain serviceable under the 1 in 10 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

3.10.7.3(5) Structural Integrity

3.10.7.3(5)(a) Various levels of structural integrity, ranging from the minimum level of structural integrity as stipulated in the National Building Code of Canada and the BC Building Code to enhanced integrity as determined by a rigorous blast-resistant design approach will be considered. Any above-ground parkade structure and its structural members will be designed 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 any above-ground parkade.

3.10.7.3(6) Fire Rating Requirements

3.10.7.3(6)(a) The above-ground parkade, if provided, does not require a fire rating as it is an F.2 occupancy that falls under section 3.2.2.83 of the National Building Code of Canada.

3.10.7.3(7) Drainage Requirements

3.10.7.3(7)(a) The design of any above-ground parkade will be detailed to provide the required drainage slopes of not less than 2% in the two principal directions as recommended by CSA Standard CAN/CSA S413-07.

3.10.7.3(8) Expansion Joints

3.10.7.3(8)(a) To accommodate the thermal movements of the any above-ground parkade structure, expansion joints may be required to divide the above-ground parkade into segments. Size all expansion joints to ensure that the various segments do not come into contact under the maximum design loading. Each segment of any above-ground parkade will have its own lateral load resisting system.

- 3.10.7.3(8)(b) The expansion joints will be detailed to minimize the intrusion of grit into the gland thereby minimizing any resulting damage.
- 3.10.7.3(9) Structural Loads
- 3.10.7.3(9)(a) Any above-ground parkade structure will be designed for the following loading conditions:
- (a).1 Uniformly Distributed Live Loads:
 - (a).1.1 Passenger Cars (all levels): 2.40 kPa
 - (a).1.2 Snow Drift (roof level only): as per calculation according to BC Building Code.
 - (a).1.3 Exterior Ramp Structures: 4.80 kPa.
 - (a).2 Partial Loading: The full intensity of the reduced live load applied uniformly on any portion of the length of a member is to be considered if it produces a more critical effect than the same intensity applied over the full length of the member.
 - (a).3 Live Load Reduction: A live load reduction factor will be applied based on the permitted requirements of the National Building Code of Canada and the BC Building Code. A live load reduction factor is not permitted for live loads due to snow.
 - (a).4 Concentrated Live Loads:
 - (a).4.1 All above-ground parkade levels will be designed to support the uniformly distributed live loads noted above, or a concentrated load of 11.0 kN, whichever produces the more critical effect. The concentrated load will be applied over an area of 750 mm x 750 mm located so as to produce the maximum effects in the structural members.
 - (a).4.2 Design pedestrian ramps to support the uniformly distributed live loads noted above, or a concentrated load of 9.0 kN, whichever produces the more critical effect. The concentrated load

will be applied over an area of 750 mm x 750 mm located so as to produce the maximum effects in the structural members.

- (a).5 Elevators: All moving elevator loads will be increased 100% for impact.
- (a).6 Wind Pressures: Design wind pressures will be calculated as per the requirements of the National Building Code of Canada, the BC Building Code and the Structural Commentary – Part 4.
- (a).7 Thermal Loads: Any above-ground parkade structure will be subject to thermal loads due to seasonal temperature changes. These loads will be calculated in accordance with the National Building Code of Canada, the BC Building Code, Structural Commentary – Part 4 and the climatic data found in Appendix C of the National Building Code of Canada and the BC Building Code.
- (a).8 Uniformly Distributed Superimposed Dead Loads:
 - (a).8.1 Suspended mechanical and electrical services: 0.50 kPa

3.10.7.3(10) Corrosion Protection

- 3.10.7.3(10)(a) Provide one of the acceptable corrosion protection systems from Table 1 of CSA S413-07 Corrosion protection system for any above-ground parkade.

3.10.8 Link between Cancer Centre and the Hospital

- 3.10.8.1 The link between the Building and the Hospital at existing level 0 and level 1 will be supported by a foundation that is independent from the Building structure.
- 3.10.8.2 The link structure will be designed to resist vertical load, wind load and seismic load to meet latest edition of the BC Building Code, CSA 23.2-04 and CSA S16-01.
- 3.10.8.3 The design live load will be 4.8 kPa minimum.

PART 4. SITE DEVELOPMENT REQUIREMENTS

4.1 Exterior Spaces for Patients and Visitors

4.1.1 Provide exterior public spaces including areas that:

- 4.1.1.1 welcome and engage visitors, patients, and staff;
- 4.1.1.2 provide protection from sun, wind, rain and polluted air produced by roadways and parking areas;
- 4.1.1.3 offer solitude and privacy as well as areas for groups of family and friends to sit comfortably;
- 4.1.1.4 have visual appeal throughout the year;
- 4.1.1.5 are safe, with visible areas with adequate lighting and seating for visitors and discharged patients waiting for transportation;
- 4.1.1.6 provide safe, and well-lit spaces for individuals in wheelchairs, and planned in conjunction with other exterior waiting areas;
- 4.1.1.7 are located and designed to avoid conflict with mechanical systems and other sources of noise and vibration;
- 4.1.1.8 provide paving with a smooth surface, tight joints, where necessary with a maximum slope of 1:20 where travel is uni-directional (as on a ramp) and otherwise a maximum slope of 1:50;
- 4.1.1.9 include trees, lighting and other elements located to support way-finding through the Site, with particular emphasis on building entrances.

4.1.2 Exterior Therapeutic and Social Spaces

- 4.1.2.1 Provide exterior spaces such as courtyards and gardens to accommodate non-programmed activities, including:
 - 4.1.2.1(1) spaces designed to provide a suitable environment that takes patient vulnerabilities such as immune suppression, sensitivity to direct sunlight and physical strength into consideration;
 - 4.1.2.1(2) accessible garden spaces adjacent to patient waiting and care facilities which are indicated on interior and/or site signage; and
 - 4.1.2.1(3) spaces designed to support healing and recovery.

4.1.2.2 Design and construct any courtyards included in the Facility design in accordance with the following:

- 4.1.2.2(1) patient accessible courtyards will be highly visible to staff from inside the Facility and secured from public access from areas adjacent to the Building exterior;
- 4.1.2.2(2) garden courtyards will have continuous glazing to provide daylight to all spaces or circulation zones adjacent to the courtyard;
- 4.1.2.2(3) patient accessible courtyards adjacent to patient waiting areas will include seating for patients and spaces for patients in wheelchairs;
- 4.1.2.2(4) outdoor seating surfaces will be constructed with wood and/or composite wood/recycled plastic elements;
- 4.1.2.2(5) walkways within courtyards will be a minimum 1.5m in width to accommodate patients with intravenous equipment, gurneys and wheelchairs or walkers;
- 4.1.2.2(6) provide a minimum of one handrail between the entrance to any courtyard (from the interior of the Facility) and a seat for patients experiencing difficulties with strength or balance; and
- 4.1.2.2(7) planting in garden courtyards will reflect the character of the regional landscape, and will ensure that filtered light reaches adjacent interior spaces.

4.1.3 Staff Facilities

Provide Facility staff with a sheltered outdoor space adjacent to the staff lounges that:

- 4.1.3.1 has a minimum useable area 1/3 that of the adjacent staff lounges;
- 4.1.3.2 provides shelter from sun, rain and wind;
- 4.1.3.3 offers views of trees and plants that reflect seasonal change;
- 4.1.3.4 includes seating and tables for meals during the summer months; and
- 4.1.3.5 provides visual privacy from public and patient care areas.

4.1.4 Design Requirements for Green Roofs

- 4.1.4.1 Provide extensive-type green roofs where roofs are overlooked by adjacent, regularly occupied spaces within the Facility.
- 4.1.4.2 Green roof(s) will be designed and constructed to achieve the following goals:
 - 4.1.4.2(1) to expand the amount of greenspace;

- 4.1.4.2(2) to contribute to the stormwater management strategy for the Facility;
 - 4.1.4.2(3) to provide habitat for birds and insects;
 - 4.1.4.2(4) to protect the roof membrane from degradation from exposure to ultraviolet light, temperature changes, and physical abrasion; and
 - 4.1.4.2(5) to improve air quality; mitigate urban heat island effect; decrease thermal conductivity; and
 - 4.1.4.2(6) to contribute to sound attenuation characteristics of the roof structure.
- 4.1.4.3 Green roof development may be either intensive or extensive in design and construction, or a combination of the two.
- 4.1.4.4 Green roof(s) will be constructed with either a proprietary set of components, designed and supplied as an integrated system, or be designed as a loose laid or modular design that includes protection board, root barrier, drainage mat, growing medium and plants.
- 4.1.4.5 The design of green roof(s) will minimize the amount of weight added to the roof structure.
- 4.1.4.6 Green roof(s) will be designed to protect roof membrane against penetration by water, water vapour, or plant roots.
- 4.1.4.7 Selected plant species for the green roof(s) will be proven in the local climatic conditions and moisture regime.
- 4.1.4.8 Provide hose bibs adjacent to green roof(s), regardless of whether an automatic irrigation system is supplied as part of the design.
- 4.1.4.9 Maintenance requirements for green roof(s) will be clearly documented and such documentation will be included in the final design. An accessible inspection chamber will be provided for each roof drain.
- 4.1.5 Tree and Shrub Planting
- 4.1.5.1 Planting will reflect the character and climatic demands of the Prince George region, and the Sub-Boreal Spruce Biogeoclimatic Zone.
 - 4.1.5.2 All plant material selection for the Facility and the Site will consider potential allergic reactions and avoid any potential allergic reaction causing species.
 - 4.1.5.3 Planting on the east side of Facility will provide visual separation from Lethbridge Street, shading to mitigate heat gain in the summer months, and seasonal interest. These plantings will be designed to avoid compromising distant views from the patient treatment areas on the second floor.

- 4.1.5.4 Layout of planting in the corridor between the Facility and the existing hospital will consider both existing and future underground utilities.

4.2 Circulation and Adjacencies (Pedestrian and Vehicular)

4.2.1 General

Circulation will co-ordinate the movements of vehicles, bicycles, pedestrian and wheelchairs. The design will emphasize safety, while providing opportunities for interaction and social contact.

4.2.2 Pedestrian Walkways

- 4.2.2.1 Integrate pedestrian circulation throughout the Site that minimizes conflict with vehicles and bicycle zones.
- 4.2.2.2 Design pathways to provide universal access to all entrances and exits.
- 4.2.2.3 Pathway lighting levels will correspond with the use of a given area, and proximity to patient rooms.
- 4.2.2.4 Pathways and sidewalks will be configured to provide maximum amount of natural visual surveillance.

4.2.3 Vehicular access & parking

- 4.2.3.1 Integrate vehicular circulation with layout of pedestrian and bicycle zones throughout the Site to provide visible connections, to promote safe travel, and to minimize conflict between vehicles and other modes of travel. The driveways will provide connections between the surrounding roads and the main entrance to the Facility.
- 4.2.3.2 Design and construct permanent parking for the Facility, including:
- 4.2.3.2(1) replacing any existing Hospital parking stalls that are lost due to construction of the Facility; plus
- 4.2.3.2(2) adding 86 additional stalls.
- 4.2.3.3 In addition to the permanent parking described in Section 4.2.3.2 above, provide temporary off-Site parking during Construction to replace any existing Hospital parking stalls that are made unavailable during the Construction.
- 4.2.3.4 Vehicle parking stalls will include standard stalls measuring - 2.6m width x 5.5m length, small car stalls - 2.6m width x 5m length, handicapped spaces measuring 3.6m width x 5m length near building entrances, and a minimum of one space at each building entrance - 4m width x 9m length with unobstructed access on the passenger side of the vehicle.
- 4.2.3.5 Provide convenient access for private vehicles.

- 4.2.3.6 Staff parking stalls will be provided with accessible weather-proof power source for block heaters.
 - 4.2.3.7 Design streets and driveways to support level of use planned for each area within the Facility.
 - 4.2.3.8 Design for the functional separation of traffic for emergency vehicles, visitors and staff, and service vehicles.
 - 4.2.3.9 Design for maximum access to the Facility and provide drop-off area for a minimum of 3 cars at both the front and rear entrances, which are designed to provide weather protection to patients entering and leaving the Facility. Provide shelter from rain and snow to within 300mm of the curb.
 - 4.2.3.10 Provide a taxi zone for a minimum of one taxi cab at both the front and rear entrances.
 - 4.2.3.11 Patient and visitor parking will be located in closer proximity to the building than staff stalls.
 - 4.2.3.12 Provide a minimum of 10 planting areas with one or more large caliper shade tree(s) on a minimum 1.5m standard within the parking area north and west of the Facility. Such planting areas will be evenly distributed across this portion of the Site.
 - 4.2.3.13 Provide either built or vegetative screening between parking spaces and the building in locations where parking is within 3m of regularly occupied interior spaces, and where such screening does not conflict with driver or pedestrian sight lines within the parking area.
 - 4.2.3.14 In order to maximize the number of existing on grade parking spaces retained, the existing parking lot area will be incorporated into the new Site layout and Project Co will preserve existing elements such as electrical receptacles, lamp standards and pedestrian walkways.
- 4.2.4 Bicycle access & storage
- 4.2.4.1 Provide well-lit secure bicycle locking/parking facilities for a minimum of twenty-five (25) bicycles.
- 4.2.5 Signage
- 4.2.5.1 Signage will be designed and located to satisfy the Authority's requirements for Site identification and be coordinated with existing signage on the Site for consistency. Signage will be designed and constructed to withstand the typical weather conditions experienced at the site of the works, and will be provided with lighting after dark so they are legible at a distance of 100m for the major signs, and 10m for all others.
- 4.2.6 Environmental considerations
- 4.2.6.1 Retain any healthy existing trees that do not conflict with development of Site grading.

4.2.6.2 Existing trees will be evaluated by a Certified Arborist engaged by Project Co.

4.3 Site Infrastructure

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

4.3.1 Municipal Off-Site Services Infrastructure

All municipal off-site services will be designed and constructed to provide the infrastructure necessary to support the Facility to the satisfaction of all Governmental Authorities. Off-site services will be designed and constructed to meet proposed and future development requirements.

4.3.1.1 Sanitary Sewers

4.3.1.1(1) The sanitary sewers will be of a diameter, grade and depth to safely convey all effluent from the Facility and adjacent development. The sanitary sewer system includes the pipes, manholes, and all other required appurtenances to comply with applicable municipal and provincial standards.

4.3.1.2 Storm Sewers and Drainage

4.3.1.2(1) Storm sewers and drainage networks will be of a size, grade and depth to safely collect and convey all storm water around the Site.

4.3.1.3 Watermain and Appurtenances

4.3.1.3(1) The watermain system will be able to safely provide adequate domestic and fire fighting capacity to the Facility and adjacent sustainable community development. The watermain system includes the pipes, valves, pumps, controls, manholes, and all other required appurtenances to comply with applicable municipal and provincial standards.

4.3.1.4 Road Works

4.3.1.4(1) The Authority has completed a parking study. A copy is available in the Data Room. If Project Co's design for the Facility changes the anticipated traffic impact, Project Co will provide an amended traffic impact study to the satisfaction of the City and the Authority. Project Co will be responsible for the funding, design and construction of any additional required improvements.

4.3.1.5 Street Lighting

- 4.3.1.5(1) Off-site roadways, walkways and parking areas will be lit during darkness to ensure safe vehicle and pedestrian traffic in respect to collisions, personal safety, site access and egress.

4.3.2 On-Site Services Infrastructure

All on-site servicing will meet or exceed the quality requirements for the corresponding municipal off-site services. On-site services will be designed and constructed to meet the needs of the Facility and future development requirements of the Facility as outlined in Section 3.7.

4.3.2.1 Sanitary Sewers

- 4.3.2.1(1) The sanitary sewers will be of a diameter, grade and depth to safely convey all effluent from the site. The sanitary sewer system includes the pipes, manholes, and all other required appurtenances to comply with applicable municipal and provincial standards.

4.3.2.2 Storm Sewers and Drainage

- 4.3.2.2(1) The storm sewers and drainage network will be of a size, grade and depth to safely convey all storm water.
- 4.3.2.2(2) Site storm water storage and attenuation will be provided as required to ensure no net increase in downstream flows for the 10 year return period.
- 4.3.2.2(3) Utilize mosquito control best management practices in the design and construction of storm water features.

4.3.2.3 Watermain and Appurtenances

- 4.3.2.3(1) The watermain system (watermain and appurtenances) will be capable of providing domestic and fire fighting capacity for the Facility.
- 4.3.2.3(2) The watermain system will include backflow preventers to protect the municipal system and on site facilities from contaminants.

4.3.2.4 Road Works

- 4.3.2.4(1) The on-site roadway, including the pavement, curbs and gutters, sidewalks, walkways, signage, pavement markings, and traffic calming devices, is to be handicapped accessible and wheel-chair friendly, and will provide safe passage between parking areas, loading areas, emergency vehicle areas and drop off areas.

4.3.2.5 Street Lighting around the Facility

- 4.3.2.5(1) On-site roadways, walkways and parking areas will be lit during darkness to ensure safe vehicle and pedestrian traffic with respect to

collisions, personal safety, and building access and egress. Lighting will be sympathetic to the proposed buildings on site and designed to not spill over into neighbouring residential areas.

4.3.2.6 Electrical, Telecommunications, Gas Services

- 4.3.2.6(1) Electrical, telecommunications, and gas services to support the Facility will be provided.

PART 5. ARCHITECTURAL

5.1 Building Configuration and Internal Circulation

- 5.1.1 Provide a level floor interior connection or link between the Facility and the Hospital at both Level 0 and Level 1 of the Hospital. Provide continuous glazing the full length of the link. Connect the link to the Hospital and to the Facility for ease of patient and material transfer and to minimize disruption to the main entry and lobby of the Facility.
- 5.1.2 Building layout and fenestration will consider existing distant views to the east, and preserve such views where feasible.
- 5.1.3 Locate a service elevator adjacent to a patient/visitor elevator. Service elevator to be double-sided allowing normal access to service lobbies on the opposite side to the patient/visitor elevator lobby but allowing it to be used by patient and visitors when the patient/visitor elevator is being serviced. Size both elevators to accommodate patient transfer on a stretcher.
- 5.1.4 Provide minimum 2400mm wide global circulation corridors and corridors accessing patient care areas within the following Components: Systemic Treatment.
- 5.1.5 Provide minimum 2000mm wide corridors accessing patient care areas within the following Components: Radiation Therapy; General Clinics; and Pharmacy.
- 5.1.6 Provide minimum 2000mm wide corridors accessing workshop type spaces.
- 5.1.7 Provide minimum 1800mm wide corridors accessing patient care areas within the following Components: Cancer Rehabilitation.
- 5.1.8 Provide minimum 1500mm wide corridors in all other areas.
- 5.1.9 Provide alcoves accessible from corridors to accommodate disaster preparedness cabinets supplied by the Authority. Refer to Appendix 2E [Equipment] for cabinet specifications. Each level of the Building shall have a minimum of one cabinet and the cabinets are to be distributed throughout the Building at a ratio of one cabinet per sixty occupants.

5.2 Building Character

- 5.2.1 General character of the Facility's exterior appearance is to be compatible with and complementary to the existing additions made to the Hospital in 2001. "Residential" character is not acceptable.

5.2.2 Design the Facility to reflect the architectural vernacular of Prince George and northern British Columbia as well as First Nations' cultural influences.

5.3 Quality of Space/Interior Design

5.3.1 Incorporate the principles of evidence-based design.

5.3.2 Provide access to natural light for approximately 70% of all regularly occupied patient waiting and treatment and staff work areas.

5.3.3 Employ materials and detail surfaces to absorb and minimize sound transmission throughout patient care and patient consultation areas, staff work and public areas.

5.3.4 Conceal and make discreet the clinical infrastructure from view of visitors and patients wherever possible.

5.3.5 Maximize opportunities for patient empowerment through control of lighting, sound, décor (personalization) and daylight.

5.3.6 Create visual interest within patient care areas by varying colours, textures and lighting.

5.3.7 Support a 'healing environment' by the use of materials, colour, texture, design features, and proportions.

5.3.8 Balance the openness required for patient monitoring with privacy considerations regarding confidentiality of patient information and with the security needs of staff at all hours of the day.

5.3.9 Design workplaces so that they are flexible and adaptable to change in program or personnel and promote patient and staff safety.

5.3.10 Design of workspaces will be ergonomic and conducive to workflow and processes.

5.3.11 Provide 'rest stops' and intuitive meeting points for patients and visitors to pause, rest, and consult.

5.3.12 Include suitable spaces throughout the Facility for the display of two- and three-dimensional art complete with wall backing for mounting and donor recognition systems with appropriate lighting, power, and data connectivity.

5.3.13 Design so that the Facility can effectively care for bariatric patients and consider the design recommendations for a bariatric friendly Facility that are set out in "Planning and Design Guidelines for Bariatric Healthcare Facilities" published by the American Architectural Institute, latest edition.

5.3.14 Design the Facility as elder-friendly.

5.3.15 Calming and Restorative Design

- 5.3.15.1 The Facility interior will be calming and restorative, and will include extensive daylighting of public spaces and patient waiting, patient care and staff work areas, as well as an interior atrium garden, to provide views of nature.
- 5.3.15.2 Exterior views from patient waiting and relaxation areas are to be of the surrounding landscape and courtyards, where snow-cover will not be disturbed during winter months.
- 5.3.16 Provide convenient exterior access for patients from all Level 1 patient reception and waiting areas.
- 5.3.17 Exterior access will include access to the northeast portion of the Site through the main entrance, the patient garden and at all points required by the BC Building Code for emergency egress.
- 5.3.18 Entrance vestibules
 - 5.3.18.1 entrance vestibules will be protected from snow and rain by canopies, building overhangs or the like;
 - 5.3.18.2 use oversized entrance vestibules for transportation with waiting space for seated, in-wheelchair and standing users, and effective sheltering of the building interior;
 - 5.3.18.3 deal effectively with mud, sand and dirt, including accommodating for construction/oil-gas workers with muddy boots;
 - 5.3.18.4 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;
 - 5.3.18.5 entry vestibules are to 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;
 - 5.3.18.6 provide a vestibule entry directly into the link between the Facility and the Hospital. Configure and locate this vestibule so that travel between the two facilities can occur without having to pass through the vestibule; and
 - 5.3.18.7 provide automatic swing doors activated by handicapped accessible push-button controls located on the inside and outside of both sets of doors. Doors are to be configured for push-pull manual operation in addition to automatic operation.

5.4 Wayfinding and Signage

5.4.1 Overriding Principles

- 5.4.1.1 Provide a simple configuration of the Facility circulation systems and functions so that way finding is inherently easy.

- 5.4.1.2 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.
 - 5.4.1.3 Provide significant recognizable, easily named and identified elements in key and easily found locations that can become 'meeting points' for patients and visitors.
 - 5.4.1.4 Design public elevator and stair lobbies and public circulation routes to be distinct from service routes and other non-public routes.
 - 5.4.1.5 Provide all signage required for Facility operations.
 - 5.4.1.6 Signage will be highly visible, clear, concise, and well-differentiated from surrounding information, notices, advertising, etc.
 - 5.4.1.7 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.
 - 5.4.1.8 Provide signage that is resistant to graffiti and physical damage.
 - 5.4.1.9 Use international symbols where and as applicable.
 - 5.4.1.10 Orient all building plan directories to reflect the direction from which they are viewed.
 - 5.4.1.11 Provide signage that directs visitors to all patient destinations and all other departments and rooms within. Prioritize patient destinations over non-patient destinations.
 - 5.4.1.12 Orient all important signs, including all patient destination signs, to be perpendicular to the line of patient travel on approach.
 - 5.4.1.13 Provide signage that is clearly visible day or night.
 - 5.4.1.14 Avoid multi-layered naming hierarchies and complex numbering systems.
 - 5.4.1.15 Provide a suitable location and configuration for donor recognition display at or near the main entrance, minimum display area of 15 SM.
 - 5.4.1.16 Signage will comply with the Authority's "Visual Identity Guidelines" and be coordinated with the Authority.
 - 5.4.1.17 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.
- 5.4.2 Design Requirements

- 5.4.2.1 Design the internal directional signs to include:
- 5.4.2.1(1) a main directory, installed at or near the main public entrance to the Facility that indicates the Facility in relation to the overall Site and the location of every area and department within the Facility that is accessible to the public;
 - 5.4.2.1(2) a continuous 'trail' of signage from the entrances to each of the reception/information points listed on the directories;
 - 5.4.2.1(3) installation of signage at each point at which a directional decision is required;
 - 5.4.2.1(4) consistent terminology;
 - 5.4.2.1(5) door signage to indicate restrictions on entry and warn of hazards;
 - 5.4.2.1(6) door signage that is not obscured by the emergency systems and Code Blue system call;
 - 5.4.2.1(7) door signage to identify every space (e.g. rooms, alcoves, corridors and stairwells) in the Facility;
 - 5.4.2.1(8) door signage that is located in a consistent location for every room in the Facility;
 - 5.4.2.1(9) door signage that is consistent with the following room numbering protocol:
 - 5.4.2.1(9)(a) Each room has a unique identifier number;
 - 5.4.2.1(9)(b) Rooms are numbered in a manner that reflects normal movement through the Facility;
 - 5.4.2.1(9)(c) Labelling anticipates a person attempting to follow numbering along corridors in sequence;
 - 5.4.2.1(9)(d) Blocks of numbers are periodically skipped to allow for future expansion of the numbering system if rooms are added through renovations;
 - 5.4.2.1(9)(e) Project Co will review door numbering system with the Authority.
 - 5.4.2.1(9)(f) Each room requires a number for service reasons and since many rooms will not have formal wall numbering panels, each door frame will be equipped with a lamacoid number plate approximately 25 mm high by 50 mm long, attached to the head of the door frame on

the hinge side; and as this numbering system is used for deliveries, repairs, fire alarm notifications, etc., it is important that room numbers be determined early in design and maintained following occupancy. Follow the same numbering system on design and construction documentation for all disciplines (architectural, mechanical, electrical, etc.).

- 5.4.2.1(10) unique two digit numbers for corridors;
- 5.4.2.1(11) single digit numbers for stair wells;
- 5.4.2.2 Design external directional signage that:
 - 5.4.2.2(1) clearly indicates access for the public;
 - 5.4.2.2(2) clearly indicates restrictions to 'after-hours' access and closest accessible entrance;
 - 5.4.2.2(3) is well illuminated, backlit, reflective or high contrast and easily visible at night;
 - 5.4.2.2(4) for illuminated external Facility signage:
 - 5.4.2.2(4)(a) clearly identifies the Facility;
 - 5.4.2.2(4)(b) minimizes light spillage;
 - 5.4.2.2(4)(c) indicates the accesses, parking and restrictions for various vehicle types, as required; and
 - 5.4.2.2(4)(d) includes at least one exterior illuminated sign at Lethbridge Street that is large enough for drivers of vehicles to see at a far enough distance that they can safely slow down and follow the signage to enter the Facility and the parking areas.

5.5 Building Envelope

- 5.5.1 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.
- 5.5.2 Design exterior walls in accordance with the 'rain-screen principles'. Include a continuous air space of minimum 25 mm clear width.
- 5.5.3 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.

- 5.5.4 Ensure continuation of the air barrier, vapour barrier, thermal barrier and rain barrier across the entire envelope including foundations, walls and roofs.
- 5.5.5 Design building envelope details to avoid thermal bridging.
- 5.5.6 Utilize a building envelope consultant through design and construction.

5.6 Interior Building Components

Design and build the Facility's interior building components in accordance with the following:

5.6.1 Interior Walls and Partitions

5.6.1.1 The interior walls and partition systems will:

- 5.6.1.1(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].
- 5.6.1.1(2) Provide separations required for fire safety and protection.

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

5.6.1.3 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:

- 5.6.1.3(1) Cleaning, maintenance and infection prevention and control;
- 5.6.1.3(2) Permanence and durability including impact resistance;
- 5.6.1.3(3) Flexibility and adaptability of services;
- 5.6.1.3(4) Aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public;
- 5.6.1.3(5) Low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;
- 5.6.1.3(6) Flexibility to permit adaptability of the internal spaces, if required to suit future process revisions;
- 5.6.1.3(7) Provide fittings, attachments and internal bracing/backup as required to accommodate and support wall mounted equipment at video-conferencing room(s).

5.6.2 Ceilings

- 5.6.2.1 The ceiling system will be part of the definition of interior spaces and may be accessible or inaccessible in total or in part.
- 5.6.2.2 Accessible ceiling systems may provide access to the ceiling spaces throughout the system or at specific and particular locations.
- 5.6.2.3 Ceiling systems will comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed and will conform to the Sound Transmission ratings specified in Appendix 3D [Sound Transmission Ratings].
- 5.6.2.4 Ceiling systems can form a component of fire resistance rated separations for areas requiring such separation.
- 5.6.2.5 Ceiling height will not be less than 2.7 metres above the finished floor in all areas except for the following:
 - 5.6.2.5(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.
 - 5.6.2.5(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.
 - 5.6.2.5(3) Ceiling heights in cancer treatment vaults, the CT scan room, the Equipment Storage (future brachytherapy) Room (Rm 3.1.1.10 of the radiation therapy component of the Clinical Specifications) and other rooms requiring ceiling-installed equipment will be no less than 3.0 metres.
- 5.6.2.6 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:
 - 5.6.2.6(1) Cleaning, maintenance and infection prevention and control;
 - 5.6.2.6(2) Flexibility and access to the spaces above;
 - 5.6.2.6(3) Compatibility with mechanical, plumbing, electrical, communications services and fixtures;
 - 5.6.2.6(4) Low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality; and
 - 5.6.2.6(5) Aesthetic and design qualities to provide a healing environment for the patients, staff and public.

5.6.3 Floor Finishes

- 5.6.3.1 The floor and floor systems form a part of the interior space and will be finished to be complementary and integral to the functional and aesthetic requirements of the interior space.
 - 5.6.3.2 Floor finishes will be selected to suit types and concentration of pedestrian and/or vehicular/wheel traffic to be anticipated.
 - 5.6.3.3 Flooring designs and patterns may comprise a component of the “way-finding” system of the Facility. Refer to Section 5.4.
- 5.6.4 Design and select floor finishes to comply with the following criteria:
- 5.6.4.1 Cleaning, maintenance and infection prevention and control including the frequency and quality of joints and also including ease of replacement if and when required;
 - 5.6.4.2 Imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture;
 - 5.6.4.3 Permanence and durability and resistance to concentrated service traffic both pedestrian and vehicular;
 - 5.6.4.4 Aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public;
 - 5.6.4.5 Low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;
 - 5.6.4.6 Patterns and textures compatible with the requirements for pedestrian safety and elder friendly design. Refer to Sections 3.2 and 3.4. Non-skid flooring will be used in food service areas, laundry rooms, wash and change rooms, bathing areas, etc.
- 5.6.5 Infection Prevention and Control
- 5.6.5.1 Design the Facility to mitigate and prevent where possible, the spread of infection including via contaminated surfaces and airborne pathogens.
 - 5.6.5.2 Select appropriate materials and use simple detailing leading to quality workmanship and ease of accessibility for routine cleaning and maintenance.
 - 5.6.5.3 Design the Facility to contain infections during an outbreak at the room level.
 - 5.6.5.4 Design the Facility to consider ease of infection prevention and control in future alterations, modifications and additions.
 - 5.6.5.5 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.
 - 5.6.5.6 Locate hand wash sinks in accordance with the following design principles:

- 5.6.5.6(1) Sinks will be located at least one metre (three feet) from patients, cleaning supplies and adjacent counters.
- 5.6.5.6(2) Hand wash sinks will be free standing and not inserted into or immediately adjacent to a counter.
- 5.6.5.6(3) Sinks will be installed at least 865 mm above the floor.
- 5.6.5.7 Design of hand wash sinks will be in accordance with the following design principles:
 - 5.6.5.7(1) All materials used to construct hand wash sinks will be capable of sustaining regular cleaning/disinfection with hospital-approved cleaners and disinfectants.
 - 5.6.5.7(2) Sink size will be sufficient to prevent recontamination (from splashing) during use for hand hygiene. Cup or bar sinks are not of sufficient size for hand washing.
 - 5.6.5.7(3) Sink and spout will be designed to minimize splashing and aerosolization.
 - 5.6.5.7(4) Sink spouts will be free of aerators/modulators/rose sprays.
 - 5.6.5.7(5) Finishings around plumbing fixtures will be smooth and water resistant.
 - 5.6.5.7(6) Plug or overflows capable of taking a sink plug will not be used.
 - 5.6.5.7(7) Strainers and anti-splash fittings at outlets will not be used as they easily become contaminated with bacteria.
 - 5.6.5.7(8) Taps and controllers: Controls (water taps) will be hands free. Either electric eye (triggered by hand, not body placement) or foot pedal operation is acceptable. Taps such as gooseneck taps will not swivel. Electric eye technology will have a backup that allows for operation during power interruptions, and have a means for users to adjust water temperature adjacent to the sink.
- 5.6.5.8 Alcohol-based Hand Rub Dispensers
 - 5.6.5.8(1) Design the Facility to accommodate alcohol-based hand rub dispensers. Placement to be in accordance with "Alcohol-based Hand Rub (ABHR) Dispenser Placement Guidelines, Appendix of PHSA Hand Hygiene Campaign Toolkit, PHSA Infection Prevention and Control" and subject to prior approval by the Authority.
- 5.6.5.9 Considerations for Infection Prevention and Control Design
 - 5.6.5.9(1) Consider the following draft standards and position papers when designing infection prevention and control measures for the Facility:

"Healthcare Facility Design Position Statement published by Community and Hospital Infection Control Association (CHICA)" and "Interim Guidelines for Healthcare Design – Oncology Centers and Units, DRAFT 1 April 2007".

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 Basic Requirements

6.2.1.1 Refer to Schedule 2 [Design and Construction Protocols] regarding available survey information.

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.

6.3.1.2 Concrete material and mix proportions will be designed to provide high sulphate resistant performance if required and performance consistent with the requirements of the site geotechnical report. The concrete design mix will be designed to maximize the fly ash content and meet the BC Building Code and concrete strength performance requirement.

6.3.2 Quality Requirements

6.3.2.1 Inspection and testing of cast in place concrete and concrete materials will be carried out by a testing laboratory in accordance with CAN/CSA A23.1-04. Non-destructive Methods for Testing Concrete will comply with CAN/CSA A23.2-04.

6.3.2.2 Inspection and testing of precast concrete materials and workmanship will be carried out by the precast concrete contractor as part of its quality control program in accordance with CAN/CSA-A23.2-04. Maintain plant records and a quality control program as required by CSA A251.

6.3.2.3 Performance Criteria

6.3.2.3(1) Concrete floors will be finished with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1. Overlay toppings to level floors will not be used.

6.3.2.3(2) Cracks in concrete floors and walls will be repaired to suit the floor finish and long-term serviceability requirements of the floor.

- 6.3.2.3(3) Foundation walls for basement occupied spaces, including any occupied spaces in underground parkade levels, will be water-proofed 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 building foundation.
- 6.3.2.3(4) Design of cast in place concrete for radiation shielding will conform to the Authority's Design Criteria for High Energy Radiation Therapy Vaults.

6.4 Masonry (Division 4)

6.4.1 Basic Requirements

- 6.4.1.1 Masonry design and construction that meets or exceeds current Canadian standards and practices as set out in this Schedule, may be considered for building elements and systems, where appropriate.
- 6.4.1.2 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.
- 6.4.1.3 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 Overriding Principles

- 6.4.2.1(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.
- 6.4.2.1(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.
 - 6.4.2.1(2)(a) Painted or unpainted concrete unit masonry will not be considered an acceptable exposed finish in clinical or public areas.

6.4.2.2 Quality Requirements

- 6.4.2.2(1) Masonry design and construction will comply with CSA S304.1-04.
- 6.4.2.2(2) Concrete unit masonry practices and work standards will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual, CSA-S304.1-04, and CSA-A371-04.

6.4.3 Brick Masonry

6.4.3.1 Overriding Principles

- 6.4.3.1(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.
- 6.4.3.1(2) No brick masonry below grade for exterior applications.
- 6.4.3.1(3) Brick masonry in interior applications will have integral finish and construction compatible with the Authority's maintenance and infection prevention and control requirements.

6.4.4 Stone Masonry

6.4.4.1 Overriding Principles

- 6.4.4.1(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 Quality Requirements

- 6.4.4.2(1) 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 that meets or exceeds current Canadian standards and practices as set out in this Section, may be considered for building elements and systems, where appropriate.

6.5.2 Performance Criteria

- 6.5.2.1 Structural steel, steel deck, and cold-formed steel stud systems will be designed to comply with the deflection and vibration criteria outlined in Section 3.10.
- 6.5.2.2 Erection tolerances for steel construction will be in accordance with CSA S16-01 Clause 29.7.
- 6.5.2.3 For steel floor and roof construction, the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs will be considered. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight will be considered in the design 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 CSA A23.1. Thin overlay toppings to level floors will not be used.
- 6.5.2.5 Special attention will be paid to crack control of concrete topping slabs on steel deck. As a minimum, the following details and procedures will be implemented:
- 6.5.2.5(1) Minimize wet weight deflections of steel decking and supporting structure.
 - 6.5.2.5(2) Where practical, place concrete in alternate bays. Avoid placing large areas at one time.
 - 6.5.2.5(3) Use concrete topping with a low design slump. Add superplasticizer to increase slump for placing and finishing.
 - 6.5.2.5(4) Use 14mm or larger aggregate topping mix.
 - 6.5.2.5(5) Avoid placing topping slabs on hot or windy days.
 - 6.5.2.5(6) Reinforce topping slabs with a minimum 10M at 350mm centers each way shared a minimum 20mm above steel deck.
 - 6.5.2.5(7) Provide extra topping slab reinforcement around openings, columns, and at corners.
 - 6.5.2.5(8) Wet cure topping slabs for a minimum of three days using soaked burlap covered with polyethylene or similar methods.
- 6.5.2.6 Cracks in concrete topping slabs will be repaired to suit the floor finish and long-term serviceability requirements of the floor.
- 6.5.2.7 Steel floor/roof decking will be wide rib profile for ease of attachment of current and future services, equipment, and fixtures using drilled insert expansion anchors into the bottom of the deck ribs.
- 6.5.2.8 Steel floor/roof decking plus the concrete topping slab thickness will satisfy the requirements of a ULC-rated assembly meeting the BCBC fire rating requirements. Spray on or applied fireproofing material will not be used to achieve required floor deck fire rating.
- 6.5.2.9 Structural steel floor/roof framing and supporting members will be fire-proofed to meet the BCBC fire rating requirement.
- 6.5.2.10 Preference will be given to spray-on fire proof applications to floor/roof beams, joists, and girders for ease of attachment of future services, equipment, and fixtures.

6.5.3 Structural Steel and Steel Joists

6.5.3.1 Quality Requirements

- 6.5.3.1(1) Workmanship will be carried out by an approved testing laboratory. Testing procedures as specified in CSA S16-01 to verify soundness of representative shop and field welds will be used.
- 6.5.3.1(2) Material quality including sourcing and welding quality to be controlled by independent testing agency.

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 building envelope.
- 6.5.4.1(2) Load bearing steel studs may be part of the building structure or may be independent of the principle building structural system.

6.5.4.2 Quality Requirements

- 6.5.4.2(1) Load bearing steel stud design and construction will comply with CSA-S136-01.
- 6.5.4.2(2) Manufacturer will be certified in accordance with CSSBI Standard 30M-06 and CSA-A660-04.
- 6.5.4.2(3) 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, 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.

6.5.5 Miscellaneous Metals

6.5.5.1 Quality Requirements

- 6.5.5.1(1) Primers and paints of miscellaneous metals will conform to Master Painters Institute (MPI) Architectural Specification Standards Manual.

6.6 Wood Plastics and Composites (Division 6)

6.6.1 Basic requirements

- 6.6.1.1 Urea formaldehyde will not be used in the Facility.
- 6.6.1.2 Timber is an acceptable product for the building structure. The material and design will meet CAN/CSA 086.1-94 Code requirement.
- 6.6.1.3 Finish carpentry and architectural woodwork, including but not limited to cabinets, casework (excluding laboratory casework, which is included in Division 12), frames, panelling, trim, installation of doors and hardware, and other wood-related products and applications will be provided as required for wood products exposed to view in finished interior and exterior installations.
- 6.6.1.4 Plastic laminate surfacing and/or solid polymer fabricated surfacing will be provided as required to create surfaces that require 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 Acrylic plastic products will be provided 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 Exterior exposed wood will be pressure treated.

6.6.2 Performance Criteria

6.6.2.1 Finish carpentry and architectural woodwork

- 6.6.2.1(1) The design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork will conform to the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Quality Standards Manual (latest edition) for minimum "Custom Grade," and Door and Hardware Institute (DHI) standards.
- 6.6.2.1(2) 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(3) Adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian 'Eco-Logo' program, and, and CaGBC (Canada Green Building Council).

6.6.2.1(4) Marine-grade plywood substrate will be used for countertops.

6.7 Thermal and Moisture Protection (Division 7)

6.7.1 Basic requirements

6.7.1.1 Construction assemblies will be designed according to the building envelope principles outlined in Section 5.5 and the CMHC technical guidelines.

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

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

6.7.1.4 Comfortable, liveable interior environments will be created by providing protection such as insulation to resist the transfer of heat through exterior walls and roofs.

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

6.7.2 Performance criteria

6.7.2.1 Damp proofing

6.7.2.1(1) Foundation wall surfaces will have sufficient damp proofing coverage that is sufficient to repel and prevent moisture ingress.

6.7.2.2 Waterproofing

6.7.2.2(1) Waterproofing will be provided to prevent moisture ingress to occupied spaces below grade, including any occupied spaces in below-grade parking levels.

6.7.2.2(2) Sheet membrane waterproofing will be used to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated.

6.7.2.2(3) Waterproof membranes will be provided in exterior walls as part of the building envelope and integral with rain screen or cavity wall assemblies.

6.7.2.3 Vapour Barriers

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

6.7.2.4 Air barriers

6.7.2.4(1) Air barrier assemblies will be designed to limit air ex-filtration and infiltration through materials of the assembly, joints in the assembly, joints in components of the wall assembly, and junctions with other building elements including the roof.

6.7.2.4(2) Air barrier assemblies will prevent air leakage caused by air pressure across the wall and roof assembly in accordance with the standards listed above, including interruptions to the integrity of wall and roof systems such as junctions with dissimilar constructions.

6.7.2.5 Thermal protection

6.7.2.5(1) Thermal insulation will be provided as part of the building envelope to prevent the transfer of heat both from the interior to the exterior and vice versa, dependent on seasonal conditions, and to resist the absorption of water.

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

6.7.2.5(3) Foamed plastic insulation will be CFC and HCFC free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.

6.7.2.5(4) Minimum insulation values will be 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) Materials and workmanship for roofing will conform to the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) latest Standards and requirements for five (5) year Guarantee, as published in the RGC Roofing Practices Manual.

6.7.2.6(2) Roof materials will comply with RGC Roofing Practices Manual "Acceptable Materials List," including:

6.7.2.6(2)(a) Flexible membrane – SBS modified (two-ply system)

- 6.7.2.6(2)(b) Flexible membrane – Elastomeric or Thermoplastic (single-ply system)
- 6.7.2.6(3) Quality of roofing will undergo inspections as required by the RCABC to be obtain the RCABC warranty.
- 6.7.2.6(4) Foamed plastic insulation will be CFC- and HCFC-free and in compliance with the Province of British Columbia Ozone Depleting Substances Regulations.
- 6.7.2.6(5) A complete horizontal barrier to weather and climate will be provided, using one of the following construction systems as applicable to the installation required:
 - 6.7.2.6(5)(a) Built-up bituminous or non-bituminous exposed or protected roofing systems, or
 - 6.7.2.6(5)(b) Other roofing systems such as sheet metal, shingles, and roof tiles.
- 6.7.2.6(6) Roofing systems will include:
 - 6.7.2.6(6)(a) Flashings and sheet metal;
 - 6.7.2.6(6)(b) Thermal insulation;
 - 6.7.2.6(6)(c) Roofing specialties and accessories required for completion;
 - 6.7.2.6(6)(d) Interior access systems to roof areas;
 - 6.7.2.6(6)(e) Protection from pedestrian traffic and solar radiation;
 - 6.7.2.6(6)(f) Roof drainage, including overflow scuppers.
- 6.7.2.6(7) Sheet metal flashings will be designed to divert water away from membrane flashing termination and protect the membrane from deterioration due to the elements and mechanical damage. The roofing membrane will be continuous under the metal.
- 6.7.2.6(8) 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. Building design and roof systems will ensure that entrance ways are protected from sliding snow and ice and will ensure that there are no accumulations of snow and ice in roof valleys.

6.7.2.7 Fire and Smoke Protection

- 6.7.2.7(1) Spray-applied cementitious fire proofing will conform to ULC standards and will be certified by Warnock Hersey (WH), or another certification body approved by the Authority.
- 6.7.2.7(2) Barriers will be integrated into vertical and horizontal space separations to protect against the spread of fire and smoke, and protection will be applied to exposed building elements (structural and non-structural) susceptible to fire and subsequent damage.
- 6.7.2.7(3) Penetrations of vertical and horizontal fire-resistance rated separations will be protected.
- 6.7.2.7(4) Fire-stopping and smoke seal systems will consist of asbestos-free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.
- 6.7.2.7(5) Fire-stopping materials will:
 - 6.7.2.7(5)(a) Be compatible with substrates;
 - 6.7.2.7(5)(b) Allow for movement caused by thermal cycles;
 - 6.7.2.7(5)(c) Prevent 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, all products will be compatible and from the same manufacturer.
- 6.7.2.7(7) Fire stopping sealants and coatings will be silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water; acrylic-based coatings and sealants are not acceptable.

6.7.2.8 Sealants

- 6.7.2.8(1) Sealant materials will be applied to achieve:
 - 6.7.2.8(1)(a) Seals to the building envelope systems or around openings in the building envelope systems as required to prevent water ingress;
 - 6.7.2.8(1)(b) Seals around and over cavities in or behind surface elements to allow effective infection prevention and control;
 - 6.7.2.8(1)(c) Sealed joints between dissimilar or similar materials to allow a smooth or even transitions;

- 6.7.2.8(1)(d) Sealed expansion or controls joints in the building envelope systems or structural systems to allow movement.
- 6.7.2.8(1)(e) No cracks will be allowed in clinical areas.
- 6.7.2.8(2) Exterior sealants will completely and continuously fill joints between dissimilar and/or similar materials.
- 6.7.2.8(3) Interior sealant (at frames such as those at doors, windows and skylights) will completely fill joints between dissimilar materials and will be one component, acrylic emulsion type.
- 6.7.2.8(4) Silicone caulking to washroom plumbing fixtures will be mildew-resistant and impervious to water.
- 6.7.2.8(5) Sealants applied to expansion and control joints in concrete floors requiring self-levelling properties will be two-component epoxy urethane sealants for horizontal surfaces.
- 6.7.2.8(6) Sealants for exterior vertical expansion and control joints in masonry or wall cladding will be non-sag sealant.
- 6.7.2.8(7) Sealants will allow for minimum 25% movement in joint width.
- 6.7.2.8(8) In corridors and other traffic areas used by laundry carts, supply carts, material handling equipment etc., sealant will be traffic bearing type and suitable to support imposed load without deformation or failure.

6.7.2.9 Traffic Coatings

- 6.7.2.9(1) If parking structures (above ground or underground) are provided, the structural concrete floor slabs of such parkade structures will be protected with a traffic coating to prevent the ingress of moisture into the slab.
- 6.7.2.9(2) The traffic coating will comply 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 Duodeck 390 and that meets or exceeds 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, Duochem 392 SA.

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 (20 mils) thick and extend the membrane a minimum of 10 cm (4") 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, interior windows and sidelights will be constructed of tempered glass. Exterior glazing at doors and sidelights will be laminated.

6.8.1.2 Installation methods and locations for doors, frames, and hardware will conform to Door and Hardware Institute (DHI) standards.

6.8.1.3 Doors

6.8.1.3(1) Doors will be sized, fabricated, and installed to suit the intended function of spaces or rooms requiring acoustic or visual privacy, security, special HVAC requirements, fire-resistance rated separations or other closures.

6.8.1.3(2) Size Requirements for Doors

6.8.1.3(2)(a) Door openings will be of adequate width to suit the intended purpose of rooms on either side of the doors and allow the movement of people and equipment associated with those rooms.

6.8.1.3(2)(b) Double doors will be provided into rooms where large pieces of equipment will be moved in or out during the

lifetime of the Building and where such equipment cannot pass through 1200 mm single door openings.

- 6.8.1.3(2)(c) Door openings must accommodate movement of equipment.
- 6.8.1.3(2)(d) Double doors will be provided 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.
- 6.8.1.3(2)(e) Unless required otherwise, doors to patient areas, including doors to water closets and change room cubicles, will have a minimum width of 950 mm.
- 6.8.1.3(2)(f) No single door will be less than 750 mm wide.
- 6.8.1.3(2)(g) No door or door leaf will be less than 2150 mm high, unless specifically required for access to services or other purposes where height is restricted.
- 6.8.1.3(3) Acoustic requirements for doors, windows within doors and interior windows beside doors:
 - 6.8.1.3(3)(a) Comply with Appendix 3D [Sound Transmission Ratings].
- 6.8.1.3(4) Except for rooms requiring a positive or negative pressurization, in-patient room doors will have hardware that allows the doors to stay in an open position and facilitate casual observance of patients by the nursing staff.
- 6.8.1.3(5) Doors into or between major departments or activity areas through which cart, stretcher, or bed traffic is anticipated on a routine basis will be automatically activated by an electronic device or manual push button, located to allow emergency access without the necessity to stop movement. All other doors through which cart, stretcher, bed, or frequent patient or staff traffic is anticipated on a routine basis will have appropriate hardware or automatic activation that allows the doors to stay in an open position.
- 6.8.1.3(6) Door sizes and designs will be applied consistently to rooms of similar use, location, and configuration.
- 6.8.1.3(7) Doors will not swing 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.

- 6.8.1.3(8) Doors may swing into patient bathrooms, provided they allow for ease of patient use, both on their own and assisted by staff. Such doors will be equipped with appropriate hardware to allow the door to be opened out into the room in an emergency situation.
- 6.8.1.3(9) Doors will have appropriate hinges, edge protection, and face protection to minimize damage and resultant disruptive maintenance.
- 6.8.1.3(10) Doors and frames will have a suitable finish that prevents dirt and fingerprint accumulation, and can be easily cleaned and disinfected.
- 6.8.1.3(11) The extent of glazing in a door, or the size and quantity of sidelights, will be consistent and balanced between the nature of observation required and the privacy requirements of the occupants of the room. Where possible and appropriate, the preference is to provide glazing in an adjacent sidelight rather than within the door itself.
- 6.8.1.3(12) Glazing in doors and sidelights will allow patient observation and operational safety of the spaces they serve. Blinds or window coverings suitable and appropriate for the level of privacy intended and required will be provided. Blinds will be integral with the window air space.
- 6.8.1.3(13) Doors and door frames will have 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.
- 6.8.1.3(14) In areas where security is considered paramount, safety and security will be achieved with the appropriate location, configuration, materials, construction, and detailing of doors and hardware. Coordination with and approval by the Authority is required.

6.8.1.4 Windows

- 6.8.1.4(1) Windows will be sized, configured, and adequately constructed to suit rooms that require daylight, views and/or natural ventilation.
- 6.8.1.4(2) Consideration will be given to 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.
- 6.8.1.4(3) Glazing heights will be coordinated 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 frames will conform to the requirements of the Canadian Steel Door and Frame Manufacturer's Association (CSDFMA).
- 6.8.2.1(2) Interior metal doors will have flush faced construction.
- 6.8.2.1(3) Exterior Metal Doors will have:
 - 6.8.2.1(3)(a) flush faced 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) Pressed Metal Frames will have:
 - 6.8.2.1(4)(a) fully welded construction;
 - 6.8.2.1(4)(b) thermally-broken door frames; and
 - 6.8.2.1(4)(c) anchors to each jamb to suit wall type and receive the frame.
- 6.8.2.1(5) Door Glazing
 - 6.8.2.1(5)(a) Exterior glazing will be sealed units in thermally-broken frames to prevent heat loss.

6.8.2.2 Wood Doors

- 6.8.2.2(1) Wood doors will conform to the Quality Standards for Architectural Woodwork (latest edition) published by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC).
- 6.8.2.2(2) Wood doors will be sized, constructed and provided with hardware and finishes to suit the intended function and aesthetics of the Facility.
- 6.8.2.2(3) Construction, finish, and installation will attempt to minimize the requirement for maintenance and resulting disruption to Facility operations.
- 6.8.2.2(4) Wood doors will be flush Custom Grade quality (as defined in the AWMAC standards referred to above), solid particleboard core.

- 6.8.2.2(5) Fire-resistance rated doors will be constructed with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.
- 6.8.2.2(6) Finish hardware will be installed securely to resist loosening over time and fastened to solid wood backing, except where hardware is designed to be through-bolted.
- 6.8.2.2(7) Stiles, rails and faces will be glued 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) Face veneer will be B-Grade hardwood veneer with AWMAC No. 3 edge and finished to suit the intended use.
- 6.8.2.2(9) Wood veneer-faced doors will not be used 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) Doors used in locations requiring radiation protection will:
 - 6.8.2.2(10)(a) be lined with lead and labelled with lead thickness; and
 - 6.8.2.2(10)(b) be labelled with the STC rating if required.

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 or provide glazed interior partitions as appropriate to comply with functional program requirements.
- 6.8.2.3(2) Aluminum doors will be used within aluminum entrances and storefront.
- 6.8.2.3(3) Frames will be thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.
- 6.8.2.3(4) Frames will incorporate drained and vented system (rain screen) with a complete air and vapour seal, allowing any moisture entering the frame to drain to the exterior and allowing air into the pressuring chamber.
- 6.8.2.3(5) Aluminum swing entrance doors will be heavy-duty commercial or institutional grade and may be automatically operated, motion-detector controlled, with longer opening times for the elderly.
- 6.8.2.3(6) Aluminum finish for exposed aluminum surfaces will be applied in the manufacturing process and be permanent and resistant to corrosion caused by weather exposure and climate.

6.8.2.4 Specialty Doors

- 6.8.2.4(1) Overhead Rolling Service Doors
 - 6.8.2.4(1)(a) Lateral movement of door curtain slats will be restrained. Windlocks will be provided as required by door size or wind load requirements.
 - 6.8.2.4(1)(b) Curtain slats will be interlocking flat slats, complete with bottom bar and contact type bottom astragal.
 - 6.8.2.4(1)(c) Manual operation will be provided with inside lift handle and locking bar or chain hoist. Motor operation 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, automatic closing device will be operated by fire door release device connected to fire alarm system.
- 6.8.2.4(2) Overhead Rolling Grilles
 - 6.8.2.4(2)(a) Overhead rolling grilles will be fabricated with metal components, and assembled to allow visual access to secure areas.
 - 6.8.2.4(2)(b) Grille guides will be complete with aluminum or steel guides, fabricated to withstand vertical and lateral loads, counterbalanced by helical torsion springs, and sound-deadened.
 - 6.8.2.4(2)(c) Manual operation will be provided with inside lift handle and locking bar or chain hoist. Motor operation may be provided on grilles requiring constant usage. Chain operation will be by means of reduction gears and galvanized hand chain.
- 6.8.2.4(3) Overhead Rolling Counter Shutters
 - 6.8.2.4(3)(a) Shutter curtains will be fabricated with extruded aluminum, galvanized steel, or stainless steel interlocking flat slats, complete with guides of similar materials.
 - 6.8.2.4(3)(b) Shutters will have manual operation and locking capability.

- 6.8.2.4(4) Interior Aluminum Sliding Doors and Sidelights
- 6.8.2.4(4)(a) Interior sliding doors and sidelights will have recessed mounted track with sliding and fixed panel(s), and suitable for single glazing 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) Doors equipment will accommodate medium to heavy pedestrian traffic and up to the following weights for active leaf doors: 100 kg for locations as designated bi-part, 200 kg for single slide.
- 6.8.2.4(5)(c) Door operator, including the motion and presence detection system, will be capable of operating within the temperature ranges existing at the Facility and be unaffected by ambient light or ultrasonic interference.
- 6.8.2.4(5)(d) Energy-saving devices will be provided to reduce conditioned air loss.
- 6.8.2.4(6) Automatic Swing Doors
- 6.8.2.4(6)(a) Automatic swing doors will be used for interior and exterior locations where appropriate, including for 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) Door equipment will accommodate medium to heavy pedestrian traffic and up to 98 kg weight of doors.
- 6.8.2.4(6)(c) Directional motion sensor control device, if used, will be unaffected by ambient light or ultrasonic frequencies.
- 6.8.2.4(6)(d) All in-swing doors that are required exits will be equipped with an emergency breakaway switch that

internally cuts power to the operator. No external power switch will be allowed

- 6.8.2.4(6)(e) Longer hold-open times will be implemented to accommodate the elderly and frail.

6.8.2.4(7) Aluminum Curtain Walls

- 6.8.2.4(7)(a) Aluminum curtain walls will conform to the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

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

- 6.8.2.4(7)(c) The design of the curtain wall framing will incorporate a thermal-break system.

- 6.8.2.4(7)(d) Aluminum finish for exposed aluminum surfaces will be permanent and resistant to corrosion resulting from weather exposure and climate.

- 6.8.2.4(7)(e) The assembly will be designed to resist local seismic conditions.

- 6.8.2.4(7)(f) The assembly will resist 1-in-100 year climatic events (with a safety factor).

6.8.2.5 Aluminum Windows

- 6.8.2.5(1) Aluminum windows will conform to the Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications.

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

- 6.8.2.5(3) The design of the curtain wall framing will incorporate a thermal-break system.

- 6.8.2.5(4) Aluminum finish for exposed aluminum surfaces will be permanent and resistant to corrosion resulting from weather exposure and climate.

- 6.8.2.5(5) The assembly will be designed to resist local seismic conditions.
- 6.8.2.5(6) The assembly will resist 1-in-100 year climatic events (with a safety factor).
- 6.8.2.6 Skylights
 - 6.8.2.6(1) Skylights will conform to 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) Aluminum finish for exposed aluminum surfaces will be 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 materials and workmanship will conform to the Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines, and the Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual.
 - 6.8.2.7(2) Exterior and/or interior glass and glazing may be provided as integral components of the exterior building envelope, interior partitions and screens, exterior and interior doors, handrail balustrades, skylights and decorative and ornamental glazing.
 - 6.8.2.7(3) The assembly will be designed to resist local seismic conditions.
 - 6.8.2.7(4) The assembly will resist 1-in-100 year climatic events (with a safety factor).
 - 6.8.2.7(5) Laminated safety glass will be used 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) Full wall unframed mirrors will be 6 mm thick minimum float glass backed with electrolytically-applied copper plating. All edges will be ground smooth and polished.
 - 6.8.2.7(6)(b) Wall mounted posture mirrors will be framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back will be galvanized steel.

6.8.2.8 Finish Hardware

- 6.8.2.8(1) Finish hardware materials and workmanship will conform to quality standards of the Door and Hardware Institute (DHI).
- 6.8.2.8(2) Finish hardware supplier will be an established contract builders hardware firm who will have in its employ one or more AHC (Architectural Hardware Consultant) who are members in good standing of the Door and Hardware Institute (DHI) and who will be responsible for the complete hardware contract.
- 6.8.2.8(3) Finishes will be selected to provide maximum longevity and preservation of the finish.
- 6.8.2.8(4) Hardware, where applicable, will be ULC-listed for fire rating for all functions up to 2-hour doors.
- 6.8.2.8(5) Hardware will be heavy-duty commercial quality. Locksets and latchsets will be fully mortised type and lever handles will be solid material.
- 6.8.2.8(6) Hardware in special areas will suit the purposes unique to those areas, as identified in the user consultation process as described in Appendix 2C [User Consultation Protocol].
- 6.8.2.8(7) Keying
 - 6.8.2.8(7)(a) Primus EF Level 2 Cylinders will be supplied.
 - 6.8.2.8(7)(b) 4-level system will be implemented.
 - 6.8.2.8(7)(c) Keying groups will be assigned by the Authority.
 - 6.8.2.8(7)(d) New key fittings will be given to and controlled by the Authority.
 - 6.8.2.8(7)(e) Keys from factory will be given to the Authority.
 - 6.8.2.8(7)(f) Four (4) keys will be supplied 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, water will be allowed to collect and exist 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, finish materials will be durable to withstand damage and easily replaceable in sections if damage does occur.
 - 6.9.1.4 Infection prevention and control will be a priority in the selection of finishes for all patient care areas.
 - 6.9.1.5 Acoustic characteristics of finish materials will be a priority consideration.
 - 6.9.1.6 The appearance of finishes and colours will create and promote a natural healing environment, prevent glare, and minimize artificial lighting requirements.
 - 6.9.1.7 Selection of materials will promote sustainability by, for instance, having low-emissivity or comprising of renewable resources.
 - 6.9.1.8 The absence of known carcinogenic chemicals used in the manufacture or disposal of materials will be a priority consideration. Consult the Green Guide for Healthcare Version 2.2.
 - 6.9.1.9 The absence of chemicals in material manufacture or disposal with other negative health effects will be a priority consideration. Consult the Green Guide for Healthcare Version 2.2.
- 6.9.2 Performance Criteria
- 6.9.2.1 Interior Wall Framing
 - 6.9.2.1(1) Materials and workmanship for interior walls, including steel studs and furring and gypsum board ceiling suspension systems, will conform to the Canadian Sheet Steel Building Institute Standards (CSSB1), and the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition).
 - 6.9.2.1(2) System design and components will meet seismic restraint requirements.
 - 6.9.2.1(3) Prefabricated steel studs for interior partitions and furring will be non-load bearing, with no axial load other than its own weight, the weight of attached finishes, and lateral loads of interior pressure differences and seismic loads.
 - 6.9.2.1(4) Steel stud framing construction will accommodate electrical, plumbing and other services in the partition cavity, and support fixtures, wall cabinets and other such wall-mounted items with reinforcement and backing.

- 6.9.2.1(5) Design will consider the differences in air pressure that may result on opposite sides of the wall or partition due to factors such as wind and other lateral pressures, stack effects, or mechanically-induced air pressurization.

6.9.2.2 Gypsum Board

- 6.9.2.2(1) Materials and workmanship for gypsum board and accessories will conform to the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition).
- 6.9.2.2(2) Thickness of gypsum board will be no less than 5/8" (16 mm).
- 6.9.2.2(3) Except as described in Section 6.9.2.2(4), glass mat water-resistant gypsum backing panels (tile backer board) will be used behind ceramic wall tile in showers, behind sinks, or other wet areas.
- 6.9.2.2(4) Reinforced cementitious board or cementitious backer unit (CBU) may be used as an alternative to glass mat water-resistant gypsum backing panels in 6.9.2.2(3).
- 6.9.2.2(5) Abuse-resistant gypsum board will be provided where required for increased resistance to abrasion, indentation, and penetration of interior walls and ceilings.
- 6.9.2.2(6) Glass mat surfaced gypsum sheathing board will be used wherever exterior gypsum sheathing is required at exterior walls.
- 6.9.2.2(7) Airborne sound insulation will be provided for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Assemblies will be airtight. Recessed wall fixtures such as cabinets or electrical, telephone and television outlets and medical gas outlets, which perforate the gypsum board surface, will not be located back-to-back. In addition, any opening for fixtures will be carefully cut to the proper size and piping penetrations will be appropriately sealed. Conduit/duct/piping penetrations will be sealed with tape and filled at the plenum barrier. The entire perimeter of a sound insulating assembly will be made airtight to prevent sound flanking. An acoustic caulking compound or acoustical sealant will be used to seal between the assembly and all dissimilar surfaces (including at window mullions) in accordance with the recommendations of an acoustic consultant.

6.9.2.3 Ceramic Tilework

- 6.9.2.3(1) Materials and workmanship for ceramic tilework will conform to the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual (latest edition).

- 6.9.2.3(2) In order to reduce opportunities for the spread of infection, use of ceramic tile will be minimized in interior applications at patient and other clinical areas.
- 6.9.2.3(3) Floor tile installed on wet and exterior surfaces will 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) Exterior tiles will be frost-resistant and have a moisture absorption rating of 3.0% or less.
- 6.9.2.3(5) Control joints and expansion joints will be provided in conformance with the recommendations of the TTMAC Tile Installation Manual.
- 6.9.2.3(6) A waterproof membrane will be provided 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) Crack isolation membranes will be provided to resist crack transmission from the substrate due to lateral movement and designed for use in thin-set applications of tile over a cracked substrate. Materials used will be elastomeric sheets or trowel-applied materials suitable for subsequent bonding of ceramic tile.
- 6.9.2.3(8) Ceramic tile will be set and grouted with epoxy setting and grouting materials.
- 6.9.2.4 Ceilings
 - 6.9.2.4(1) Acoustic Tile Ceilings
 - 6.9.2.4(1)(a) Ceiling tiles may be used in the following locations:
 - (a).1 Hallways;
 - (a).2 Communication rooms;
 - (a).3 Offices, meeting rooms;
 - (a).4 Common lobby, admitting areas;
 - (a).5 Waiting areas;
 - (a).6 Quiet rooms, Chapel rooms;
 - (a).7 Staff sleep rooms;

- (a).8 Pharmacy;
 - (a).9 Cafeterias and coffee/gift shops;
 - (a).10 Dining rooms;
 - (a).11 Patient and staff lounges; and
 - (a).12 Other areas requiring a non-institutional finish.
- 6.9.2.4(1)(b) Acoustic Tile: Non-Fire Rated
- 6.9.2.4(1)(c) Project Co will use Celotex Barouqe Wet-Felted Acoustical Ceiling Tile, Product # BET-197, Safetone Class A., or Armstrong 823 or an equivalent product approved in advance by the Authority.
- 6.9.2.4(1)(d) These are a non-directional, fissured pattern, white ceiling panel.
- 6.9.2.4(1)(e) They have a Trim Edge detail (Square) to fit a standard 15/16" grid.
- 6.9.2.4(1)(f) Panel size is 24X48X5/8", 64 sq. ft. per carton.
- 6.9.2.4(1)(g) Installation is to be as per manufacturer's specification.
- 6.9.2.4(1)(h) Dust generated from making modifications of tile will be cleaned by wet wiping or filtered vacuuming. Do not dry sweep or used compressed air to remove dust.
- 6.9.2.4(1)(i) Acoustic Tile: Fire Rated
- 6.9.2.4(1)(j) Project Co will use Celotex Barouque Wet-Felted Acoustical Ceiling Tile, Product # PBT-197, Protectone (For specific UL fire resistance time-rated assemblies)., or Armstrong 1728 or an equivalent product approved in advance by the Authority.
- 6.9.2.4(1)(k) These are a non-directional, fissured pattern, white ceiling panel.
- 6.9.2.4(1)(l) They have a Trim Edge detail (Square) to fit a standard 15/16" grid.
- 6.9.2.4(1)(m) Panel size is 24X48X5/8", 64 sq. ft. per carton.
- 6.9.2.4(1)(n) Installation is to be as per manufacturer's specification.
- 6.9.2.4(1)(o) Dust generated from making modifications of tile should be cleaned by wet wiping or filtered vacuuming. Do not dry sweep or used compressed air to remove dust.

- 6.9.2.4(1)(p) Interior sound levels will be controlled to facilitate a comfortable and healing environment for patients and a safe working environment for Facility staff.
- 6.9.2.4(1)(q) Acoustic ceiling tiles in a suspension system will be installed to provide the levels of sound attenuation to suit the intended function of the room.
- 6.9.2.4(1)(r) Ceiling tiles in a suspension system will provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.
- 6.9.2.4(1)(s) Special surface-treated ceiling tiles, such as wood, mylar or metal-faced tiles, may be installed where maintenance and ease of cleaning are priorities as well as the accessibility and acoustic requirements.
- 6.9.2.4(1)(t) System design and components will meet seismic restraint requirements.
- 6.9.2.4(1)(u) Standard acoustical panels and tiles will be designed for installation within the normal occupancy condition range of 15°C - 29°C and maximum 70% relative humidity. When the service use temperature and relative humidity are expected to exceed these ranges, use of acoustical units specifically designed for such applications will be considered.
- 6.9.2.4(1)(v) In any area where lay-in ceiling panels frequently need to be removed for plenum access, tiles will be provided with scratch-resistant surfaces.
- 6.9.2.4(1)(w) Ceilings installed in food preparation areas will be capable of being cleaned without undue wear on the tile.
- 6.9.2.4(2) "Hard" Ceilings
 - 6.9.2.4(2)(a) Hard ceilings are to be constructed of ½ " 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. The finish of the hard ceilings will be as per the paint specifications outlined in Section 6.9.2.7. The following rooms will have the hard ceilings:

- (a).1 Housekeeping and Utility rooms;
- (a).2 Patient care, treatment rooms;
- (a).3 Chemo Therapy and other specialty treatment areas;
- (a).4 Kitchenette rooms;
- (a).5 Maintenance;
- (a).6 Storage Rooms;
- (a).7 Sterile supply rooms;
- (a).8 Laundry rooms;
- (a).9 Washroom, tub and bath rooms;
- (a).10 Stairwells;
- (a).11 Closets; and
- (a).12 Other areas where infection prevention and control may be an issue.

6.9.2.4(3) Specialty Ceilings

- 6.9.2.4(3)(a) Ceilings in Radiology and X-Ray rooms are to be lead lined gyproc as per the "Radiation Protection In Radiology Safety Code, Section B".

6.9.2.5 Flooring

6.9.2.5(1) All Rooms Except Wet Rooms

- 6.9.2.5(1)(a) Project Co will use Tarkett Granitt for all rooms except wet rooms in the Facility or an equivalent product approved in advance by the Authority.
- 6.9.2.5(1)(b) All joins will be hot welded seam.
- 6.9.2.5(1)(c) All installs will have a 150 mm Tarkett coved base.
- 6.9.2.5(1)(d) Cove will not be capped, but will be straight cut, finished with clear silicone caulking.
- 6.9.2.5(1)(e) Flooring adhesive to be water soluble, low odour product.
- 6.9.2.5(1)(f) New installs will be hot welded to existing floor product.
- 6.9.2.5(1)(g) Where there is no existing product to butt against, edging will be finished with vinyl finishing strip as per manufacturers specifications.
- 6.9.2.5(1)(h) Flooring will not be finished with sealer and/or wax, but must be finished with high speed buffing as per manufacturers specification.

- 6.9.2.5(2) Wet Rooms
- 6.9.2.5(2)(a) Project Co will use Tarkett Eminent Safe T for all wet rooms in the Facility or an equivalent product approved in advance by the Authority.
- 6.9.2.5(2)(b) All joins will be hot welded seam.
- 6.9.2.5(2)(c) All installs will have a 150 mm Tarkett eminent covered base.
- 6.9.2.5(2)(d) Cove will not be capped, but will be straight cut, finished with clear silicone Caulking
- 6.9.2.5(2)(e) Flooring adhesive to be solvent based, low odour product.
- 6.9.2.5(2)(f) New installs will be hot welded to existing floor product.
- 6.9.2.5(2)(g) Where there is no existing product to butt against, edging will be finished with vinyl finishing strip.
- 6.9.2.5(3) Stair Covering
- 6.9.2.5(3)(a) Stair treads will be one piece solid vinyl Johnsonsite VIRTR (visually impaired roundel tread riser) with carborundum strip or an equivalent product approved in advance by the Authority.
- 6.9.2.5(3)(b) Adhesive to be water soluble, low odour product.
- 6.9.2.5(4) Other Flooring
- 6.9.2.5(4)(a) There may be floor surfaces that require specialized application such as Stonehard, poured epoxy, painted concrete or special vinyl. Project Co will consult with the Authority to determine areas where these applications are required.
- 6.9.2.5(4)(b) In areas where floor patching is required, Project Co will ensure that replacement matches, as closely as possible, the existing flooring.
- 6.9.2.5(5) Materials and workmanship for flooring will conform to the National Floor Covering Association (NFCA) Specification Standards Manual. US Federal Specification RR-T-650d.

- 6.9.2.5(6) The selection process for flooring materials will include considerations of cleaning and maintenance, pedestrian and rolling traffic, acoustics, infection prevention and control, and aesthetics.
- 6.9.2.5(7) Epoxy flooring in all wet areas will be water and slip-resistant and prevent water or moisture transmission to the substrate. Flooring will terminate at the walls in the form of 150mm high flash coves in these areas.
- 6.9.2.5(8) Flooring on which wheeled or service vehicle traffic is anticipated and to which wear and damage may result will be comprised of suitably heavy-duty materials.
- 6.9.2.5(9) Flooring in areas subject to moisture and heat over extended periods of time will comprise of permanent, heavy-duty integral materials such as seamless epoxy quartz flooring.
- 6.9.2.5(10) Flooring in patient and staff areas where cart or stretcher traffic is expected or where cleaning on a regular or emergency basis is necessary will be of a quality suitable for those purposes.
- 6.9.2.5(11) Flooring in public, staff, and patient washrooms will be impervious to water and have a slip-resistant finish.
- 6.9.2.5(12) Resilient tile products will be considered for flooring in service corridors and service areas.
- 6.9.2.5(13) Resilient Flooring
- 6.9.2.5(13)(a) Slip-resistant sheet vinyl will have a static coefficient of friction of 0.6 on level surfaces and 0.8 on ramps.
- 6.9.2.5(13)(b) Exposed surface will provide anti-bacterial activity against gram-positive and gram-negative micro-organisms. All seams will be welded. Areas surfaced in sheet flooring will have integral cove bases.
- 6.9.2.5(13)(c) Linoleum sheet flooring will be a homogenous sheet linoleum of primarily natural materials, consisting of linseed oil, wood flour, and resin binders mixed and calendared onto a natural jute backing. All seams will be welded. Areas surfaced in sheet flooring will have integral cove bases.
- 6.9.2.5(13)(d) Rubber flooring tile will be 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 will 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. Areas surfaced with resilient tile flooring will have rubber bases.

6.9.2.5(13)(e) Tactile warning strips and stair nosings will be provided to assist the visually impaired.

6.9.2.5(13)(f) Adhesive for resilient flooring will meet or exceed EPA Standards for acceptable VOC concentration and emission rates.

6.9.2.5(14) Seamless Quartz Epoxy Flooring

6.9.2.5(14)(a) Seamless epoxy flooring will be a 100% solids, zero VOC, solvent-free system comprised of a two-component epoxy primer, a two-component epoxy resin and curing agent, coloured quartz aggregate broadcast into both primer and undercoat, and a high performance, UV-resistant two-component, clear epoxy sealer. Bases will be integral cove bases.

6.9.2.5(15) Carpets and Carpet Tiles

6.9.2.5(15)(a) Carpeting will be certified under CCI/CRI Indoor Air Quality Program and will have 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)(b) Carpet will maintain static generation at less than 3.5 KV at 21 °C and 20% relative humidity throughout the life of the product.

6.9.2.5(15)(c) Adhesive for carpet will be non-solvent, non-toxic, odourless adhesive that, when installed, will meet or exceed EPA Standards for acceptable VOC concentration and emission rate.

6.9.2.5(15)(d) Carpet will be designed to accept wheelchair traffic.

6.9.2.6 Acoustic Treatment

6.9.2.6(1) Design 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 paramount.
- 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 Facility 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.
 - 6.9.2.6(3)(e) Sound isolation as required for Specialty rooms such as video-conferencing.
- 6.9.2.6(4) Partition and ceiling construction will provide approximately the same degree of sound control through each assembly. When a partition is used for sound isolation, the sound control construction will extend from slab to slab.
- 6.9.2.6(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, placing them back-to-back and next to each other will be minimized. Electrical boxes and medical gas outlets will be staggered, preferably by at least one stud space. Mineral fibre insulation will be used 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) Constructions such as ducts, rigid conduits, or corridors that act as speaking tubes to transmit sound from one area to another will be minimized. Common supply and return ducts will have sound attenuation liners at the diffuser and/or grill to maintain assemblies' STC. Conduit will be sealed.
- 6.9.2.6(8) To isolate structure-borne vibrations and sound, vibrating equipment will have resilient mountings to minimize sound transfer to structural materials. Ducts, pipes, and conduits will have resilient, non-rigid boots or flexible couplings where they leave vibrating equipment; and they

will be isolated from the structure with resilient gaskets and sealant where they pass through walls, floors, or other building surfaces.

- 6.9.2.6(9) Acoustic screens, vibration isolators, and carefully selected exterior equipment will be used to prevent exterior noise that neighbours may find offensive.

6.9.2.7 Painting and Protective Coatings

6.9.2.7(1) Walls, Doors and Shelving

- 6.9.2.7(1)(a) Project Co will use General Paint HP 2000 eggshell or semi gloss for all walls, doors and shelving in the Facility, or an equivalent product approved in advance by the Authority.

6.9.2.7(2) Door frames and metal doors

- 6.9.2.7(2)(a) Project Co will use General Paint Enviroguard semi gloss for all door frames and metal doors in the Facility, or an equivalent product approved in advance by the Authority.

6.9.2.7(3) Wood finish doors

- 6.9.2.7(3)(a) Project Co will use General Paint Clear Coat Interior Tru-Rub Varnish for all wood finish doors in the Facility, or an equivalent product approved in advance by the Authority.

6.9.2.7(4) Paint Grade Doors

- 6.9.2.7(4)(a) Project Co will use General Paint HP 2000 semi gloss for all paint grade doors in the Facility, or an equivalent product approved in advance by the Authority.

6.9.2.7(5) Ceilings

- 6.9.2.7(5)(a) Project Co will use General Paint Z coat Flat for all ceilings in the Facility, or an equivalent product approved in advance by the Authority.

6.9.2.7(6) New wall / product finish

- 6.9.2.7(6)(a) Project Co will use General Paint Interior Super Seal Latex Sealer, or an equivalent product approved in advance by the Authority.

- 6.9.2.7(7) Exterior walls
- 6.9.2.7(7)(a) Project Co will use General Paint Breeze Exterior semi gloss latex for all of the exterior walls of the Facility, or an equivalent product approved in advance by the Authority.
- 6.9.2.7(8) Floors, concrete
- 6.9.2.7(8)(a) Project Co will use Cloverdale Paints ClovaCoat 300, base component A, curing agent B, or an equivalent product approved in advance by the Authority.
- 6.9.2.7(8)(b) Primer if needed will be Preptech 83020, base component A, curing agent B or an equivalent product approved in advance by the Authority.
- 6.9.2.7(8)(c) Thinner: C70 or C25, or an equivalent product approved in advance by the Authority.
- 6.9.2.7(9) Materials and workmanship will conform to Master Painters Institute (MPI) Architectural Painting Specification Manual (latest edition).
- 6.9.2.7(10) Exterior paints and painting will be of a quality to protect the substrate materials from weather and climate conditions.
- 6.9.2.7(11) A visually harmonious and aesthetically coordinated appearance will be achieved across all areas of the Facility.
- 6.9.2.7(12) Exterior and interior finish materials will have surface finishes either as manufactured and integral to the finish material or as applied to the surface of the finish material by paint or special coating.
- 6.9.2.7(13) Exterior masonry materials such as brick and concrete block will be treated with water-repellent coatings to prevent water ingress into or through the material.
- 6.9.2.7(14) Exterior and interior materials subject to corrosion from exposure to moisture or other corrosive agents and where painting is deemed to be insufficient protection will receive a special protective coating. Such materials include exterior and interior structural, galvanized, and miscellaneous steel.
- 6.9.2.7(15) In patient, staff, and public interior areas, indoor air quality will be a priority, and paints and paint materials will have a minimal VOC level.
- 6.9.2.7(16) Interior paint materials will be of a quality to withstand regular or repeated cleaning as the function of the area dictates.

- 6.9.2.7(17) Painted patient areas will be painted with a semi-gloss finish.
 - 6.9.2.7(18) Handrails, doors, and frames will be painted a contrasting colour from walls in consideration of the visually impaired.
 - 6.9.2.7(19) Materials used will be lead and mercury-free.
 - 6.9.2.7(20) Seamless epoxy wall coatings will be a two-component, high solids, Zero or low VOC, solvent-free, epoxy glaze wall coating, and will be seamless and abrasion, chemical, and UV-resistant.
 - 6.9.2.7(21) Paint materials will be rated under Environmental Notation System (ENS) with acceptable VOC ranges as listed in the MPI Approved Product List under "E" ranges.
 - 6.9.2.7(22) Only materials having a minimum MPI "Environmentally Friendly" E2 rating based on VOC (EPA Method 24) content levels will be used.
- 6.9.2.8 Special Wall Coverings
- 6.9.2.8(1) Materials and workmanship will conform to the Master Painters Institute (MPI) Architectural Painting Specification Manual (latest edition).
 - 6.9.2.8(2) Wall coverings may be required on interior walls to satisfy aesthetic considerations beyond the application of paint and create a healing environment in patient areas, a comfortable working environment in staff work areas, and a safe and inviting environment in public areas.
 - 6.9.2.8(3) Wall coverings will not be used in areas that may have excessive moisture present or require high and frequent maintenance.
 - 6.9.2.8(4) Sealers and adhesives will be non-toxic, water-based type and meet requirements of Canadian "Eco Logo" program or equivalent. TVOC emissive content will not be more than 20 grams per litre.

6.10 Specialties (Division 10)

6.10.1 Basic Requirements

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

6.10.2 Performance Criteria

6.10.2.1 Tackboards and Whiteboards

- 6.10.2.1(1) Tackboard surfaces will be of a type and quality to allow pin penetration of the surface materials and have reasonable resistance to deterioration.

- 6.10.2.1(2) Whiteboard surfaces will be of a type to allow use of felt-type writing instruments and allow erasing and cleaning with minimal effort.
 - 6.10.2.1(3) Tackboards and whiteboards will be complete with manufactured frames and accessory trays.
 - 6.10.2.1(4) Whiteboard writing surfaces will be porcelain ceramic on steel surface, magnetic, scratch and abrasion-resistant and have maximum contrast, glare control, and reflectivity, and be scratch and abrasion-resistant.
 - 6.10.2.1(5) Lamination adhesive used for tackboards and whiteboards will be non-toxic, water-based adhesive.
- 6.10.2.2 Compartments and Cubicles
- 6.10.2.2(1) Compartments and cubicles will include toilet partitions, change cubicles, shower partitions, and other compartments and cubicles requiring privacy and security.
 - 6.10.2.2(2) Exposed surfaces will be permanent, water-resistant, corrosion-proof, and readily cleaned and maintained.
 - 6.10.2.2(3) Partitions and standards will be secured to the floor or ceiling structure, and resistant to lateral loading and impact.
 - 6.10.2.2(4) Compartment/cubicle doors will be of material matching the partitions and include permanent, purpose-made hardware. Doors and hardware will provide privacy and security and be handicap accessible where required.
 - 6.10.2.2(5) Curtain tracks and curtains may be used in lieu of doors where and as appropriate.
 - 6.10.2.2(6) Change compartments will be complete with a mirror.
 - 6.10.2.2(7) Toilet Partitions
 - 6.10.2.2(7)(a) Sheet metal will be galvanized steel conforming to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish for steel surfaces will be polyester, baked enamel.
 - 6.10.2.2(7)(b) Stainless steel will be Type 304 conforming to ASTM A240 with No. 4 finish.
 - 6.10.2.2(7)(c) Plastic laminate used for partitions will be Grade 10/HGS GP50 scuff-resistant, high pressure laminate, conforming to NEMA LD-3.

- 6.10.2.2(7)(d) Particleboard core for partitions will conform to CAN3-0188.1 Industrial Grade "R".
- 6.10.2.2(7)(e) Fibre-reinforced plastic (fibreglass) will be moisture resistant.
- 6.10.2.2(8) Change Cubicle Partitions
 - 6.10.2.2(8)(a) Where not adjacent to showers, partitions will conform to quality assurance requirements specified for toilet partitions.
- 6.10.2.2(9) Shower Partitions
 - 6.10.2.2(9)(a) Partitions will be solid phenolic laminated thick stock, factory-laminated with decorative finish both faces of core and conforming to CAN3-A172 or NEMA LD3.
- 6.10.2.3 Wall Guards and Corner Guards, Handrails, Wall Protection, Door Edge and Door Frame Protection
 - 6.10.2.3(1) Wall and corner guards
 - 6.10.2.3(1)(a) Protection of walls and exposed wall corners at patient areas, service areas, and other areas will be provided as required, to prevent damage due to impact from traffic such as stretchers, equipment and service vehicles.
 - 6.10.2.3(1)(b) Materials selected will be appropriate to the amount and degree of impact anticipated.
 - 6.10.2.3(1)(c) Wall and corner guards will be secured to reinforcing and backing in the walls, which will be sufficient to withstand expected impact loads.
 - 6.10.2.3(2) Handrails
 - 6.10.2.3(2)(a) Handrails will be provided in corridors and other ambulatory patient areas appropriate for the type of patients requiring support.
 - 6.10.2.3(3) Wall protection
 - 6.10.2.3(3)(a) Sheet wall protection will be applied to wall areas where the impact damage anticipated is of a larger area of wall than would be protected by bumper guards.

6.10.2.3(3)(b) Sheet wall protection to faces of doors will be applied where impact damage is anticipated and may complement the installation of door edge and frame protection.

6.10.2.3(3)(c) Wall and corner guards will be secured to reinforcing and backing in the walls, which will be sufficient to withstand expected impact loads. Wall protection will be high impact stain-resistant conforming to ASTM D4226 with anti-microbial additives.

6.10.2.3(3)(d) Wall protection handrails and corner guard products will be stain-resistant to pen marks, paint, and graffiti, and will withstand commercial cleaners without fading or staining. These products will also contain anti-microbial additives to retard mildew and bacterial growth.

6.10.2.3(4) Door Edge and Door Frame Protection

6.10.2.3(4)(a) Door edges and door frames in patient areas will be protected from damage such as impact caused by the regular movement of stretchers and other wheeled vehicles.

6.10.2.3(4)(b) Door edges and door frames in clinical and service areas will be protected from damage such as impact caused by regular and non-regular service vehicles.

6.10.2.3(4)(c) Bumper guards, crash rails, handrails, and corner guards will be high impact-resistant extrusion conforming to ASTM D4226 and with anti-microbial additive.

6.10.2.4 Elevated Access Flooring

6.10.2.4(1) Materials, workmanship, and test methods will conform to the "Recommended Test Procedures for Access Floors" as published by the Ceilings and Interiors Systems Construction Association (CISCA).

6.10.2.4(2) The electrical resistance of the access floor system will be tested in accordance with NFPA 99.

6.10.2.4(3) Elevated access flooring may be considered where electronic and data cabling, outlets, junctions, etc., in the floor are in heavy concentration and must be regularly serviced, added to or altered.

- 6.10.2.4(4) Elevated access flooring may be considered where flexibility of access points over a floor area, or part thereof, is required rather than a focused or distributed single access point.
- 6.10.2.4(5) Panel-to-understructure (metal-to-metal) connections will provide less than 10 ohms resistance without grounding clips.
- 6.10.2.4(6) The access floor system assembly will consist of modular floor panels laid out on a grid system, supported by and secured to the understructure. Panels will be supported by an adjustable pedestal base that positively locates, engages, and secures panels, and that accommodates horizontal grid members only as required.
- 6.10.2.4(7) All components of the access floor system will be of steel construction with manufacturer's standard corrosive-resistant finishes, except for panel-cementitious core.
- 6.10.2.4(8) Panels will be easily removable by one person with standard tools and a lifting device and will be interchangeable, except for cut-outs for special conditions. Cable cut-out panels will be interchangeable with solid panels.
- 6.10.2.4(9) The completed surface of floor system will provide a continuous smooth floor surface and under-floor space to accommodate electrical, communication, computer service lines and mechanical ducting, and may serve various areas as air supply or return plenums. The area below the raised access floor system may be a pressurized area.
- 6.10.2.4(10) Panels will be square, of welded steel components with an enclosed galvanized steel bottom pan formed in a flat or uniform pattern of square or round pockets. The unitized panels will be internally filled with lightweight concrete to improve sound characteristics and provide performance value.
- 6.10.2.4(11) Panels may be surfaced with resilient floor tiles or carpet tiles, where required.
- 6.10.2.4(12) Pedestals, when secured to subfloor, will be capable of supporting a minimum axial load without deformation.
- 6.10.2.4(13) Panels will support a minimum concentrated load of 566 kg on a 25 mm square point anywhere on the panel, with a deflection not to exceed 2.5 mm.
- 6.10.2.4(14) Panels will support a rolling load of 453 kg on a 75 mm x 20.6 mm wheel at 10 passes, and 800 lbs on a 150 mm x 38 mm wheel at 10,000 passes.

6.10.2.4(15) Ultimate load will be 1721 kg

6.10.2.5 Building Signage

6.10.2.5(1) Refer to Section 5.4.

6.10.2.6 Metal Lockers

6.10.2.6(1) Individual and shared storage facilities will be provided in designated staff areas for Facility staff and in accessible secure areas suitable for patients to secure personal effects.

6.10.2.6(2) Such storage facilities may be metal lockers and metal locker systems of sizes, numbers, and groupings as determined by the Facility in consultation with the Authority.

6.10.2.6(3) Sheet metal will be galvanized steel conforming to ASTM A653 with ZF001 (A01) zinc coating.

6.10.2.6(4) Finish for steel surfaces will be polyester baked enamel.

6.10.2.6(5) Single, double, or multiple-tier metal lockers for staff use will be complete with provision for locking with padlock, number plates, and hanging hooks.

6.10.2.6(6) Single, double, or multiple-tier metal lockers for patients will be provided with coin and key-operated locks.

6.10.2.7 Storage Shelving Systems

6.10.2.7(1) Storage systems for materials will be provided in designated storage areas.

6.10.2.7(2) Adjustable shelving systems may be specifically manufactured for storage purposes, such as plywood or steel-slotted angle industrial shelving for bulk materials or plastic laminate-faced plywood for clean storage.

6.10.2.7(3) Mobile storage systems for files will be a high-density system designed to make maximum use of available space by eliminating need for access aisle for each run of shelving. System must be installed and braced to resist seismic loads.

6.10.2.8 Washroom Accessories

6.10.2.8(1) Accessories for washroom functions in public, patient, and staff washrooms will be provided as required in accordance with the applicable NHA standards (available in the Data Room). Type, size,

and number of accessories will be determined by the numbers and categories of users.

- 6.10.2.8(2) Staff and public washroom accessories will include but are not limited to the following:
 - 6.10.2.8(2)(a) Toilet paper dispensers
 - 6.10.2.8(2)(b) Paper towel disposals
 - 6.10.2.8(2)(c) Mirrors
 - 6.10.2.8(2)(d) Handicap grab bars (with integral tactile grip finish)
 - 6.10.2.8(2)(e) Coat hooks
 - 6.10.2.8(2)(f) Sanitary napkin dispensers
 - 6.10.2.8(2)(g) Sanitary napkin disposals
 - 6.10.2.8(2)(h) Baby change tables
- 6.10.2.8(3) Patient washroom accessories will include but are not limited to the following:
 - 6.10.2.8(3)(a) Toilet paper dispensers
 - 6.10.2.8(3)(b) Paper towel disposals
 - 6.10.2.8(3)(c) Mirrors
 - 6.10.2.8(3)(d) Handicap grab bars (with integral tactile grip finish)
 - 6.10.2.8(3)(e) Coat hooks
- 6.10.2.8(4) Shower rooms or showers in washrooms will include but are not limited to the following accessories:
 - 6.10.2.8(4)(a) Shower curtain track or rod as appropriate
 - 6.10.2.8(4)(b) Handicap grab bars
 - 6.10.2.8(4)(c) Fold-down shower seat
- 6.10.2.8(5) Recessed washroom accessories (such as recessed waste receptacles) will not be used.
- 6.10.2.8(6) Accessories will be commercial grade and free from imperfections in manufacture and finish.

- 6.10.2.8(7) Washroom accessory and installation will allow cleaning and maintenance of the accessory and surrounding wall area.
- 6.10.2.8(8) Fittings will have concealed fastening for security and discouragement of tampering.
- 6.10.2.8(9) Soap dispensers and paper towel dispensers will be supplied and installed by the Authority. Coordinate with the Authority to ensure that the design of staff, public, and patient washrooms accommodates the Authority supplied soap dispensers and paper towel dispensers.

6.10.2.9 Privacy Curtain and IV Tracks

- 6.10.2.9(1) Privacy curtains are required as follows:
 - 6.10.2.9(1)(a) around each bed / stretcher holding area.
 - 6.10.2.9(1)(b) around each treatment space
 - 6.10.2.9(1)(c) around exam cubicles.
- 6.10.2.9(2) Cubicle tracks will be extruded, anodized aluminum, and entirely enclosed, except for a slot in the bottom.
- 6.10.2.9(3) 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 will be provided. One end of each track will be fitted with a removable end stop to permit simple carrier replacement. Splicing clamps will be of anodized aluminum. Curves will be factory-curved.
- 6.10.2.9(4) IV tracks will be extruded aluminum, anodized finish and entirely enclosed except for slot in bottom. IV carriers will consist of plated steel block supported from four nonconductive nylon ball-bearing wheels and equipped with 180-degree twist lock with nylon washer.
- 6.10.2.9(5) Install IV tracks in the following rooms over each treatment space in the Systemic Therapy Unit.

6.10.2.10 Projection Screens

- 6.10.2.10(1) Screens will be fully recessed, heavy-duty type for electrical operation.
- 6.10.2.10(2) Screens will be listed by Underwriter's Laboratories and CSA.
- 6.10.2.10(3) Motor will be quick reversal type, especially designed for the purpose, ball-bearing and oiled for life, with automatic thermal overload cut-out and integral interlocking gears, and include preset but adjustable limit switches to automatically stop screen fabric in the up and down

positions. Stop action will be positive to prevent coasting. Roller will be mounted on two heavy-duty brackets equipped with self-aligning bearings.

6.10.2.10(4) Surfaces will be flame-retardant and mildew-resistant.

6.10.2.10(5) Motor compartment will be metal-lined.

6.11 Equipment (Division 11)

6.11.1 Basic Requirements

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

6.11.2 Performance Criteria

6.11.2.1 Patient Lifts

6.11.2.1(1) Portable patient lifts will be provided by the Authority. Refer to Appendix 2E [Equipment].

6.11.2.1(2) Custom-fabricated overhead patient lifts will be provided by the Authority. Refer to Appendix 2E [Equipment] for instances of "Patient Assist system, ceiling mounted". Project Co will provide a ceiling-mounted attachment point for the lift in the rooms noted in the Equipment List. The precise placement and the configuration and capacity of the attachment will be determined in consultation with the Authority.

6.11.2.2 Window Washing Systems

6.11.2.2(1) Equipment or appropriate anchors will be provided to facilitate window washing.

6.12 Furnishings (Division 12)

6.12.1 Basic Requirements

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

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

6.12.1.3 If window coverings are required to provide black-out functions, materials, tracks, seals, and operation will be suited to that purpose.

- 6.12.1.4 Window coverings will be designed and manufactured using materials and mechanisms that minimize cleaning and maintenance operations and maximize infection prevention and control.
- 6.12.1.5 All window coverings will be easy to remove and clean.
- 6.12.1.6 Provide window coverings for:
 - 6.12.1.6(1) all exterior windows, preferably vertical blinds but other products may be considered providing they provide privacy, sun and heat control consistent with Project Co's energy management plan, 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);
 - 6.12.1.6(2) all interior windows where privacy may be a concern; and
 - 6.12.1.6(3) blinds between glass in all waiting rooms and the negative pressure room (room number 3.1.2.9 in the Clinical Specification).

6.12.2 Performance Criteria

6.12.2.1 Window Shade Systems

- 6.12.2.1(1) Shading fabric will be PVC or vinyl-coated polyester or fibreglass yarn.
- 6.12.2.1(2) Shading fabric will be waterproof, washable, rot-proof, flame-resistant, fungal and bacteria-resistant, colourfast to light, glare-reducing, and able to control heat gain and provide external visibility.
- 6.12.2.1(3) Shading fabric for window shade systems will pass Small Scale Vertical Burn requirements in accordance with CAN/ULC-S109 or NFPA-701.
- 6.12.2.1(4) Shading fabric for window shade systems will be tested in accordance with ASHRAE Standard 74073 for shading coefficient, fungal resistance in accordance with ASTM G21, and bacterial resistance.

6.12.2.2 Vertical Blinds

- 6.12.2.2(1) Blinds will be mono-control single cord system and provide rotating and traversing action. Vanes will be 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.

6.12.2.3 Venetian Blinds

- 6.12.2.3(1) Blinds will be used only in between glass.
- 6.12.2.3(2) Blinds will be hand-operated, horizontal louvre blinds with spring-tempered aluminum alloy slats and baked enamel finish.

- 6.12.2.3(3) Blinds will have high tenacity, woven polyester fibre lift cords, electro-galvanized coated head channel and bottom rail, and cord lock.

6.12.2.4 Venetian-Type Blinds between Glass

- 6.12.2.4(1) Blinds will consist of slats uniformly spaced and 100% interlaced between cross-ladders on at least one tape. The attachment of the suspension members from the window opening to the blind will be tapes with no special end rails required.
- 6.12.2.4(2) There will be no openings in the glazing plane.
- 6.12.2.4(3) Slats will be tempered aluminum alloy.
- 6.12.2.4(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 Performance Criteria

- 6.13.1.1(1) Materials and manufacture will conform to applicable reports of the National Council on Radiation Protection and Measurement (NCRP).
- 6.13.1.1(2) Radiation protection will be provided in walls, doors, and windows as required and appropriate to protect staff and patients from x-ray and nuclear radiation emitted from equipment in radiography, mammography, tomography, angiography, nuclear medicine facilities, radioactive material storage rooms, CT/Brachio rooms, Radiation Therapy Vaults and other rooms in the radiation protection shield. Floors and ceilings may be required to be included in the radiation protection shield if direction of radiation is deemed to be in vertical or angled directions.
- 6.13.1.1(3) Radiation protection will be provided 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.
- 6.13.1.1(4) Radiation shielding will be 0.9 mm lead to 2.1 m above floor level as a minimum.
- 6.13.1.1(5) Sheet lead will conform to ASTM B749 Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate and will meet or exceed Federal Specification QQL-201F Grade C.

- 6.13.1.1(6) Lead-lined gypsum board will conform to ASTM C36 or CAN/CSA-A82.27, Type X.
- 6.13.1.1(7) Lead glass will meet or exceed Federal Specification DD-G-451.
- 6.13.1.1(8) Cassette transfer cabinets will meet or exceed MIL-C-3673 (DM) Radiation shielded.
- 6.13.1.1(9) Radiation shielded doors will meet or exceed ANSI/NWMA Industry Standard for wood doors and NCRP Report #49.
- 6.13.1.1(10) Radiation-shielded doors will be fabricated using a single layer of sheet lead with wood core laminated on each side of the lead. Cores will be bonded using poured lead dowels at edges.
- 6.13.1.1(11) Radiation-shielded door frames will be lead-lined, pressed steel door frames.
- 6.13.1.1(12) Lead glass or lead louvers in radiation shielded doors will be equivalent to sheet lead in doors.
- 6.13.1.1(13) Lead-laminated gypsum wallboard will consist of a single unpierced sheet of lead laminated to the wallboard.
- 6.13.1.1(14) Sheet lead applied directly to partition steel studs will be installed to provide a continuous and complete protective shield.
- 6.13.1.1(15) Radiation shielding barriers, mobile or fixed, modular and transparent barriers will be provided to protect medical personnel by providing a full body shield. Units will have distortion-free, lead-plastic windows.
- 6.13.1.1(16) Radiation Therapy Vaults
 - 6.13.1.1(16)(a) Design and Construct the Radiation Therapy Vaults in compliance with the BC Cancer Agency's "Design Criteria for High Energy Radiation Therapy Vaults". Provide all necessary radiation shielding, including appropriately shielded doors.
 - 6.13.1.1(16)(b) Meet all licensing requirements of the Canadian Nuclear Safety Commission for the Radiation Therapy Vaults.

6.14 Conveying Equipment (Division 14)

6.14.1 Basic Requirements

- 6.14.1.1 Elevator systems will be designed to accommodate the requirements / needs of the Facility in a manner which contributes to the overall efficiency and effectiveness of the Facility and the Services.
 - 6.14.1.2 Elevator systems will be designed to ensure there is sufficient capacity to accommodate the wide range of user and functionality requirements, in a manner which satisfies expectations for safety, reliability, responsiveness, accessibility and operational efficiency.
 - 6.14.1.3 Provisions will be considered for persons with special mobility needs and other forms of disabilities, such as learning difficulties or mental disorders.
 - 6.14.1.4 Elevators will support access provisions, for people and materials, to all functional areas. Elevator access to all building levels, including mechanical levels, will be provided by at least one elevator.
 - 6.14.1.5 Equipment provided will have a proven track record of at least five years field operation in Canada in similar environments and of similar configuration.
 - 6.14.1.6 Durable elevator cab finishes (including stainless steel fronts as well as hand and bumper rails) will be provided.
 - 6.14.1.7 Provide emergency power operation of the elevators such that all elevators are fed with emergency power and capable of operating at least one at a time. Arrange that at least one elevator in each group can operate at the same time on emergency power.
 - 6.14.1.8 Elevators used for patient transfer and support services will be configured with platforms which are narrow and deep with wide side opening doors to accommodate easy movement of beds and material carts.
- 6.14.2 Performance Criteria for Elevators
- 6.14.2.1 Scope of Work
 - 6.14.2.1(1) Supply and install a minimum of two public/patient elevators in the main lobby of the Building in accordance with the requirements of this Section.
 - 6.14.2.2 Codes, By-laws, and Regulations
 - 6.14.2.2(1) Provide equipment and perform work in accordance with the latest edition of the B44 Safety Code for Elevators and any other code which may govern the installation of the equipment.
 - 6.14.2.3 Trademarks
 - 6.14.2.3(1) Arrange that none of the car or hall equipment has any trademark, company name, or logo.

6.14.2.4 Fixtures

- 6.14.2.4(1) Provide buttons with LED illumination and stainless steel targets.

6.14.2.5 Operating Conditions

- 6.14.2.5(1) Provide equipment that will operate normally when the machine room and hoistway temperature is between 5 and 35 degrees Celsius.
- 6.14.2.5(2) Provide equipment that will operate normally when the power supply is within 10 percent of its rated voltage.

6.14.2.6 Non-Proprietary Equipment

- 6.14.2.6(1) Arrange the equipment such that there are no times, dates, trips, or other counters that would shut down the equipment or change its operation.

6.14.2.7 Equipment Summary

- 6.14.2.7(1) Provide a minimum of two public/patient elevators with the following minimum performance requirements:
 - 6.14.2.7(1)(a) Machine-room-less traction or hydraulic equipment.
 - 6.14.2.7(1)(b) Contract speed of 0.76 m/s (150 fpm).
 - 6.14.2.7(1)(c) Capacity of 2268 kg (5000 lb).
 - 6.14.2.7(1)(d) Two speed side opening entrances with a width of 1370 mm (54") and a height of 2134 mm (84").
 - 6.14.2.7(1)(e) Floors served – all useable floors (one elevator to also serve any mechanical floors).
 - 6.14.2.7(1)(f) Clear inside cab dimensions of 1800 mm (5'11") wide by 2590 mm (8'6") deep.
 - 6.14.2.7(1)(g) Clear cab height to suspended ceiling of 2590 mm (8'6").

6.14.2.8 Elevator Car Dimensions: Patient Stretcher Requirement

- 6.14.2.8(1) Arrange that at least one elevator serving all floors will meet the requirement to accommodate and provide adequate access for a patient stretcher 2010 mm (79") long by 610 mm (24") wide in the prone position.

6.14.2.9 Machine Room and Hoisting Equipment

- 6.14.2.9(1) Provide either a geared or a gearless traction hoisting machine located within the hoistway.
- 6.14.2.9(2) Provide a spring applied electric brake, held open by an electro-magnet actuated by the controller. Design the brake to automatically apply in event of interruption of power supply from any cause.
- 6.14.2.9(3) Provide an automatic reset governor located in the hoistway that can be maintained from the car top. When the governor has tripped, arrange that it will be reset when the car is moved in the up direction.
- 6.14.2.9(4) Provide sound and vibration isolation pads such that there is no direct contact between the machine and the building structure.
- 6.14.2.9(5) Provide an emergency brake to stop the elevator if it overspeeds or if it moves more than 500 mm (20") away from the floor with the doors open.
- 6.14.2.9(6) Provide a solid state drive complete with isolation transformers, filters (to meet IEEE Standard 519-1992 for Special Applications), and isolation pads.
- 6.14.2.9(7) Provide a digital velocity encoder on the motor, giving feedback to the controller on motor speed and position.
- 6.14.2.9(8) Provide a microprocessor based controller consisting of relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static drive units, wiring terminal strips, and related components all enclosed in a cabinet with hinged door panels.

6.14.2.10 Hoistway Equipment

- 6.14.2.10(1) Provide entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibbs, and all other equipment required for a complete installation. Provide entrance doors and frames finished in brushed stainless steel.
- 6.14.2.10(2) Provide standard 'T' section steel guide rails for the car (and counterweight). Install guide rails using brackets fastened to the building structure. Clamp the guide rails to the bracket with clips arranged to prevent any horizontal movement of the rail. Join the rail sections using steel backing plates.
- 6.14.2.10(3) Provide hoist ropes/belts of sufficient size and number to lift the load and ensure proper wearing qualities. Provide either steel ropes consisting of at least six strands wound around a hemp core centre or Polyurethane coated belts with high-tensile-grade zinc-plated steel

cords. Ensure that all the ropes for a particular elevator are from the same manufacturing run.

- 6.14.2.10(4) Provide a counterweight to counterbalance the elevator for smooth and economical operation with cast iron or steel plate weights contained in a structural steel frame. Provide a counterweight equal to the weight of the elevator car plus between 45 and 50 percent of the rated capacity.
- 6.14.2.10(5) Provide for the car and counterweight either spring mounted roller guides or slipper guides located at the top and the bottom of the car and counterweight frame.
- 6.14.2.10(6) Provide fascias from each hall sill to the entrance header below. Include express zones. Extend the fascias into the pit and the overhead.
- 6.14.2.10(7) Provide a car frame constructed of steel channels and a platform constructed of steel channels with a wood or metal sub-floor. Isolate the frame and platform from one another so that there is no metal to metal contact in order to prevent the transmission of noise and vibration. Mount the elevator cab shell on the platform in alignment with the hoistway entrances. Isolate the cab from the car frame and platform.

6.14.2.11 Cab Equipment

- 6.14.2.11(1) Provide durable elevator cab finishes (including stainless steel fronts, hand and bumper rails, and indirect lighting) to suit the building.
- 6.14.2.11(2) Provide car doors, jambs, headers, hangers, tracks, door closers, gibbs, electrical contacts, and all other equipment required for a complete installation.
- 6.14.2.11(3) Provide swing return car stations incorporating floor push buttons, door open and close buttons, an alarm button, and other fixtures required for normal operation. Provide for each floor button a call registered light and momentary audible tone. Provide a Firefighters' Emergency Operation panel. Provide below the car station a locked service cabinet containing devices other than those used for normal operation. Engrave the car station with the elevator capacity, identification number, government installation number, and other required markings.
- 6.14.2.11(4) For each elevator with centre opening doors or with front and rear doors, provide 2 car stations. Otherwise, provide one car station per elevator.

- 6.14.2.11(5) Provide a digital (dot matrix or segmented) car position indicator located above each car station with a minimum 50 mm (2") high display.
- 6.14.2.11(6) Do not install any certificates or licences in the cab. Arrange and pay for a variance from the Governmental Authority having jurisdiction for this if required.
- 6.14.2.11(7) Provide a voice synthesizer for each elevator with automatic verbal announcement of each floor at which the elevator stops. Provide a system that will handle a variety of other messages and indications as may be required by the Authority at a later date.
- 6.14.2.11(8) Provide an infra-red multiple beam door protective device that protect the full width and up to 1830 mm (6') from the floor of the door opening. Locate the device 25 mm (1") behind from the leading edge of the door.
- 6.14.2.11(9) Provide battery operated emergency cab lighting.
- 6.14.2.11(10) Provide a two speed exhaust fan mounted in the cab top.
- 6.14.2.11(11) For each type of elevator, provide one set of cab protective pads that cover all walls and the cab front return panel along with pad hooks. Provide pad hooks in each elevator.
- 6.14.2.11(12) Provide a heavy duty closed loop door operator to open and close the car and hoistway doors simultaneously with an average opening speed of 600 mm (24") per second and an average closing speed of 300 mm (12") per second.
- 6.14.2.11(13) Provide a hands-free two-way voice intercommunication / telephone system with a lobby rescue station and remote handset.

6.14.2.12 Hall Equipment

- 6.14.2.12(1) Where required, provide hoistway access switches located in the entrance frame or in the hall door sight guard.
- 6.14.2.12(2) Provide hoistway door unlocking devices (by lunar key) on the hall doors at all floors.
- 6.14.2.12(3) Provide one riser of hall stations for each group of elevators. Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button) located with their centreline 1070 mm \pm 25 mm (42" \pm 1") above the floor.
- 6.14.2.12(4) Provide a digital (dot matrix or segmented) hall position indicator located above the main floor entrance with a minimum 50 mm (2") high display.

- 6.14.2.12(5) Provide hall lanterns with electronic tones at each entrance.
- 6.14.2.12(6) Provide a remote fire recall switch for each group of elevators at the central alarm and control facility (or fire alarm panel if there is no central alarm and control facility).
- 6.14.2.12(7) Provide, at the central alarm and control facility (or fire alarm panel if there is no central alarm and control facility), a lobby panel for the elevators that includes car position indicators, in-service pilot lights, parking switches, emergency power indicators, Firefighter's Emergency Operation indicators, and other elements required by this Schedule.
- 6.14.2.12(8) Provide an elevator video management system including a computer, flat panel monitor, keyboard, mouse, printer, control system interface, and software to monitor all elevators. Monitor the elevator operation and status in real time including at a minimum car position, car calls, hall calls, door status, load, and status of features such as independent service, emergency power, Firefighter's Emergency Operation, and security. Provide the ability to generate reports for fault log, number of hall calls, and hall call registration times. Provide the ability to lockout service (car and hall calls) to any floor.

6.14.2.13 Electric Wiring

- 6.14.2.13(1) Provide copper wiring to connect the equipment.
- 6.14.2.13(2) Run the wire in metal conduit, duct or electrical metallic tubing.
- 6.14.2.13(3) Provide travelling cable between car stations and the controller in the machine room.
- 6.14.2.13(4) Provide at least six pair spare shielded wires and a spare coaxial conductor in the travelling cable. This is in addition to the wiring identified elsewhere in this Schedule.
- 6.14.2.13(5) Provide at least ten percent spare wires in each travelling cable.
- 6.14.2.13(6) Provide on one controller a separate junction box for non-elevator devices such as telephones, cameras, and security systems.

6.14.2.14 Operational Features

- 6.14.2.14(1) Provide keyed access to any elevators which serve any mechanical levels.
- 6.14.2.14(2) Provide for and install security cameras in the elevators. Provide the required wiring in the travelling cable run between the car top and the controller as well as power to the car top for the camera.

- 6.14.2.14(3) Provide and install a card reader security system. Provide the required wiring between the card reader and the elevator security box in the machine room along appropriate elevator controller connections and circuits for the security system (including floor tracking).
- 6.14.2.14(4) Provide independent service.
- 6.14.2.14(5) Provide Code Blue / cardiac arrest operation with key switches at each floor and in each cab.
- 6.14.2.14(6) Provide Firefighters' Emergency Operation (Phase 1 and Phase II) for all elevators.
- 6.14.2.14(7) Provide emergency power operation of the elevators such that all elevators are fed with emergency power and capable of operating at least one at a time. Arrange that at least one elevator in each group can operate at the same time on emergency power.

6.14.2.15 Operating Performance

- 6.14.2.15(1) Levelling - Arrange that the car stops within 3 mm (1/8") of the floor level.
- 6.14.2.15(2) Ride quality - Arrange that the lateral acceleration (front to rear and side to side) measured during express runs is less than 150 mm/s/s (0.5 f/s/s) peak to peak.
- 6.14.2.15(3) Adjust the door equipment so that the noise level is less than 62 decibels during a full door open and door close operation. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.
- 6.14.2.15(4) Arrange the machine room equipment so that the noise level with the elevator running is less than 80 decibels. Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

PART 7. FACILITIES SERVICES SUBGROUP SPECIFICATIONS

7.1 Fire Suppression (Division 21)

7.1.1 Fire Protection

7.1.1.1 Basic Requirements:

- 7.1.1.1(1) The sprinkler system and equipment will be designed to the occupancy classification that it protects. Provide for expansion capacity in accordance with Section 3.8.2.

- 7.1.1.1(2) Provide on the sprinkler system take-off from water supply an approved detector type double check valve assembly with approved listed OS&Y gate valves on both sides complete with tamper switches.
 - 7.1.1.1(3) The fire pump, if required, will require emergency power supply and will have a transfer switch which is part of the fire pump controller, package mounted in separate mechanically attached enclosure to form one assembly, specifically approved for the purpose as a complete unit.
 - 7.1.1.1(4) Sprinklers that may be subject to freezing temperatures will be supplied by a dry system.
 - 7.1.1.1(5) Quick response sprinklers will be provided throughout, with temperature ratings to suit the specific hazard area.
 - 7.1.1.1(6) All sprinkler heads in areas subject to vandalism will be of a type that will protect the patients and staff from harm and will be vandal proof.
 - 7.1.1.1(7) Provide a double interlocked, cross-zoned, pre-action supplied sprinkler system to all rooms, an individual system per room, with sensitive equipment and/or records (including CT Room(s), Computer Server Room(s), Patient Records Room(s), RT Vault(s) and Linacs (provide an independent pre-action system for each vault)). Allow for infrastructure and supply expansion capabilities, valved and capped, to accommodate one additional linac vault.
 - 7.1.1.1(8) Each fire extinguisher will be located and approved for the hazard and classification of the space it serves.
- 7.1.1.2 Performance Criteria:
- 7.1.1.2(1) All fire protection systems will be hydraulically sized to NFPA standards.
 - 7.1.1.2(2) All equipment and installation will be in accordance with manufacturers' requirements.
 - 7.1.1.2(3) All equipment will be ULC approved.
 - 7.1.1.2(4) Qualified contractor licensed and regularly engaged in such installations will install all fire protection systems and equipment.
 - 7.1.1.2(5) Provide backflow protection on all fire protection systems in accordance with CSA requirements.
 - 7.1.1.2(6) Locate zone shut-off valves so they are visible and accessible from the floor. Do not conceal from view: do not locate in janitor rooms, storage rooms, or stairwells. All valves controlling water flow must be monitored by the Building's BMS.

7.1.1.2(7) Fire Department Connection will be installed at a location approved by the local Governmental Authority.

7.1.1.2(8) Install fire extinguishers in a semi or fully recessed cabinet.

7.2 Plumbing (Division 22)

7.2.1 Site Services:

7.2.1.1 Provide individual water, fire protection, gas, sanitary, medical gas and storm services as required and sized to suit the usage needs of the Facility.

7.2.1.2 The water supply into the Site will have a water meter and reduced pressure backflow preventer. The water supply will have an independent shut-off valve. Submit the projected domestic water supply load.

7.2.1.3 Basic Requirements:

7.2.1.3(1) Domestic water systems will be to AWWA standards. Provide water treatment, as required to meet CSA/AWWA standards.

7.2.1.3(2) Provide utilities-commission approved meters for domestic water, steam and condensate. Meters will be used to measure energy. Refer to Appendix 2D [Energy].

7.2.1.3(3) The HVAC, plumbing, fire protection, and medical gases systems will be designed to avoid disruption to the operation of the Facility during maintenance or repairs. The systems must be designed so rooms do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves located in the corridor ceiling spaces will be accessible from standing or when using a maximum 8-foot tall ladder.

7.2.1.3(4) The design should incorporate flexibility for future alterations. Allow for expansion capacity within each system in accordance with Section 3.8.2.

7.2.1.3(5) All systems will be clearly labelled. Labelling will include painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage.

7.2.1.3(6) All fixtures and equipment will be designed and installed to manufacturer's specifications and standards.

7.2.1.3(7) The water systems will ensure delivery of water supplies at the required pressures to all water outlets. Minimum pressure to be maintained at 35 PSI at the highest, most remote fixture.

- 7.2.1.3(8) Provide durable materials to allow for 24 hour a day operation with minimal downtime.
 - 7.2.1.3(9) Consideration should be given to easy access and serviceability and avoiding interference with other services.
 - 7.2.1.3(10) Provide floor drains on all mechanical floors.
 - 7.2.1.3(11) Provide backflow preventers on the incoming water service as well as at equipment source connections where required by code.
 - 7.2.1.3(12) Provide interceptors to intercept oil, grease, dirt, and solids.
 - 7.2.1.3(13) Provide domestic water strainer at the incoming service into the Facility.
 - 7.2.1.3(14) If a water booster pump is required, ensure it is designed with 100% redundancy and emergency power capability to provide uninterrupted water service and pressure in the event of malfunction, maintenance, or power loss.
- 7.2.1.4 Performance Criteria:
- 7.2.1.4(1) All drainage systems will be designed such that the system connects to the Site services. Designs will utilize gravity drainage where possible.
 - 7.2.1.4(2) In the case where 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 installed at intervals sufficient to carry the pipe and load, at 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.
 - 7.2.1.4(3) If a pumping system is required for subsurface, storm, or sanitary drainage, then the design will include 100% redundancy with equipment on emergency power such that the system does not flood the mechanical space it is housed in. The sump will have twin compartments: a settling and a pumping compartment, and will be sized to prevent short cycling of the pump. Provide alarm points for high water and pump failure.
 - 7.2.1.4(4) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout as per BCICA quality standards. Where piping and / or piping components are subject to freezing, provide insulation and heat tracing on life-safety systems, the heat trace system will be monitored and alarmed for malfunction or service disruption. Ensure that heat trace systems on life-safety systems will be on emergency power.

- 7.2.1.4(5) All plumbing drainage that is acidic 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.
- 7.2.1.4(6) All plumbing drainage in room(s) that may require disposal of radio-active material will be of corrosion resistant material to a point where dilution, as a result of additional discharge from other sources, renders the radio-active discharge non radio-active.
- 7.2.1.4(7) Provide flushing and disinfection of domestic water systems. Provide independent testing of piping systems once flushing and cleaning has been completed.
- 7.2.1.4(8) Provide automatic trap primers in drains.

7.2.2 Plumbing Fixtures:

7.2.2.1 Basic Requirements:

- 7.2.2.1(1) All plumbing fixtures to be suitable for a hospital patient care facility. Fixtures selected must have proven acceptable hospital performance from previous installations.
- 7.2.2.1(2) Particular attention will be given to fixture selection and their performance relative to infection prevention and control. To this end, size and depth of fixture basins should be considered. The depth should be at least 170 mm [6 3/4"] at the deepest part. Small 'bar' type sinks are not desired.
- 7.2.2.1(3) Toilets with flush tanks are not desired.
- 7.2.2.1(4) Barrier-free plumbing fixtures and fittings will be suitable.
- 7.2.2.1(5) Provide anti-splash, anti-aerosolizing, faucet fittings (i.e. laminar flow) that do not retain air. Gooseneck faucet fittings are preferred. Avoid low profile gooseneck faucet fittings.
- 7.2.2.1(6) Fixtures will not have an overflow.
- 7.2.2.1(7) Public toilets will be elongated. They will have an open front seat with electronic hands-free flush valve operation.
- 7.2.2.1(8) Patient toilets will be elongated and have an open front seat. Manual high/low dual flow flush valves will be provided.
- 7.2.2.1(9) Urinals will be wall-hung and low-consumption. They will have electronic hands-free flush valve operation.

- 7.2.2.1(10) 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.
 - 7.2.2.1(11) Patient washroom lavatory fixtures will be made of an impervious, durable material. They will have manual operation type faucets.
 - 7.2.2.1(12) Staff handwash sinks for nursing stations, patient care areas, examination rooms, and other similar function rooms will be made of stainless steel or 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.
 - 7.2.2.1(13) Provide drainage facilities that will alleviate water pressure exerted onto the bottom of foundations and/or floor slabs.
 - 7.2.2.1(14) Toilets should be of a type that can be used with portable bariatric commode chairs if required.
 - 7.2.2.1(15) Provide trap primers with automatic solenoid valves at p traps in negatively-pressurized rooms.
 - 7.2.2.1(16) Provide suitable quantities of janitors' sinks, hose bibs, eye wash stations, and drinking fountains to provide sufficient service to the Facility.
- 7.2.2.2 Performance Criteria:
- 7.2.2.2(1) Provide isolation valves for all floors and individual rooms for all plumbing services. Clearly identify all valves.
 - 7.2.2.2(2) Provide accessible clean-outs for all sinks and lavatories (and future sinks and lavatories) above the flood-level rim of the sink.
 - 7.2.2.2(3) Construct working mock-ups of all sinks with gooseneck faucets for the Authority's review.
 - 7.2.2.2(4) Toilets will be selected with special attention to reducing spread of infection. Flush valves will be suitably sized for the water consumption of the bowl. Toilet bowls will not splash or spray water onto the toilet rim or anywhere outside of the toilet bowl and will be designed to minimize the aerosolization of the toilet contents.
 - 7.2.2.2(5) All electronic sensor-activated fixtures will be hardwired.
 - 7.2.2.2(6) Provide pressure reducing valves with 100% redundancy in accessible locations if system pressure exceeds acceptable delivery pressure.

7.2.3 Domestic Hot Water Systems:

7.2.3.1 Basic Requirements:

- 7.2.3.1(1) Domestic hot water demand will be calculated in accordance with ASPE Plumbing Engineering Design Handbook.
- 7.2.3.1(2) Domestic hot water will be of adequate temperature to serve the needs of the Facility at not less than 60°C. Provide mixing valves where temperatures are required to be less than 60°C at point of use.
- 7.2.3.1(3) Domestic hot water system will be designed with sufficient capacity and recovery rate for the Facility's hot water requirements. Allow for expansion capacity within each system. Provide for expansion capacity in accordance with Section 3.8.2.
- 7.2.3.1(4) Domestic hot water system will be designed with a circulation system to ensure timely delivery of hot water to all fixtures.
- 7.2.3.1(5) Domestic hot water system will be designed to prevent growth and spread of Legionella bacteria within the tanks, piping, fixtures, or any other component. Design methods to use include, but are not limited to, eliminating dead-leg piping, and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

7.2.3.2 Performance Criteria:

- 7.2.3.2(1) Hot water generating equipment and /or storage will be designed with 100% redundancy.
- 7.2.3.2(2) Generate and store domestic hot water at 60°C to minimize Legionella.
- 7.2.3.2(3) Distribute domestic hot water at 60°C.
- 7.2.3.2(4) Recirculate domestic hot water from the distribution system(s) back to the generating and/or storage equipment.
- 7.2.3.2(5) Monitor hot water supply temperatures via the BMS system and provide alarm outputs when the temperature exceeds the design setpoint.
- 7.2.3.2(6) The domestic hot water generating equipment will meet the energy efficiency requirements of ASHRAE 90.1.

7.2.4 Medical Gas Systems

7.2.4.1 Basic Requirements:

- 7.2.4.1(1) The medical gases for the Facility will be supplied from the supplies located in the existing Hospital's mechanical room.
 - 7.2.4.1(2) Medical gases will include Oxygen, Medical Air and Medical Vacuum.
 - 7.2.4.1(3) Provide an isolation valve on each medical gas supply at the point of connection into the existing Hospital medical gas system. Provide a flow meter on each medical gas supply to measure energy and to monitor usage within the Facility. The BMS will monitor and trend all data related to flow of medical gas supply into the Facility.
 - 7.2.4.1(4) All pipe and pipe fittings will be in accordance to ASTM 88, de-greased copper Type 'L'.
 - 7.2.4.1(5) Service Outlets
 - 7.2.4.1(5)(a) Provide recessed service outlet boxes designed for concealed piping and fabricated for straight insertion of secondary equipment.
 - 7.2.4.1(5)(b) Each recessed wall outlet will have a permanently marked, colour-coded non-interchangeable index system so to prevent the connection of the wrong gases. Provide a secondary check valve to hold the line pressure if the primary valve is removed for maintenance.
 - 7.2.4.1(5)(c) Provide 2-part DISS type outlet connections for each medical gas.
 - 7.2.4.1(6) Ball type shut off valves will be U.L. listed label showing the appropriate gas service & pressure rating. Valves will swing out during installation and have a quarter turn from full open to close.
 - 7.2.4.1(7) Area zone shut off valves will be housed in a single box with multiple shut off valves with tube extensions, lexan glass door with hinges and pull out opening ring. Provide pressure / vacuum gauges for each service.
- 7.2.4.2 Performance Criteria:
- 7.2.4.2(1) Design the system such that there is one zone shut off system per programmed area complete with local alarm panel at each zone.
 - 7.2.4.2(2) Provide construction shut off valves such that patient rooms can be isolated to accommodate renovations without disrupting service to other areas. These valves will be located in an identified accessible location.

- 7.2.4.2(3) All medical gas piping in normally inaccessible areas (e.g.: behind walls and boarded ceilings) will be identified.
- 7.2.4.2(4) Design the system such that each program area described in Appendix 3B [Mechanical, HVAC and Medical Gas] will have its own valve box and alarm panels. Alarm panel will be connected to both building and emergency power.
- 7.2.4.2(5) Provide BMS alarm interface signal to the Building's DDC system for critical alarms such as low or high pressure.
- 7.2.4.2(6) All piping, valves and filters will be factory cleaned and capped or sealed to prevent contamination.
- 7.2.4.2(7) All departments will be provided with local valve boxes and alarm panels.
- 7.2.4.2(8) A master medical gas alarm panel will be provided to monitor all medical gas functions. Remote alarm annunciation will be provided at a location with 24 hour continuous human monitoring. Provide an inter-connected status and alarm point and signal into the BMS.
- 7.2.4.2(9) All Master alarm panels will be connected to the BMS to meet code.
- 7.2.4.2(10) All medical gas systems will be certified in accordance with CSA standards by an independent testing agency.
- 7.2.4.2(11) All systems components requiring electrical power will be on emergency power.
- 7.2.4.2(12) Medical gas outlets will be provided to satisfy the Facility requirements. Refer to Appendix 3B [Mechanical, HVAC and Medical Gas] for the minimum medical gas outlets required in the Facility.
- 7.2.4.2(13) Medical gas supply will be for patient consumption only. Where equipment and or procedure(s) require medical grade gas supply, dedicated source equipment, piping, valving and monitoring will be provided to accommodate the application.

7.2.5 Specialty Systems

7.2.5.1 Basic Requirements:

- 7.2.5.1(1) Supply and install a water filtration system for the Facility's potable drinking water.
- 7.2.5.1(2) Supply and install all specialty systems as required to provide a complete installation. These systems include, but are not limited to:

- 7.2.5.1(2)(a) Acid waste and venting,
- 7.2.5.1(2)(b) Radioactive waste,
- 7.2.5.1(2)(c) Oil, grease, dirt, and solids interceptors,
- 7.2.5.1(3) Interceptors will be designed to manufacturer's specifications.
- 7.2.5.1(4) The incoming water filtration system will be capable of removing bacteria and particulates larger than 25 microns.
- 7.2.5.1(5) Acid waste, vent piping, and fittings will be suitable for the pH levels of the waste system.
- 7.2.5.1(6) Provide trap primers with automatic solenoid valves at all acid waste p-traps.
- 7.2.5.2 Performance Criteria:
 - 7.2.5.2(1) Filtration system must be sized to handle 100% design flow rate with redundant filters piped in parallel to allow for cleaning and repair.
 - 7.2.5.2(2) Provide and install cross-connection capability including valves and piping on domestic water service.

7.3 Heating, Ventilating and Air Conditioning (Division 23)

7.3.1 Heating

7.3.1.1 Basic Requirements

- 7.3.1.1(1) Project Co will provide space, process, ventilation and/or domestic hot water heating for the Building. Project Co may provide heating for the Building by connecting to the Hospital or by providing a stand-alone or other heating solution.
- 7.3.1.1(2) If Project Co provides a heating system that connects to the Hospital's central plant then Project Co will:
 - 7.3.1.1(2)(a) use a system that does not adversely affect the Hospital's existing central plant heating system except as expressly permitted by this Section;
 - 7.3.1.1(2)(b) use no more than 12 L/s of hot water;
 - 7.3.1.1(2)(c) ensure that the temperature drop between hot water leaving the Hospital and returning hot water does not exceed 22 degrees Celsius;

- 7.3.1.1(2)(d) notify the Authority of the hot water flow rate to the Building and the resulting hot water temperature drop.
 - 7.3.1.1(2)(e) consult with and obtain approval from the Authority under Section 6.9 of Schedule 2 [Design and Construction Protocols] before performing any work in the Hospital's mechanical room;
 - 7.3.1.1(2)(f) within the Hospital's mechanical room, provide new connections (with isolation/balancing valves) to existing piping for new primary heating supply and return pipes;
 - 7.3.1.1(2)(g) provide secondary supply and return loop with dedicated pump stations inside the Building;
 - 7.3.1.1(2)(h) as necessary, modify and/or add to the Hospital's existing systems, piping, heating pumps, other accessories and related controls;
 - 7.3.1.1(2)(i) provide sufficient, adequately sized durable piping interconnection between the Hospital and the Building and/or related equipment such that the heating service is delivered and provided; and
 - 7.3.1.1(2)(j) provide all required infrastructure to accommodate and to protect interconnection piping and construct and install the necessary interconnection works between the Hospital and the Building.
- 7.3.1.1(3) If Project Co provides a stand-alone heating solution then Project Co will:
- 7.3.1.1(3)(a) provide dual fuel fired boilers, with natural gas as the primary fuel and provide secondary fuel on the Site, in a sufficient volume to operate the boilers for a minimum of 24 hours under maximum demand conditions;
 - 7.3.1.1(3)(b) size the heating equipment to meet the maximum simultaneous Facility demand for all systems served by the heating equipment. The heating equipment also must be capable of controlling and responding to periods of low usage; and
 - 7.3.1.1(3)(c) apply energy recovery systems to offset plant heating requirements.

- 7.3.1.1(4) Comply with all BC Safety Authority and WorkSafe BC requirements, including registering the piping system design and obtaining required approvals prior to construction;
 - 7.3.1.1(5) Provide equipment that is CSA approved and meets the applicable sections of the ASME Code; and
 - 7.3.1.1(6) Provide welding materials, fabrication standards, and labour qualifications that conform to applicable ANSI and ASTM Codes.
- 7.3.1.2 Performance Criteria
- 7.3.1.2(1) Provide sufficient space heating capacity to meet the required indoor design temperatures outlined in applicable CSA Standards while using the January 1% outside design temperature outlined in the BC Building Code.
 - 7.3.1.2(2) Provide perimeter radiant heating for all exterior patient or service space.
 - 7.3.1.2(3) Any ventilation and/or radiant heating sources serving the patient rooms will be connected to the Building's emergency power supply.
 - 7.3.1.2(4) Provide adequate expansion compensation for heating piping throughout. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices will be based upon a thorough review of piping layout, and piping stress analysis.
 - 7.3.1.2(5) All high points in piping will be equipped with air removal devices such as air collection chambers and air vents.
 - 7.3.1.2(6) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment for servicing or replacement.
 - 7.3.1.2(7) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.
 - 7.3.1.2(8) Balancing valves, flow-measuring devices, temperature and pressure sensors will be provided throughout the system to facilitate system balancing.
 - 7.3.1.2(9) Provide dedicated circulation pumps for all heating coils.
 - 7.3.1.2(10) Pumps will be selected to operate at the system fluid temperature without vapour binding and cavitation, will be non overloading in

parallel or individual operation, and will operate within 25% of the mid point of published maximum efficiency curve.

- 7.3.1.2(11) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.
- 7.3.1.2(12) Locate services that require regular maintenance access above non-critical spaces such that there is minimal to no disruption to the delivery of health care services.
- 7.3.1.2(13) Insulate all heating water piping, equipment and accessories to applicable BCICA and ASHRAE Standards.
- 7.3.1.2(14) Utilize screw fittings for 50mm piping and smaller and welded fittings for 65mm piping and larger.
- 7.3.1.2(15) Provide seismic mitigation and building separation devices for all piping crossing buildings and utilidors.

7.3.2 Air Conditioning

7.3.2.1 Design Principles:

- 7.3.2.1(1) Provide space, ventilation and process cooling for the Building.
- 7.3.2.1(2) The design and installation will comply with BC Safety Authority, Work Safe BC Regulations and CSA B52, Mechanical Refrigeration Code. The design of the piping system will be registered and will obtain approval from the authority having jurisdiction prior to construction.
- 7.3.2.1(3) Equipment will have CSA approval, and will meet the applicable sections of the ASME Code.
- 7.3.2.1(4) Welding materials, fabrication standards, and labour qualifications will conform to applicable ANSI and ASTM Codes.
- 7.3.2.1(5) Chiller will be rated in accordance with ARI 550/590-98.
- 7.3.2.1(6) Chiller will have multiple individual refrigerant circuits with prime mover nameplate rating of each circuit not exceeding 200 KW for groups A1, A2 or B1 refrigerants.
- 7.3.2.1(7) Cooling tower performance will be certified in accordance with CTI Standard STD-201.
- 7.3.2.1(8) Chiller and cooling tower design, placement and operation will not have an adverse effect on the Hospital.

- 7.3.2.1(9) Locate chiller and cooling tower(s) for ease of operation, accessibility for maintenance, safety considerations and appearance.
 - 7.3.2.1(10) Installation will comply with ASHARE Guideline 12-2000, Minimizing the Risk of Legionellosis Associated with Building Water Systems.
 - 7.3.2.1(11) Investigate alternate source of cooling, such as ground source systems.
- 7.3.2.2 Performance Criteria
- 7.3.2.2(1) Provide dedicated and continuously available cooling for all areas containing specialized medical equipment such as Radiation Therapy Vaults, equipment and continuous internal heat gains such as electrical and communication rooms.
 - 7.3.2.2(2) Provide sufficient space cooling capacity to meet the required indoor design temperatures outlined in applicable CSA Standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code.
 - 7.3.2.2(3) Utilize 100% outdoor air for free cooling as the first means of space cooling.
 - 7.3.2.2(4) Ensure no air within the air conditioning system, outside of the central air handling equipment, drops below its dewpoint temperature.
 - 7.3.2.2(5) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.
 - 7.3.2.2(6) Piping will be installed in an orderly manner. Slope piping to permit complete drainage of the system.
 - 7.3.2.2(7) All high points in the closed loop piping will be equipped with air removal devices, such as air collection chambers and air vents.
 - 7.3.2.2(8) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment from the Building for servicing or replacement.
 - 7.3.2.2(9) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.
 - 7.3.2.2(10) Pumps will be selected to operate without vapour binding or cavitation, will be non-overloading in parallel or individual operation, and will operate within 25% of the mid-point of published maximum efficiency curve.

- 7.3.2.2(11) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.
- 7.3.2.2(12) Locate services that require regular maintenance access above non-critical spaces such that there is minimal to no disruption to the delivery of health care services.
- 7.3.2.2(13) Insulate all chilled water and condenser water piping, equipment and accessories to applicable BCICA and ASHRAE Standards.
- 7.3.2.2(14) Utilize screw fittings, welded fittings or roll grooved mechanical couplings for all piping.
- 7.3.2.2(15) Provide seismic mitigation and building separation devices for all piping crossing buildings and utilidors.

7.3.3 Ventilation

7.3.3.1 Design Principles:

- 7.3.3.1(1) Heating, ventilation and air conditioning (HVAC) system will provide a comfortable internal environment for the patients and staff, and will meet the required environmental conditions for the equipment.
- 7.3.3.1(2) The HVAC system will maintain appropriate pressure relationships between various areas of the Facility and will provide necessary outdoor air quantity, air filtration, cleansing and exhaust to control the transmission of infection. Refer to Appendix 3B [Mechanical, HVAC and Medical Gas] for the relative pressurization and other minimum indoor air quality requirements for the Facility.
- 7.3.3.1(3) HVAC systems will be provided with adequate backup capacity and equipment redundancy to ensure continuous Facility operation at all times.
- 7.3.3.1(4) Air handling units will be provided with sectional heating and cooling coils with manual isolation valves, enabling isolation of the damaged sections of the coils.
- 7.3.3.1(5) For Class II and Class III areas units will provide redundant capacity so that in the event of a failure or scheduled serviced shutdown of one unit the other unit will continue to run and provide approximately 70% capacity to the affected area.
- 7.3.3.1(6) Provide air filtration in accordance with sub-section 6.8 of CSA Z317.2-01. Central ventilation systems will be equipped with filters with minimum dust-spot efficiency of 90% (ANSI/ASHREA standard 52.1).

- 7.3.3.1(7) Provide HEPA filtered supply air to the IV Preparation area in the Pharmacy component of the Clinical Specifications.
 - 7.3.3.1(8) Server rooms will be supplied with dedicated air conditioning systems with humidification controls.
 - 7.3.3.1(9) Design the ventilation system and all components in accordance with applicable ASHRAE and CSA Standards. If a space is not listed, ventilation rates will comply with the applicable standards and codes.
 - 7.3.3.1(10) Air handling equipment will be factory fabricated to ensure the highest construction standard. No Site built-up units will be allowed.
 - 7.3.3.1(11) Fans will be designed with Variable Frequency Drives (VFDs) for energy savings under part-load conditions.
 - 7.3.3.1(12) Provide an indirect and/or direct heat recovery system on the general exhaust air systems.
- 7.3.3.2 Performance Criteria
- 7.3.3.2(1) Incorporate a strategy to install and remove major building equipment such as fans, etc.
 - 7.3.3.2(2) Locate fans, common filters (e.g.: HEPA), and other equipment in the central mechanical rooms. Allow for adequate clearance for service access.
 - 7.3.3.2(3) All supply air, return air and general exhaust air systems will be located in interior mechanical rooms free from exposure to the elements. Ventilation systems designed to be install exterior to the building will be located outside.
 - 7.3.3.2(4) Make allowances in duct sizing and equipment selections to accommodate some flexibility for future changes in spaces. Allow for a future increase in capacity of 25% on branch lines and 10% on air handling unit sizing.
 - 7.3.3.2(5) Design the fresh air intakes, cooling coil drain pans, air handling units, duct mounted humidifiers, ductwork, and all other interconnected components to prevent moisture or contaminants from collecting within the system. Provide sufficient access panels to allow for inspection and cleaning.
 - 7.3.3.2(6) Fresh air intakes will be located to not entrain contaminants from outdoor sources. All intakes will be located in areas not accessible by the public..

- 7.3.3.2(7) All supply, return, and exhaust air will be fully ducted to the space being served and connected to air terminals. Ceiling space will not be used as air plenum.
- 7.3.3.2(8) Locate services that require regular maintenance access above non-critical spaces such that there is minimal disruption to the delivery of health care services.
- 7.3.3.2(9) Insulate all ductwork to applicable BCICA and ASHRAE Standards.
- 7.3.3.2(10) Provide seismic mitigation and building separation devices for all ductwork crossing buildings and utilidors.

7.3.4 Steam Plant

7.3.4.1 Design Principles:

- 7.3.4.1(1) Project Co will provide steam for humidification, process and/or domestic hot water heating needs for the Building. Project Co may provide steam by connecting to the Hospital's central plant or by providing a stand-alone or other solution.
- 7.3.4.1(2) If Project Co provides a steam system that connects to the Hospital's central plant then Project Co will:
 - 7.3.4.1(2)(a) provide a system that does not adversely affect the Hospital's existing central plant steam system, except as expressly permitted by this Section;
 - 7.3.4.1(2)(b) use no more than 500 Kg/hr of 850 KPa steam from the existing system;
 - 7.3.4.1(2)(c) notify the Authority of the quantity of steam that will be used for the Building;
 - 7.3.4.1(2)(d) return any steam condensate result from this connection, to the existing condensate accumulator (surge tank) in the Hospital's central plant;
 - 7.3.4.1(2)(e) Within the Hospital's central plant, provide new connections (with isolation valves) to existing piping for new steam and condensate return pipes;
 - 7.3.4.1(2)(f) consult with and obtain approval from the Authority under Section 6.9 of Schedule 2 [Design and Construction Protocols] before performing any work in the Hospital's central plant;

- 7.3.4.1(2)(g) provide dedicated steam pressure reducing valve stations and condensate return pump stations inside the Building,
 - 7.3.4.1(2)(h) as necessary, modify and/or add to the Hospital's existing central plant steam systems and condensate return systems, other accessories and related controls;
 - 7.3.4.1(2)(i) provide a sufficient, adequately sized durable piping interconnection between the Hospital's central plant and the Building and/or related equipment such that the steam and condensate return piping services are delivered and provided;
 - 7.3.4.1(2)(j) provide all required infrastructure to accommodate and to protect interconnection piping and construct and install the necessary interconnection works between the Hospital's central plant and the Building only within the hatched area shown on Appendix 2H [Site Plan], unless otherwise approved by the Authority;
 - 7.3.4.1(2)(k) provide steam, regardless of the steam quality level in the Hospital's central plant, for humidification usage such that the chemical concentrations in the air stream will not exceed the levels acceptable under applicable Laws, including occupational health and safety regulations; and
 - 7.3.4.1(2)(l) provide steam, regardless of the steam quality level in the Hospital's central plant, for sterilization usage such that the level of impurities in the steam will comply with table 3 of CSA Z317.2.
- 7.3.4.1(3) If Project Co provides a stand-alone steam solution then Project Co will:
- 7.3.4.1(3)(a) provide a complete steam generation and distribution system with appropriate steam pressure;
 - 7.3.4.1(3)(b) provide dual fuel fired boilers, with natural gas as the primary fuel and provide secondary fuel on the Site, in a sufficient volume to operate the boilers for a minimum of 24 hours, under maximum demand conditions;
 - 7.3.4.1(3)(c) provide chemical treatments for the boiler feed system such that when steam is used for humidification the chemical concentrations in the air stream will not

exceed the levels acceptable under applicable Laws, including occupational health and safety regulations; and

- 7.3.4.1(3)(d) provide chemical treatments for the boiler feed system such that when steam is used for sterilization the level of impurities in the steam will comply with table 3 of CSA Z317.2.
 - 7.3.4.1(4) Comply with all BC Safety Authority and WorkSafe BC requirements, including registering the piping system design and obtaining required approvals prior to construction;
 - 7.3.4.1(5) Provide equipment that is CSA approved and meets the applicable sections of the ASME Code; and
 - 7.3.4.1(6) Provide welding materials, fabrication standards, and labour qualifications that conform to applicable ANSI and ASTM Codes.
 - 7.3.4.1(7) The steam system will be provided with adequate capacity to ensure continuous Facility operation at all times.
 - 7.3.4.1(8) The steam pressure will be reduced for steam equipment. Pressure reducing stations will be provided for high and low demand consumptions. Manual by-pass will also be provided.
 - 7.3.4.1(9) Condensate return pump systems will be provided with the appropriate pressure and temperature rating. The pump and storage units will be sized to preventing hunting. 100% pump redundancy will be provided.
 - 7.3.4.1(10) Utilize screw fittings for 50mm piping and smaller and welded fittings for 65mm piping and larger.
 - 7.3.4.1(11) Steam used for humidification will be injected into the supply air with distribution manifolds. The distribution manifold will provide complete and uniform absorption within the air supply unit without deposition on unit casing and components. Controls for modulating the steam supply and interlocking with the air flow will be provided.
- 7.3.4.2 Performance Criteria
- 7.3.4.2(1) Piping will be arranged for ease of operation, accessibility for maintenance, safety considerations and appearance.
 - 7.3.4.2(2) Provide expansion compensation for steam and condensate piping throughout. Location of anchors and guides, design of expansion compensation loops and selection of expansion compensation devices

will be based upon a thorough review of piping layout, and piping stress analysis.

- 7.3.4.2(3) Equipment and piping will be installed with adequate service space, access panels and ability to remove equipment from building for servicing or replacement.
- 7.3.4.2(4) Isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or major drain down.
- 7.3.4.2(5) Pumps will be selected to operate at the system fluid temperature without vapour binding and cavitation, will be non overloading in parallel or individual operation, and will operate within 25% of the mid point of published maximum.
- 7.3.4.2(6) Pump construction and installation will permit complete pump servicing without breaking piping or motor connections.
- 7.3.4.2(7) Discharge from steam safety valves and vents will be piped to the outdoors.
- 7.3.4.2(8) Locate services that require regular maintenance access above non-critical spaces such that there is minimal to no disruption to the delivery of health care services.
- 7.3.4.2(9) Insulate all steam and condensate piping, equipment and accessories to applicable BCICA and ASHRAE Standards.
- 7.3.4.2(10) Provide seismic mitigation and building separation devices for all piping crossing buildings and utilidors.

7.3.5 Metering Requirements for Energy Measurement and Verification

- 7.3.5.1 Provide all of the system meters, and trend logging equipment sensors to comply with and fulfill the energy measurement and verification requirements set out in Appendix 2D [Energy] and Appendix 3E [Energy Model].

7.3.6 Sound Attenuation and Vibration Isolation

7.3.6.1 Design Principles:

- 7.3.6.1(1) Design all mechanical systems to prevent sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces and maintain sound to levels as per Appendix 3D [Sound Transmission Ratings] and CSA Z317.2-01. Design mechanical systems located at or near any exterior wall of the Building to minimize sound transmission to the neighbouring residential community.

- 7.3.6.1(2) Provide vibration isolation devices on all equipment with rotating components.
- 7.3.6.1(3) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.
- 7.3.6.1(4) Provide flexible connectors on all pump, duct, and wiring connections to isolated equipment.
- 7.3.6.2 Performance Criteria
 - 7.3.6.2(1) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.
 - 7.3.6.2(2) Utilize fibre free internal insulation.
- 7.3.7 Testing, Adjusting, Balancing and Commissioning:
 - 7.3.7.1 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. Commission all systems in accordance with Section 12 (Commissioning) of Schedule 2 [Design and Construction Protocols].
- 7.3.8 Underground Parking (if underground parking is provided):
 - 7.3.8.1 Exhaust systems will be provided and controlled by the BMS.
 - 7.3.8.2 Make-Up air systems will be provided, tempered and controlled by the BMS to maintain temperature in all parking levels above freezing. Monitor temperatures in all parking levels.
 - 7.3.8.3 Provide Radiant slab glycol heating systems to prevent frosting on ramps that are exposed to weather. Operation of the radiant slab systems will be controlled by the BMS.
 - 7.3.8.4 Provide a dry sprinkler fire protection system with appropriate zones.
 - 7.3.8.5 Provide parking floor slab drainage systems.
 - 7.3.8.6 All parking area drain assemblies and plumbing piping (from the Facility or otherwise) that are exposed to the parking spaces will be insulated, heat traced and monitored by the BMS.
- 7.3.9 Above ground Parking (if above ground parking is provided):
 - 7.3.9.1 For those storeys of the Building that, pursuant to the BC Building Code, are not considered to be open air storeys:
 - 7.3.9.1(1) exhaust systems will be provided and controlled by the BMS; and

- 7.3.9.1(2) make-up air will be provided, tempered and controlled by the BMS to maintain temperature in all parking levels above freezing. Temperatures in all parking levels will be monitored.
 - 7.3.9.2 Provide radiant slab glycol heating systems to prevent frosting on ramps that are exposed to weather. Operation of the radiant slab systems will be controlled by the BMS.
 - 7.3.9.3 Provide a fire suppression system appropriate to the building classification and occupancy.
 - 7.3.9.4 Provide parking floor slab drainage systems.
 - 7.3.9.5 All parking area drain assemblies and plumbing piping (from the Facility or otherwise) that are exposed to the parking spaces will be insulated, heat traced and monitored by the BMS.
- 7.3.10 Exhaust Systems
- 7.3.10.1 Design Principles
 - 7.3.10.1(1) All exhausted air will be discharged to ensure no cross contamination with outdoor air intake to the Building.
 - 7.3.10.1(2) Provide exhaust fans at the end of discharge systems. Ensure that such fans will be readily serviceable and are separated from spaces that house other mechanical equipment.
 - 7.3.10.1(3) Provide heat extraction and heat recovery for general exhaust air and outdoor air intake.
 - 7.3.10.2 Performance Criteria
 - 7.3.10.2(1) Radiation Therapy Vaults will be exhausted separately from the general exhaust systems. 100% redundancy will be provided. Heat extraction will be provided.
 - 7.3.10.2(2) Airborne infection isolation rooms and their associated washrooms will be provided with dedicated exhaust systems. HEPA filters will be provided in the exhaust ductwork in readily serviceable spaces.
 - 7.3.10.2(3) Each biosafety cabinet, including roughed in ones, will be provided with dedicated exhaust systems.
 - 7.3.10.2(4) Each fume hood, fume extraction device and other smoke/fume generating process booths/space will be provided with dedicated exhaust systems that are corrosion/chemical resistant to the exhaust media.

- 7.3.10.2(5) Gas scavenging exhaust for medical anaesthetic gas will be provided. Service outlet installation standards will be the same as provided for medical gas installations.
- 7.3.10.2(6) Dedicated exhaust systems will be provided as required by the Clinical Specification.

7.3.11 Specialty Systems

- 7.3.11.1 Provide normal and back-up cooling water systems for the linear accelerator machines in the Radiation Therapy Vaults. Filter and treat cooling water to the requirements of the machines. Switching between normal and back-up cooling systems will be automatic. All status will be monitored by the BMS.
- 7.3.11.2 Emergency generator room will be provided with ventilation air. Air cooled radiators will be provided with exhaust air to outdoor. By-pass will be provided in each of the radiator exhaust ducts to return warm air back to the generator room to maintain proper room temperature. Ventilation air and radiator exhaust air will be provided with sound attenuation.
- 7.3.11.3 A fuel oil supply system will be provided for the emergency generator.
- 7.3.11.4 All services for specialty systems will be provided as required by this Agreement, including the Clinical Specification and Appendix 2E [Equipment].
- 7.3.11.5 In the Systemic Treatment component of the Clinical Specifications, Room 3.1.2.9 (Negative Pressure Room) will be considered as an airborne infection isolation room. Room 3.1.2.10 (Negative Pressure Washroom) and Room 3.1.2.11 (Positive Pressure Ante Room) will be considered as spaces serving this airborne infection isolation room.
- 7.3.11.6 Provide an individual exhaust system within the simulation area of the radiation therapy component of the Clinical Specifications.
- 7.3.11.7 Provide routing space for future exhaust ducts to extend to the roof for the seed room and a future storage radioactive source room for the future brachytherapy suite.
- 7.3.11.8 Provide routing space for future exhaust ducts to extend to the roof for a future high dose rate radiation therapy room in the Equipment Storage (future brachytherapy) Room (Rm 3.1.1.10 of the radiation therapy component of the Clinical Specifications).

7.4 Reserved for Future Expansion (Division 24) – NOT USED

7.5 Integrated Automation (Division 25)

7.5.1 Controls:

7.5.1.1 Design Principles:

- 7.5.1.1(1) The building management system (“**BMS**”) will perform the following functions:
- 7.5.1.1(1)(a) Automatically operate, monitor and manage the building mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without disruption to the clinical and patient treatment delivery.
 - 7.5.1.1(1)(b) Display building related alarms at the Help Desk.
 - 7.5.1.1(1)(c) Provide a form of external monitoring for the Authority including all associated hardware and software.
 - 7.5.1.1(1)(d) Meter and trend data related to flow of electrical power, natural gas and domestic water to the Facility and as required by LEED NC.
 - 7.5.1.1(1)(e) Interface with the building electrical and communication systems including fire alarm, lighting, UPS and emergency power systems for monitoring, control and alarming.
 - 7.5.1.1(1)(f) Monitor equipment status, temperature, humidity and alarms in clinical areas, such as freezers, coolers, labs and other medical equipment as identified in the Clinical Specification.
 - 7.5.1.1(1)(g) Provide smoke management, including fan controls and other HVAC equipment controls, in accordance with all applicable standards.
- 7.5.1.1(2) The controls system will be designed as a BMS to allow monitoring and operation of the entire Facility from a single location or remote Internet connection.
- 7.5.1.1(3) The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.
- 7.5.1.1(4) The BMS will be non-proprietary and designed with open protocol.

- 7.5.1.1(5) The BMS will optimize the system performance under all operating conditions to minimize the Facility energy usage.
 - 7.5.1.1(6) The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion. The BMS will be capable of expanding in scope and size with future Facility renovations.
 - 7.5.1.1(7) The BMS will be an independent system separate from the building fire alarm and other control systems.
 - 7.5.1.1(8) The BMS will be provided as a complete package from one manufacturer, not a composite system from several manufacturers.
 - 7.5.1.1(9) Provide airflow sensors at infectious control isolation dampers in ductwork to ensure isolation has been achieved. Provide local audio and visual alarms for these sensors in addition to the BMS alarms.
- 7.5.1.2 Performance Criteria
- 7.5.1.2(1) Zoning for HVAC systems will be based on occupancy, room location within the building, room orientation, and thermostatic room loads.
 - 7.5.1.2(2) Failsafe components will be hard-wired to provide reliable operation in all circumstances.
 - 7.5.1.2(3) The BMS will meter and trend all data related to the flow of services into and out of the Building including, but not limited to, domestic water, chilled supply and return, steam, condensate, various medical gas lines, natural gas, and electricity.
 - 7.5.1.2(4) The BMS will monitor, control, indicate alarms, and provide trending where applicable for all connected sensors and control points.
 - 7.5.1.2(5) The BMS will be connected to emergency power.
 - 7.5.1.2(6) The BMS will monitor critical alarms for essential building and life safety systems. These alarms will notify the Authority as well as the building's master control centre. These critical alarms include, but are not limited to:
 - 7.5.1.2(6)(a) Fire alarm system for alarm, supervisory and trouble;
 - 7.5.1.2(6)(b) All temperature alarms resulting from setpoint deviations;
 - 7.5.1.2(6)(c) Medical gas system high and low pressure alarms;
 - 7.5.1.2(6)(d) All alarms relating to the fire protection system.

- 7.5.1.2(7) The BMS will control all public area lighting such as parking lots, walkways, exterior signage, and corridor and lobby lights located in areas not occupied 24 hours per day. Exterior lighting will include an input for photocell over-ride.
- 7.5.1.2(8) The BMS documentation will include a detailed narrative description of the sequence of operation of each system.
- 7.5.1.2(9) User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments.
- 7.5.1.2(10) The BMS will interface with building electrical and communication systems. This system is to be utilized to annunciate security alarms, freezer alarms, lab alarms, medical equipment alarms, UPS, generator, and switchgear alarms.

7.6 Electrical (Division 26)

7.6.1 General

7.6.1.1 Basic Requirements

- 7.6.1.1(1) All electrical systems, materials, and equipment in the Facility will be of a type and quality intended for use in a permanent health care facility. The electrical systems will provide redundancy, proper protection, continuity of service and a safe working environment for patients, visitors, and staff.
- 7.6.1.1(2) All electrical systems and equipment required for the function of each identified program will be provided and configured with due regard for the details of delivery of the programs. Devices identified as provided by other divisions will be the responsibility of their respective divisions, with coordination of all electrical or systems interfaces between all divisions involved.
- 7.6.1.1(3) Understand and incorporate into the Design and Construction the principle that change will be a constant and inevitable fact within the Facility. All systems will be constructed so as to facilitate this change while minimizing the cost of change and the amount of interruption to the regular activities of the Facility.
- 7.6.1.1(4) Systems and equipment will be designed and installed in a coordinated fashion. Systems will work together where advantageous, take advantage of current best available technology and through synergy provide the Facility with reliable electrical systems performance directed to facilitating the various functions of the Facility, now and into the future.

- 7.6.1.1(5) Comply with all applicable standards, including:
- 7.6.1.1(5)(a) Authority standards (available in the Data Room);
 - 7.6.1.1(5)(b) IEEE Standard 519 – Harmonics;
 - 7.6.1.1(5)(c) IEEE Standard 1250 – Voltage Quality;
 - 7.6.1.1(5)(d) IEEE Standard 1346 – Recommended Practice for Evaluation Electric Power System; and
 - 7.6.1.1(5)(e) CSA Z3204 Electrical Safety and Essential Electrical System in Healthcare Facilities.

7.6.1.2 Performance Criteria

- 7.6.1.2(1) Every electrical system will be installed in a fixed and permanent manner, seismically restrained to meet the standards for a post-disaster building. The installation will economically occupy available space, leaving space for future additions and will be planned to facilitate easy access to other systems and equipment, including but not limited to mechanical equipment, building systems access ways, and architectural building components which may require periodic inspection or maintenance.
- 7.6.1.2(2) Redundancy will be incorporated into systems and equipment such that the failure of a single piece of major equipment or major conductor will not impair the operation of the Facility nor the clinical or administrative activities.
- 7.6.1.2(3) The protection, grounding and/or isolation, insulation and control of all circuits and systems will be designed and constructed specifically to address the clinical and functional requirements of the locations where they are installed.

7.6.2 Wiring Methods and Materials

7.6.2.1 Basic Requirements

- 7.6.2.1(1) Wiring methods and materials will result in safe reliable and flexible electrical power, control, communication, data, and life safety systems in the Facility.
- 7.6.2.1(2) All wiring will be neatly and securely installed in such a way that it is protected from damage, is not in conflict with mechanical or architectural components of the Facility and allows for future changes and additions.

- 7.6.2.1(3) Wiring methods will accommodate additions removals and relocations within the Facility for its projected working life.

7.6.2.2 Performance Criteria

- 7.6.2.2(1) All conductors and all conducting components of electrical equipment, which form part of the wiring systems in the Facility will be of non-alloyed copper. Conductors and conducting components larger than 100A may be aluminum.
- 7.6.2.2(2) Wiring and wiring support systems will be concealed from public view unless specific exemption is granted by the Authority.
- 7.6.2.2(3) All wiring will be protected from mechanical damage throughout each wiring system. Entry or accumulation of moisture into any wire, cable, or wire way will be prevented.
- 7.6.2.2(4) Wiring for systems of different voltages and from different sources of supply will be separated and will not be run in common systems. Interference between wiring of power supply systems and wiring of data and communication systems will be prevented by maintaining adequate separation and shielding throughout.
- 7.6.2.2(5) Ease of maintenance and continuous service to the clinical operations is considered a benefit such that the wiring systems while being serviced or added to do not cause or require major service disruptions in the Building.
- 7.6.2.2(6) Conduit fill will not exceed 40% in any conduit.
- 7.6.2.2(7) Back boxes and junction boxes will not exceed 80% of the maximum fill allowable under the BC Building Code.
- 7.6.2.2(8) All conductors and cables will be clearly labelled at both ends.
- 7.6.2.2(9) All pull boxes, junction boxes and conduits will be identified with purpose-manufactured durable and clearly legible marking to identify the function and voltage of the system.
- 7.6.2.2(10) Approved fire stopping will be installed and maintained at all fire separations and other locations as required by applicable laws and standards.

7.6.3 Raceways

7.6.3.1 Basic Requirements

- 7.6.3.1(1) For the purpose of this specification, the word "raceway" will have the same meaning as defined in the Canadian Electrical Code, Section 0.

- 7.6.3.1(2) Raceways for wiring and cabling will be provided to support, protect and organize wiring and cabling systems throughout the Facility.
- 7.6.3.1(3) Raceways will be designed and installed in such a way to provide ease of access, capacity for expansion and change, which is consistent with the requirements of the equipment and systems that they serve.
- 7.6.3.2 Performance Criteria
- 7.6.3.2(1) Separate raceways or appropriately barriered raceways will be provided for cables and conductors of different voltages or system types.
- 7.6.3.2(2) Conduits, other than conduits dedicated to a single feeder or branch circuit, will have space for installation of a minimum of 50% additional capacity in future circuits. Cable trays, in-floor tray or duct systems will have space for installation of a minimum of 70% additional capacity in future cables. Wherever 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 total installed group.
- 7.6.3.2(3) Raceways will be planned to facilitate easy access to other systems and equipment, including but not limited to mechanical equipment, building systems access ways, and architectural building components which may require periodic inspection or maintenance.
- 7.6.3.2(4) Raceways will be designed and installed without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables. Manufacturer's maximum bend radii will be observed.
- 7.6.3.2(5) All metallic raceways will be continuously bonded with a bonding conductor installed within the raceway.
- 7.6.3.2(6) Provide an additional 50% of the totally installed group as spare raceways/ducts from the main electrical room energy centre to all sub-electrical rooms.
- 7.6.3.2(7) Provide a minimum of (2) 27mm empty raceways with nylon pull string to the nearest communications room and (2) 27mm empty raceways with nylon pull string to the nearest electrical room. Terminate these Raceways in junction boxes located at the parking area entrance.

7.6.4 Electrical Utilities

7.6.4.1 Basic Requirements

- 7.6.4.1(1) Ensure that the supply of electrical energy from BC Hydro to the Facility will be designed and installed to meet the IEEE Standards listed in Section 7.6.1.1(5).
- 7.6.4.1(2) Ensure the arrangement of BC Hydro power service to the Facility complies with IEEE Standard 602-1996, Recommended Practice for Electrical Systems in Health Care Facilities.

7.6.4.2 Performance Criteria

- 7.6.4.2(1) Provide one BC Hydro service to the new main electrical room in the Facility. The switchgear for these incoming services will be arranged to feed a double ended substation. The Facility is to be fed separately from the Hospital.
- 7.6.4.2(2) The capacity of the utility connections, cable and incoming high voltage switchgear, will, in the initial installation, allow for the initial connected load requirements plus 50% spare capacity. The Design will anticipate the need for future expansion of the main electrical room to accommodate projected future growth of the Facility and to the connected load.
- 7.6.4.2(3) The design and construction of the utility connections will include one incoming breaker or a fused load-break switch.
- 7.6.4.2(4) Reduce the vulnerability of the utility connections by burying, encasing in concrete and marking the location of utility connections and other available means to guard against accidental disruption by on-site or near-site activities.
- 7.6.4.2(5) Locate BC Hydro ducts so as not to interfere with any known future expansion of the Facility.

7.6.5 Emergency Power

7.6.5.1 Basic Requirements

- 7.6.5.1(1) Provide a reliable source of power to all essential areas and systems within the Facility. The emergency power system will be available 100% of the time.
- 7.6.5.1(2) Comply with CAN/CSA-C282-00, Emergency Electrical Power Supply for Buildings unless in conflict with CSA Z32. In the case of a conflict, CSA Z32 will prevail.

7.6.5.1(3) The emergency power system fuel supply will comply with CSA B139 and ULC CAN4-S601.

7.6.5.2 Performance Criteria

7.6.5.2(1) The generator will be supplied with automatic transfer.

7.6.5.2(2) Generator will be fuelled with a readily available standby source to ensure a continuous fuel supply as in the case of an extended power outage.

7.6.5.2(3) Fuel supply stored on Site in permanent storage will provide for continuous operation of the emergency power system at 80% rated load for a period of at least 24 hours.

7.6.5.2(4) The generator will be located so as to permit convenient servicing and monitoring and to prevent unauthorized access.

7.6.5.2(5) The generator will be located, vibration isolated, and muffled so that sound and vibration are limited to low levels in the Facility outside of the generator room.

7.6.5.2(6) The generator set will be capable of undergoing testing each week for at least ½ hour with actual building load.

7.6.5.2(7) Ease of maintenance and the ability to maintain continuous service to the clinical operations is important for the successful operation of the Facility. Ensure that the servicing of or any additions to the distribution equipment do not result in a major service disruption to the Facility.

7.6.5.2(8) The transfer switches will be closed transition type, with in-phase monitoring, and will provide bumpless transfer between Hydro and the generator plant during testing. This is not a requirement between the normal and conditional power distributions.

7.6.5.2(9) The generators loads and alarms will be monitored and recorded on a digital system and the BMS system.

7.6.5.2(10) The generator plant will provide a minimum 65% of the total demand load of the complex but in no case less than the required back-up power for all patient care environment areas as defined by CSA Z32-04.

7.6.5.2(11) In addition to the requirements of the BC Building Code, the following areas will be supplied with emergency power:

7.6.5.2(11)(a) all communication rooms;

7.6.5.2(11)(b) fire alarm systems;

- 7.6.5.2(11)(c) nurse call systems;
 - 7.6.5.2(11)(d) emergency communications devices
 - 7.6.5.2(11)(e) main computer server room
 - 7.6.5.2(11)(f) nursing stations;
 - 7.6.5.2(11)(g) security / access control systems
 - 7.6.5.2(11)(h) exterior signage and walkway lighting
 - 7.6.5.2(11)(i) rooms designated as emergency operations centres;
and
 - 7.6.5.2(11)(j) alarmed freezers and coolers.
- 7.6.5.2(12) Where emergency power is needed to meet program requirements or to protect equipment from damage, it will be provided.
- 7.6.5.2(13) Uninterruptible Power Supplies (UPS) will be provided for all equipment that requires a continuous and uninterrupted source of power. UPS units for single isolated small loads less than 1 kilowatt may be freestanding units, located adjacent to the supplied equipment and rated for the connected load plus at least 20%. Where there are a number of units in a location, all of which require UPS power, the UPS will be mounted in an electrical room and a separate UPS distribution panel will be provided with UPS receptacles provided for each of the UPS loads. Loads larger than 1 kilowatt will be circuited from a UPS distribution panel. UPS units supplying UPS panels will be rated for the known connected or intended loads, plus 100% spare capacity. Project Co may provide separate or central UPS systems to feed all UPS loads.
- 7.6.5.2(14) UPS units will be fed by circuits supported by an emergency generator and will be rated for a minimum of 15 minutes at full rated load. Where vital functions are connected to a UPS circuit, an audible warning will sound in the vital function area 5 minutes before the UPS battery supply is exhausted.
- 7.6.5.2(15) 3-phase UPS units larger than 1500 watts will have static bypass maintenance switching to permit servicing of the UPS without power interruption. All UPS units will automatically transfer the load to and from the normal power supply without any interruption or disturbance of supply to the load.
- 7.6.5.2(16) Areas or equipment requiring UPS power will include:

7.6.5.2(16)(a) computer server rooms – a UPS system will be provided for the computer server room. The UPS system for the computer server room shall be dual redundant style with two UPS modules and two battery strings paralleled together. A true wrap around maintenance bypass shall be provided to allow the computer equipment to remain active while maintaining the UPS. All communication rooms shall be fed from these paralleled UPSs;

7.6.5.2(16)(b) computer network equipment;

7.6.5.2(16)(c) communication rooms; and

7.6.5.2(16)(d) Incoming demarcation room.

7.6.5.2(17) Provide dual redundant server room UPSs fed from the emergency generator. The UPS in the server room is to feed all equipment in the server room except the air conditioning, which will be fed from the emergency generator. Configure power distribution for the server room with twin power feeds down each rack with, at minimum, 30 Amp capacity per power feed.

7.6.6 Transmission and Distribution

7.6.6.1 Basic Requirements

7.6.6.1(1) Electrical power of the voltage, current, and phase(s) required will be provided, from the main sources of supply, to each load requiring supply of power, and to convenience and special purpose outlets designed to meet all requirements of Facility operations, including the clinical and administrative functions and provision of the Services.

7.6.6.1(2) Transmission and distribution equipment and systems form the backbone of all electrical operation of the Facility. Such equipment and systems will be robust, reliable, easily operated and maintained and will be designed with extra capacity to accommodate load growth and equipment additions.

7.6.6.1(3) The transmission and distribution systems will allow for future changes and additions.

7.6.6.1(4) Transmission and distribution equipment will be of a “specification grade” and “institutional” or “industrial” quality and not of a “light duty” or “commercial” quality.

7.6.6.2 Performance Criteria

- 7.6.6.2(1) Major electrical equipment, which includes but is not limited to transformers, main distribution centres, transfer switches, motor control centres, and power factor correction equipment will be grouped together in a configuration that allows for addition or expansion of each type of equipment, logical arrangement in terms of the interconnection, operation and maintenance of the equipment. One high voltage breaker on the incoming feeder will be dolly-mounted and the 600V main distribution will consist of drawout breakers.
- 7.6.6.2(2) Major electrical equipment will be located with the intention of minimizing run length of feeders and branch circuits, and will be located so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.
- 7.6.6.2(3) All components of transmission and distribution systems will be selected configured, located, and installed so as to minimize the transmission of noise, vibration or unwanted heat into other parts of the Facility.
- 7.6.6.2(4) Protection and coordination of protection equipment will be designed and installed so that the initial electrical installation, and future additions and modifications to the installation will be properly protected and fully coordinated, meaning that in the event of a fault or overload, protective devices will act to isolate only the faulty portion of the system and areas downstream, leaving all other portions of the system fully operational. Protection equipment will adequately protect against injury to persons and damage to property. The 600V secondary main switchgear will consist of breakers not fuses.
- 7.6.6.2(5) Where required by system characteristics or operational requirements, special shielding, isolation, grounding, bonding, harmonic filtration or other treatment will be provided to prevent interference between systems or degradation of performance of an individual system.
- 7.6.6.2(6) Locate distribution centres with due regard to future expansion and supply 20% extra space in distribution centres.
- 7.6.6.2(7) Components of the transmission and distribution systems which are in any public, clinical, administrative or staff area will be of a type which gives both long life expectancy without perceptible deterioration, and good appearance, and will be designed, selected and installed so as to permit easy and complete cleaning. These components include but are not limited to light switches, receptacles, wire ways, equipment grounding points, and status displays.
- 7.6.6.2(8) Single phase 120VAC grounding receptacles conforming to CEC and specifically to CSA Configuration 5-15R are to be provided at each

location where electrical equipment requiring a supply of normal or emergency power will be plug connected.

- 7.6.6.2(9) Locations of receptacles will comply with all applicable codes and standards. See Appendix 3C [Electrical] Table 1 for the minimum required for each functional area.
- 7.6.6.2(10) Receptacles in all areas will be hospital grade, with the exception of automobile block heaters, receptacles in service rooms, and receptacles in the underground parking area. All receptacles will have stainless steel cover plates. Grouped receptacles will have a single cover plate covering the whole group. Receptacles on normal power circuits will be white, receptacles on emergency power circuits will be red, and receptacles on UPS circuits will be blue and identified as UPS circuits using lamicaid or similar labels.
- 7.6.6.2(11) All receptacles will be permanently marked with lamicaid labels identifying the circuit and panel number.
- 7.6.6.2(12) Receptacles used in parking areas for engine block heaters will be deactivated when ambient temperatures at the Site rise above a preset level (typically -10 °C). Receptacles will be on preset on/off cycles when activated (typically 5 minute cycles).

7.6.7 Metering

7.6.7.1 Basic Requirements

- 7.6.7.1(1) Digital pulse metering will be supplied to provide detailed information about power quality and power consumption at key points throughout the Facility.
- 7.6.7.1(2) Any metering which is to be used to charge tenants or agencies for their power consumption will be “revenue certified”.
- 7.6.7.1(3) The metering system will be a networked system, with terminals for maintenance and plant administration, and data transfer to the BMS.
- 7.6.7.1(4) Electrical consumption meters will be connected to the BMS.

7.6.7.2 Metering Requirements for Energy Measurement and Verification

- 7.6.7.2(1) Provide all of the electrical system meters, and trend logging equipment sensors to comply with and fulfill the energy measurement and verification requirements set out in Appendix 2D [Energy] and Appendix 3E [Energy Model].

7.6.7.3 Performance Criteria

- 7.6.7.3(1) The metering system will provide easily read locally displayed information for all distribution at primary voltage and for each secondary distribution switchboard.
- 7.6.7.3(2) Historical data from the metering system network will be stored and will be capable of generating user configurable electronic and printed reports on demand.
- 7.6.7.3(3) The metering system will not be dependant on power from the metered circuit for its operation, and will be supported by a backup power source or sources, which ensure operation when the metered circuit is de-energized.
- 7.6.7.3(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.
- 7.6.7.3(5) The meters will be power quality type able to monitor harmonics and surges / sags.

7.6.8 Grounding and Bonding

7.6.8.1 Basic Requirements

- 7.6.8.1(1) All electrical equipment and systems in the Facility will be properly bonded and grounded.
- 7.6.8.1(2) Grounding and bonding will provide for safety of personnel and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems.

7.6.8.2 Performance Criteria

- 7.6.8.2(1) All conductors and all conducting components of electrical equipment which form part of the grounding and bonding systems in the Facility will be of non-alloyed copper or aluminum.
- 7.6.8.2(2) Provide solid or low resistance system grounding.
- 7.6.8.2(3) Provide equipotential grounding systems and equipment for all patient care areas.
- 7.6.8.2(4) Provide patient care environment bonding point (room reference ground buss) in each patient sleeping and diagnostic and treatment room. Ground buss will be located in a readily accessible location within the room.

7.6.9 Seismic Requirements for Electrical Systems

7.6.9.1 Basic Requirements

- 7.6.9.1(1) Provide seismic restraint for all electrical equipment and components of electrical systems which are part of the building electrical systems in the Facility.
- 7.6.9.1(2) Seismic restraint systems and methods will be selected to facilitate ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and building components.
- 7.6.9.1(3) Seismic restraint systems and methods will be selected to coordinate with the building Architecture and finishes. Components of seismic restraints will, wherever practicable, be concealed from public view. Where concealment is not practicable the systems will be designed to complement building Architecture and finishes.
- 7.6.9.1(4) Seismic restraint design will follow the recommended practices published in the Seismic Restrain Standards Manual as adopted by the Electrical Contractors Association of BC and CSA S832-06 Guidelines for Seismic Risk Reduction of Operational and Functional Components.

7.6.9.2 Performance Criteria

- 7.6.9.2(1) All electrical equipment and components of electrical systems that have the potential to cause injury or damage during or following a seismic event will be seismically restrained.
- 7.6.9.2(2) Seismic restraint systems will either be 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.

7.6.10 Power Quality

7.6.10.1 Basic Requirements

- 7.6.10.1(1) An overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout Facility will be established and maintained.
- 7.6.10.1(2) A wide variety of electrical and electronic equipment types will be in use in the Facility. Equipment and systems which assure that 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 are to be provided.

- 7.6.10.1(3) Power quality will meet or exceed the IEEE established standards for power quality, including but not limited to harmonic mitigating transformers, which will be provided where required by applicable standards including:

7.6.10.1(3)(a) IEEE Standard 519 - Harmonics

7.6.10.1(3)(b) IEEE Standard 1250 - Voltage Quality

7.6.10.1(3)(c) IEEE Standard 1346 - Recommended Practice for Evaluation Electric Power System Compatibility with Electronic Process Equipment

- 7.6.10.1(4) Methods and equipment consistent with IEEE Standard 1159 - Monitoring Electric Power Quality will be provided by installing a built-in power quality meter at the BCH incoming service. All other system testing will be done by a technician using portable test equipment. Filters, TVSS, etc will be provided as required. Power quality meters will be provided at all secondary distribution centres. Provide transient suppression to panels as required, used to prove that power quality meets or exceeds published standards.

7.6.10.2 Performance Criteria

- 7.6.10.2(1) The Facility will include equipment specifically designed to control and remove all adverse power quality conditions that could damage or impair function of any of the electrical or electronic equipment, which will be in use in the Facility. Adverse power quality conditions to be addressed include but are not limited to voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference.

- 7.6.10.2(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.

7.6.11 Lighting

7.6.11.1 Basic Requirements

- 7.6.11.1(1) All luminaries of greater than 60W to have lamps with minimum efficacy of 50 lumens/watt.

- 7.6.11.1(2) Appropriate lighting will optimize use of daylight and will be achieved through a combination of natural light and luminaires and controls.
- 7.6.11.1(3) Exterior and interior lighting will create a safe and secure environment for patients and staff.
- 7.6.11.1(4) Lighting will comply with all characteristics recommended by the Illuminating Engineering Society of North America (IESNA) RP29 Lighting for Health Care Facilities.
- 7.6.11.1(5) Lighting energy consumption will comply with ASHRAE Standard 90.1 and will exceed that standard by as much as possible with a reasonable standard being a 10% reduction range while still meeting program requirements.

7.6.11.2 Performance Criteria

- 7.6.11.2(1) Selection of luminaires and light sources will meet the stated energy efficiency and quality and quantity requirements, but will also meet the objective of providing both a comfortable working environment and an environment conducive to healing and recovery.
- 7.6.11.2(2) Lighting will follow the requirements as listed in Appendix 3C [Electrical] Table 2.
- 7.6.11.2(3) Special task lighting designed for the types of procedures conducted will be provided for rooms and areas where treatment is provided and rooms and areas where specialized analytical or diagnostic work is carried out.
- 7.6.11.2(4) Luminaires in all areas will be so constructed as to require minimal cleaning and will permit practical and easy access and disassembly. All lighting components will be institutional grade.
- 7.6.11.2(5) Lighting in areas where computer terminals and similar screens will be used will be specifically designed to eliminate indirect glare and will meet or exceed the IES recommended cut off for VDT luminaires.
- 7.6.11.2(6) Lighting in technology conference rooms and video conferencing facilities will maximize viewing of monitors and screens and will provide suitable illumination of people being viewed.
- 7.6.11.2(7) Exterior luminaires will be vandal resistant.
- 7.6.11.2(8) Use of battery-operated unit emergency lighting will be minimized, however battery-operated emergency lighting or and acceptable alternative will be provided as a second level of emergency lighting in areas such as nurse units, and mechanical areas.

- 7.6.11.2(9) Lighting in operating and invasive procedure rooms will be connected to the UPS system.
- 7.6.11.2(10) Lighting in main lobbies, waiting areas and the main entrances are features of the building and will be designed of high quality products aesthetically pleasing to the public and staff.

7.6.12 Lighting Control

7.6.12.1 Basic Requirements

- 7.6.12.1(1) Lighting controls will comprise a significant part both of the energy management of the Facility and of the flexibility required to adjust lighting to suit functions and activities.
- 7.6.12.1(2) Lighting control will permit simple and integrated control of lighting; controls will be easily operated and conveniently and appropriately located for each area and function.
- 7.6.12.1(3) All lighting in public and administration areas will be capable of being switched from a central location.
- 7.6.12.1(4) The BMS will be used for remote control of the lighting.
- 7.6.12.1(5) Staff and patients will have the ability to control the lighting in their environment. Appendix 3C [Electrical] Table 2 Lighting will be followed as a minimum standard for control.
- 7.6.12.1(6) Occupancy sensors and daylight control systems will be utilized to maintain light levels at appropriate levels based upon the occupancy of the room and the quantity of daylight.

7.6.12.2 Performance Criteria

- 7.6.12.2(1) Where lighting controls are required to be located in areas accessible to the public, they will be protected from unauthorized operation.
- 7.6.12.2(2) All manually operated lighting controls will be of a type, which can be completely cleaned and disinfected without requiring any disassembly. Manually operated controls will not be deteriorated or otherwise adversely affected by frequent cleaning and disinfections.
- 7.6.12.2(3) Lighting controls in locations where they may be subjected to excessive moisture or to chemicals that might cause deterioration are to be rated specifically for the application.
- 7.6.12.2(4) Lighting in open areas and common areas will be appropriately zoned and subdivided to permit energy management and appropriate control and variation of light levels.

- 7.6.12.2(5) Control of lighting in technology conference rooms and in videoconference facilities will be integrated with the equipment controls and control stations in the room so as to permit the conference manager to vary the lighting as required for different activities. Lighting will have a minimum of 4 levels of control.

7.6.13 Major Medical Equipment

7.6.13.1 Basic Requirements

- 7.6.13.1(1) Provide all electrical requirements for connection, operation and monitoring and control of all major medical equipment.

7.6.13.2 Performance Criteria

- 7.6.13.2(1) Each item of equipment will be installed and electrically connected for proper and full operation.
- 7.6.13.2(2) Electrical characteristics of all major medical equipment, including voltage, wattage, phase, demand, inrush, frequency, connection method and control and monitoring requirements will be confirmed by Project Co and provided for.
- 7.6.13.2(3) Space, access and ventilation requirements and other operation critical characteristics of this equipment will be provided for and outlets and connection points will be located correctly for installation and so as to permit proper and safe isolation for servicing and disconnection for removal or replacement.

7.6.14 Energy Management

7.6.14.1 Basic Requirements

- 7.6.14.1(1) The integrated energy management system will monitor, record, report on and control energy from all sources which supply energy to the Facility. This system may form part of the BMS.
- 7.6.14.1(2) The energy management systems and equipment will be flexible, controllable, and will form an integral part of the Design and Construction.

7.6.14.2 Performance Criteria

- 7.6.14.2(1) The energy management system will be accessible from any networked computer using appropriate software.
- 7.6.14.2(2) A minimum of (5) Site software licenses will be provided if licensing is required.

7.6.15 Mechanical Equipment Connections

7.6.15.1 Basic Requirements

- 7.6.15.1(1) Electrical power control and monitoring connections will be provided to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe reliable and serviceable mechanical equipment and systems in the Facility.

7.6.15.2 Performance Criteria

- 7.6.15.2(1) Cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment will be of institutional or industrial quality, and will be so selected and installed as to provide for high levels of reliability, durability and ease of maintenance of the equipment.
- 7.6.15.2(2) Connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration will be of a type specifically designed to accommodate the vibration.
- 7.6.15.2(3) Connections to mechanical equipment will be designed and installed to easily permit removal and replacement of the equipment and will provide for the eventuality that equipment may be replaced in the future with upgraded and dissimilar equipment types.
- 7.6.15.2(4) Motor control centres, main feeders to motor control centres, and mechanical distribution centres will be sized to accommodate the current mechanical equipment plus 50% of that amount in additional spare capacity.
- 7.6.15.2(5) Motor control centres will be used when three 3-phase motors that require a starter are located within 50m of each other.
- 7.6.15.2(6) If an aboveground parkade is provided, provide automobile heater receptacles. The receptacles will be controlled by cyclical power and temperature value.

7.6.16 Specialty Systems

7.6.16.1 Basic Requirements

- 7.6.16.1(1) Special electrical and communications systems are required in the Facility and form essential parts of the Facility. Power supply, specially conditioned power and communication conduits and other electrical operational support equipment will be supplied and installed

in order to provide for all the requirements of permanent installations of these special electrical and electronic systems.

7.6.16.2 Performance Criteria

- 7.6.16.2(1) Cables, connectors, conduit systems, fittings and hardware used to make connection to special equipment will be of institutional or industrial quality, and will be selected and installed to provide for high levels of reliability, durability and ease of maintenance of the equipment.
- 7.6.16.2(2) Connections to special equipment will be designed and installed to easily permit removal and replacement of the equipment and will provide for the eventuality that equipment may be replaced in the future with upgraded and dissimilar equipment types.

7.7 Communications (Division 27)

7.7.1 General

7.7.1.1 Basic Requirements

- 7.7.1.1(1) Use the latest technology for transferring, securing, and storing information. The Authority expects to receive the most current technology and systems available at the start of Construction.
- 7.7.1.1(2) Without limiting Project Co's obligations under Section 12 (Commissioning) of Schedule 2 [Design and Construction Protocols]:
- 7.7.1.1(2)(a) retain a qualified 3rd party to confirm and report to the Authority on the integration of all communications systems, including to confirm that all communication systems, including network and telephone systems, nurse call, fire alarm, panic buttons, code blue, code white and intrusion systems, will produce the specified signal on all required output devices and each output device can be activated by all specified input devices; and
- 7.7.1.1(2)(b) consult with the Authority to determine the appropriate configuration and testing of the network and telephone systems, configure and test the network and telephone systems accordingly and allow the Authority or its representatives to witness and confirm such tests.

7.7.1.2 Performance Criteria

- 7.7.1.2(1) The communications systems will be proven technology, effectively used in other health facilities, will be easy to operate, and easy to maintain. Where needed, these systems will integrate readily with the other systems in the Facility and with technology provided in other health facilities to allow communications between staff at health facilities in the province of British Columbia.
- 7.7.1.2(2) Project Co will be responsible for training and educating all Authority clinical / non-clinical staff and where necessary the public on the proper use and maintenance of all of the communications systems provided in the Facility.
- 7.7.1.2(3) The communications systems will be chosen because they are cost effective, provide efficiencies for staff and patients, perform the necessary tasks sufficiently, are adaptable to change, flexible in implementation and are expandable to accommodate growth.

7.7.2 Structured Cabling

7.7.2.1 Basic Requirements

- 7.7.2.1(1) The cabling infrastructure will not differentiate on the type of end-use device that connects to it. The cabling infrastructure will be universal and allow all currently available forms of end-use devices access to the different system types.
- 7.7.2.1(2) The cabling infrastructure will be designed by a Registered Certified Data Designer (RCDD) or professional engineer. Project Co will work with the Authority to locate all drops.
- 7.7.2.1(3) All cables are to terminate in communication rooms sized in accordance with the TIA / EIA 569 standard. Maximum cable distance from room outlet to communication room will be 90 meters.
- 7.7.2.1(4) Cabling installation will comply with TIA / EIA 569 except that communication rooms may serve more than 1 floor. Communication rooms will be placed to maximize the area they serve.
- 7.7.2.1(5) Cable types will be unshielded twisted pair and fibre optic 50 micron multimode and single mode. The bandwidth requirements and distance limitations will determine the type of cable installed. At minimum, fibre will be used between the core and the network switches and from the core server room to each communication room. Each network switch will have redundant fibre connections back to the core.

- 7.7.2.1(6) The conduits, pathways, room layouts, and design will comply with the TIA / EIA-569 Commercial Building Standard for Telecommunications Pathway and Spaces, latest edition.
- 7.7.2.1(7) The cabling design and installation will comply with the TIA / EIA – 568B.1, B.2 and B.3 Commercial Building Cabling Standards and Optical Fibre Cabling Standards.
- 7.7.2.1(8) Testing of the fibre optic cable will meet the TIA / EIA 526-7, and TIA / EIA 526- 14 standards for Optical Power Loss measurement of single mode and multimode fibre cable plant.
- 7.7.2.1(9) The management and administration of the cabling plant will be done in accordance with the TIA / EIA 606 standard – the Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- 7.7.2.1(10) The grounding of the conduit pathways and components is to meet the TIA / EIA 607 Standard – Commercial Building Grounding and Bonding Requirements for Telecommunication.
- 7.7.2.1(11) Provide AMP NetConnect structured cabling components from Tyco, as specified in the Authority’s Cabling Standards document (a copy of which is available in the Data Room). The structured cabling components will be installed by a data contractor who is certified by one of the industry leaders.
- 7.7.2.1(12) Provide two 100mm conduits from the Authority’s server room in the Facility to NHA’s main server room in the Hospital, complete with one 24 strand single mode fibre cable.
- 7.7.2.1(13) High density RJ45 patch panels will be used for all copper terminations in the communication rooms. Terminate fibre cabling on patch panels in communication rooms with connector type as directed by the Authority.
- 7.7.2.2 Performance Criteria
- 7.7.2.2(1) Provide and install a complete category 6a structured cabling solution throughout the Facility. If a category better than category 6a is the latest standard at the time of the Design or the Construction, the structured cabling solution will be priced and presented to the Authority so that the Authority can determine if it wants to utilize the latest standard. RJ45 patch panels are to be utilized in lieu of an IDC style solution. All phones are VOIP and will be connected to network switches.

- 7.7.2.2(2) A star wired cabling approach will be utilized to wire all outlet locations back to communication rooms and all communication rooms back to the main computer room and main telecommunications room.
- 7.7.2.2(3) All rooms that have or are anticipated to have data, phone, video, or other end-use devices will have cable system drops run back to telecommunication rooms. For every drop location, a minimum of 2 cables will be run (two RJ45's per location). In addition, provide an additional 100% drop count over and above those prescribed. Locate these additional drops as directed by the Authority.
- 7.7.2.2(4) All conduit pathways will have maximum 30% fill, all cable trays will have maximum 25% fill.
- 7.7.2.2(5) All communication rooms will have spare capacity as recommended by TIA / EIA – 568B.1, B.2 and B.3 Commercial Building Cabling Standards and Optical Fibre Cabling Standards. All cabling will be run in conduit or cable tray. J-hooks will not be approved
- 7.7.2.2(6) Fibre optic cabling will be utilized to connect communication rooms to the main computer room and the core network room. A minimum of 24 strand cable will be used from the main server room to the communication rooms. At least 50% spare strands are to be available at the opening of the facility. Single mode fibre is to be provided. Fibre optic cabling will also be provided in rooms requiring video streaming, and areas where bandwidth requirements necessitate. Complete fibre distribution within the computer room is to be provided.
- 7.7.2.2(7) Interconnections between communications rooms will follow Figure 1: Communications Single Line Diagram, in Appendix 3C [Electrical].
- 7.7.2.2(8) Equipment rack layouts in main communications room will follow Figure 2: Draft Rack Layouts for Main Communications Room, in Appendix 3C [Electrical].
- 7.7.2.2(9) All cable drops will be terminated at both ends. The proper flame spread rating will be provided for the cabling system.
- 7.7.2.2(10) Patch cables for all end-use devices will be provided in sufficient quantity to make each device operational plus 10% spare. Patch cable will allow complete connection from end to end.
- 7.7.2.2(11) Implement a cable management labelling software and electronic drawing system to track and manage the cable plant.
- 7.7.2.2(12) Self-registration systems, electronic directional systems and patient education kiosks will be provided in reception areas. Provide floor data outlets and floor power to connect these floor mounted systems.

- 7.7.2.2(13) Specialized systems requiring multiple drops will have sufficient drops at each location to ensure system operation.
- 7.7.2.2(14) Provide cable for all public phones. Allow for a minimum of (2) per main lobby.
- 7.7.2.2(15) In addition to the 2 post racks for the cabling, provide four-4 post deep server cabinets, extra wide, similar to Model #HP 24A, complete with power distribution units on each side of the cabinet. Cabinets will be fully enclosed with locking door for the Authority's server equipment, and to be placed in the server room as directed by the Authority.

7.7.3 Network Equipment

7.7.3.1 Basic Requirements

- 7.7.3.1(1) Network equipment for building systems and facility management systems will be designed and provided by Project Co.
- 7.7.3.1(2) Network equipment for administrative and clinical networks will be provided by the Authority as indicated in Appendix 2E [Equipment].
- 7.7.3.1(3) A tier two server room (ANSI 942 standard) is needed to house the servers, core networks, UPS, and associated equipment as identified in the Clinical Specification.
- 7.7.3.1(4) Project Co will provide network equipment from the same manufacturer (and with the same model number) as the network equipment provided by the Authority.
- 7.7.3.1(5) The Facility will include communication rooms as required to service voice/video/data requirements of the Facility. Provide a minimum of one communication room per 2000 m².
- 7.7.3.1(6) The network equipment provided by Project Co will support the wireless infrastructure provided by Project Co.
- 7.7.3.1(7) All switches will be POE type.

7.7.3.2 Performance Criteria

- 7.7.3.2(1) Provide a communication entry room for the services providers near the edge of the Facility. Provide conduit for services supplied by the Authority and a minimum of 2 spare 75mm conduits for possible future expansion.
- 7.7.3.2(2) An ANSI 942 tier 2 server room is to be provided in the Facility to host servers supplied by the Authority and the main core internal backbone network equipment supplied by the Authority. The Authority will

provide a list of equipment for the purposes of space, power and environmental control planning during the design process.

- 7.7.3.2(3) In consultation with the Authority, prepare a network plan which includes the following: the network core (supplied by the Authority), the edge communication devices, the applications, all connecting end-use equipment and each separate network for systems provided for the Facility.
- 7.7.3.2(4) 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. Facility systems will include the security, nurse call, patient entertainment, BMS, CCTV and the wireless infrastructure.
- 7.7.3.2(5) Provide anticipated network traffic required for the facility networks to allow the Authority to design the core switch.
- 7.7.3.2(6) All switch infrastructures will support multiple VLAN functionality and multiple subnets per VLAN.

7.7.4 Wireless Infrastructure

7.7.4.1 Basic Requirements

- 7.7.4.1(1) The entire Facility will be provided with a digital enterprise wireless network infrastructure that will allow wireless end-use devices secure access to the Authority's network and all its associated applications.
- 7.7.4.1(2) The wireless network components will meet the current IEEE 802.11a, b, e, g, i, k, n standards. The latest standards will be adopted and the bandwidth of the network will meet the requirements of the Facility at the time of installation.
- 7.7.4.1(3) The wireless system will consist of controllers and light weight access points. Access points will, if the Authority so elects, be powered by PoE and be 802.3af compliant.
- 7.7.4.1(4) The wireless products will use advanced random data encryption protocol to secure the information and must comply, at a minimum, with WPA2. Project Co will use wireless products from Cisco and will use the latest available products at the time of Construction.
- 7.7.4.1(5) The wireless transmitters will not adversely affect other biomedical equipment.

- 7.7.4.1(6) Project Co will provide network equipment for the wireless infrastructure from the same manufacturer (and with the same model number) as the network equipment provided by the Authority.

7.7.4.2 Performance Criteria

- 7.7.4.2(1) Provide a complete wireless network throughout the Facility (excluding areas of the Facility within any underground parkade structure, surface parking area or above-ground parkade structure, as applicable) with no dead spots allowing any standard network applications or telephone applications to be utilized. The wireless network will be voice grade with quality of services incorporated.
- 7.7.4.2(2) Project Co will provide the Category 6A structured cabling for the wireless infrastructure (according to the standards provided by the Authority) to support utilizing a common access point for both wireless voice devices and wireless data devices.
- 7.7.4.2(3) The structured cabling system will connect the wireless access points to the communication rooms. The access points will be powered from the UPS system.
- 7.7.4.2(4) All access points and wireless components will be seismically supported.
- 7.7.4.2(5) Demonstrate a minimum of 30 Mb/s throughout the Facility statistically accurate to within 2%, 95% of the time.
- 7.7.4.2(6) The wireless network, including access points, will be fed from a UPS power source.
- 7.7.4.2(7) Project Co will design the wireless network in consultation with the Authority.

7.7.5 Wireless Staff Communication Systems

7.7.5.1 Basic Requirements

- 7.7.5.1(1) The wireless staff communication system will function throughout the Facility. Any wireless device type complying with the standards such as Vocera, a PDA, wireless phone or laptop computer shall function correctly on the wireless network.
- 7.7.5.1(2) The wireless system will integrate with the nurse call system, the main telephone switch, voice mail system, dictation system, and the other data network systems. It will be able to access applications such as CAIS applications. Each wireless device will offer the full functionality of a standard hardwired telephone handset.

- 7.7.5.1(3) The wireless staff communication system will meet the IEEE 802.11a, b, g, and n standards and allow sufficient bandwidth to display clinical data.
 - 7.7.5.1(4) The wireless staff communication system will provide standard telephone features as well as IP addressing and VoIP.
 - 7.7.5.1(5) Wireless data security encryption techniques are to be employed by the system in compliance with 802.11i.
- 7.7.5.2 Performance Criteria
- 7.7.5.2(1) Provide 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.
 - 7.7.5.2(2) The system will consist of a head end CPU, application server, antennae base stations, line cards, and software and wireless handheld devices. Antennae base stations are to be located in concealed areas in the Facility to provide full coverage with no dead spots.
 - 7.7.5.2(3) System server will include application software for full programming as well as gateway software to integrate with the nurse call system and other alarm systems to annunciate all necessary local alarms on the wireless handset.
 - 7.7.5.2(4) Wireless handheld devices will automatically log onto system with no manual intervention.
 - 7.7.5.2(5) Work with the Authority, including meeting with clinical staff as required, to determine programming requirements such as phone groups, personal profiles, extensions, long distance access, dialling plan, nurse call assignment plan, text messaging, web access, email access, encryption requirements and fully program system.
 - 7.7.5.2(6) Handheld devices will be battery powered and come with a charger and an additional battery. Fully charged battery will have a minimum of 10 hours of talk time / 140 hours of standby time. Handheld devices will include full keyboard, an LCD 60 character display, IP address, wireless network card, and soft keys.
 - 7.7.5.2(7) Locate wireless CPU in main communication room along with applications servers. System will be connected to an uninterruptible power supply fed from the emergency generator and providing a minimum of 15 minutes of continuous power.

- 7.7.5.2(8) Project Co will design and construct the Facility so that cell phones and pagers will work within the Facility and will work with local providers to ensure that full coverage exists in all areas of the Facility. As necessary, Project Co will provide a distributed antenna system or other similar system to ensure full cell phone coverage.

7.7.6 Nurse Call

7.7.6.1 Basic Requirements

- 7.7.6.1(1) Supply and install nurse call systems in each patient care area in the Facility. The nurse call system will be the latest proven technology at the time of the Construction.
- 7.7.6.1(2) The nurse call system will be of the same manufacturer throughout. The system will be capable of network operation to allow the tracking of calls via the system manufacturers' call management software if required.
- 7.7.6.1(3) The call management software will record all calls from all departments, response time and allow trending and report generation.
- 7.7.6.1(4) Programming and staff communication device allocation will be accessible from the associated nursing station computer.
- 7.7.6.1(5) The nurse call system will integrate with marquees or LCD electronic message boards and wireless staff communication devices (PDA's or phones) for near instant alarm response.
- 7.7.6.1(6) The nurse call system corridor lights will have a minimum of four (4) lamps. Such lamps will be LED and fully programmable.
- 7.7.6.1(7) The nurse call systems will be:
- 7.7.6.1(7)(a) Rauland, Responder IV or better;
 - 7.7.6.1(7)(b) General Electric, Telligence or better;
 - 7.7.6.1(7)(c) Simplex, EZ Care 5009 or better; or
 - 7.7.6.1(7)(d) Austco, MediCom or better.

7.7.6.2 Performance Criteria

- 7.7.6.2(1) The nurse call systems will be supplied and installed in each medical department that contains patient care areas. All nurse call systems will have two-way voice capabilities as well as tone and light communication.

- 7.7.6.2(2) All nurse call systems will be networked together to allow calls to be forwarded to other areas and for call management.
- 7.7.6.2(3) All patient care areas will have nurse call devices installed in the quantities and locations described in Appendix 3C [Electrical] Table 3 or as otherwise required by the Authority.
- 7.7.6.2(4) Call cords, bath stations, staff assist, and emergency call buttons will be located for ease of use for their intended purpose.
- 7.7.6.2(5) All rooms where a nurse call device is installed will have a multi-call classification dome light (minimum 4-lamps) to annunciate the calls. The dome light will be located to provide staff the best possible view on the outside of the room where the nurse call stations are located.
- 7.7.6.2(6) All calls will be annunciated at nurse call master stations. Master stations will be capable of linking together to allow shift programming (day/night) annunciation of calls at different nursing stations.
- 7.7.6.2(7) Work with the Authority, including meeting with Authority staff as required, to determine functional programming requirements for the nurse call system. Allow for sixteen (16) two hour training sessions for nursing staff and four (4) four-hour training sessions for maintenance staff, and fifty (50) hours of extra programming.
- 7.7.6.2(8) Tone stations will be provided in each department in sufficient quantities such that the calls can be heard from all locations within the department.
- 7.7.6.2(9) Nurse call field panels will be located in communication rooms as near as possible to the department they serve.
- 7.7.6.2(10) If possible, utilize structured Cat 6a cabling for all nurse call system devices.
- 7.7.6.2(11) Fault monitoring will be a standard feature of the nurse call system. Faults such as communication failure, power failure, and CPU faults will be monitored.
- 7.7.6.2(12) All nurse call systems will be supplied power from the vital power distribution system and will have a minimum 30 minutes of battery standby.

7.7.7 Code Blue System

7.7.7.1 Basic Requirements

- 7.7.7.1(1) The code blue system will form part of the nurse call system.

7.7.7.1(2) The system will annunciate at a location designated by the Authority so that the clinical code blue response team will be paged automatically, and the code blue will automatically display on the wireless handheld devices.

7.7.7.1(3) Meet with clinical staff and set in place the Authority's response criteria for code blue situations.

7.7.7.2 Performance Criteria

7.7.7.2(1) All patient care departments will have code blue buttons located at the nurse's station or reception desk to initiate the code blue response.

7.7.7.2(2) Patient rooms will have code blue buttons installed as per Appendix 3C [Electrical] Table 3.

7.7.8 Patient Monitoring – Not Used

7.7.9 Telephones

7.7.9.1 Basic Requirements

7.7.9.1(1) The Authority will provide the telephone system and all hardwired telephone headsets. The telephone system will be VOIP.

7.7.9.1(2) Pay-telephones will be located in main lobbies. Provide cabling for pay telephones.

7.7.9.1(3) Structured cabling to include all cross connects to telephone system, from telephone system to service provider and all patch cords to make system operational.

7.7.9.2 Performance Criteria

7.7.9.2(1) Provide, and connect the telephone systems to, a separate UPS system with enough capacity to operate the entire system for 30 minutes and include a disaster recovery option.

7.7.9.2(2) Work with the Authority and provide all the necessary telephone interface modules and paging zone modules to integrate with the public address system for the telephone system. Program the telephone system to make the public address system operational. Dictation telephone interface modules will be provided by the Authority if required.

7.7.10 Public Address

7.7.10.1 Basic Requirements

- 7.7.10.1(1) The paging system will connect to the telephone system allowing any telephone to page in the Facility.
- 7.7.10.1(2) Integration with the fire alarm system will be acceptable if all requirements of this Schedule are met.
- 7.7.10.1(3) The paging system will serve the complete Building, including the Radiation Therapy Vaults.

7.7.10.2 Performance Criteria

- 7.7.10.2(1) The public address system will consist of amplifiers, mixers, speakers, zone paging modules, telephone interface modules, microphones, and other devices as needed to facilitate overhead paging in the Facility.
- 7.7.10.2(2) The paging system will be a constant voltage system with speakers placed to cover all areas and provide at minimum 60 dB in all areas of the Facility. Amplifiers to be sized to drive all speakers in each zone plus 20% additional spare capacity for future growth. The mixers will accommodate all inputs and provide the appropriate signal to the amplifiers and speakers.
- 7.7.10.2(3) The system is to be zoned to allow paging into individual departments. It is necessary to drive different inputs into each department. Auxiliary audio inputs will be overridden when paging or a fire alarm signal takes place. Each zone to be accessible by telephone to allow department paging or Facility wide paging. A page in one department will be isolated to that department.
- 7.7.10.2(4) Speakers will be recessed in ceiling whenever possible and come complete with speaker back box. Minimum sound pressure level for paging will be 60 dB.
- 7.7.10.2(5) Amplifiers to be distributed such that the failure of one set of amplifiers does not cause the entire system to malfunction. Other sets of amplifiers to operate properly even if one set malfunctions.
- 7.7.10.2(6) Telephone access to paging will be nearly instantaneous (less than 1 second) from the time the telephone dials to the time the message is sent over the speakers.
- 7.7.10.2(7) Provide a music system (separate from the overhead paging system) for the Radiation Therapy Vaults and the CT Simulator, including an input mixer, amplifier and separate ceiling speakers in each Radiation Therapy Vault and the CT Simulator. Provide volume control adjustable from 0 to maximum output and connect a satellite radio system to the mixer. The mixer and amplifier may be located in a communications room.

7.7.11 Video Conferencing

7.7.11.1 Basic Requirements

- 7.7.11.1(1) Supply and install full video/audio conferencing systems and video/audio conferencing building infrastructure in all rooms requiring audio/video conferencing as identified in the Equipment List.
- 7.7.11.1(2) The audio/video conferencing systems will be designed and configured by audio/visual professionals who are experts in the application and use of audio/video conferencing systems, in consultation with the Authority.
- 7.7.11.1(3) The audio/video conferencing systems will comply with the latest IP based video conferencing standards or the latest high speed common standard and be compatible with existing Authority/Provincial bridging and network systems.
- 7.7.11.1(4) The H.323 internet video conferencing standard and web broadcasting will allow computers on the network set up for videoconferencing to broadcast internally or externally over the network.
- 7.7.11.1(5) The location of microphones, video cameras, video monitors, and the design of the lighting systems will optimize the performance of the video/audio conferencing system, in consultation and agreement with the Authority.
- 7.7.11.1(6) Provide appropriate dimmable lighting, sound attenuation in all rooms requiring video conferencing.

7.7.11.2 Performance Criteria

- 7.7.11.2(1) Video conferencing systems will meet Authority guidelines (available in the Data Room) and be compatible with existing Authority systems.
- 7.7.11.2(2) Provide video/audio conference systems for small conference rooms as per Appendix 2E [Equipment]. Provide wiring infrastructure, connectors and any other miscellaneous equipment not listed in the Equipment List that is required to make the video conference system functional. Design the small conference rooms in consultation with the Authority.
- 7.7.11.2(3) Large conference rooms will be configured for high end conference systems as per Appendix 2E [Equipment]. Provide spot lighting and dimmed lighting complete with control interface to the podium for these rooms. For rooms that divide, provide multiple room configuration system and isolation from room to room, audio equalization, echo cancellation and multiple network connection points. Provide wiring

infrastructure, connectors and any other miscellaneous equipment not listed in the Equipment List that is required to make the video conference system functional. Design the large conference rooms in consultation with the Authority.

- 7.7.11.2(4) Provide mobile telehealth units as per Appendix 2E [Equipment].
- 7.7.11.2(5) Project Co will consult with the Authority to determine the exact specifications of equipment, room configuration, set up, and commissioning.

7.7.12 Central Dictation

7.7.12.1 Basic Requirements

- 7.7.12.1(1) The central dictation system will be supplied by the Authority.
- 7.7.12.1(2) Cabling for the dictation system will be part of the structured cabling system. Telephones will be used by the Authority for dictation. Transcription is via Authority provided workstations that connect to the network.

7.7.12.2 Performance Criteria

- 7.7.12.2(1) Provide for the central dictation system to be accessed from any telephone. A login id will be needed to access the dictation system.

7.7.13 Intercommunication System

7.7.13.1 Basic Requirements

- 7.7.13.1(1) Internal communication systems within a modern cancer centre are an important part of ensuring clinical staff can deliver and receive timely information. The telephone system will have intercommunication capabilities. A centralized PABX style intercom is not required because the wireless telephone system will be the emergency back-up communication system at the Facility.
- 7.7.13.1(2) Local Intercom systems are required at locked entrance doors that delivery personnel or the public will need access through.
- 7.7.13.1(3) The local intercom systems will be manufactured by recognized industry leaders in the intercom business.

7.7.13.2 Performance Criteria

- 7.7.13.2(1) Provide local intercom systems at all locations requiring public or delivery access that may be locked. These systems will connect to the

nearest manned reception area. The system will be capable of remotely unlocking the door.

- 7.7.13.2(2) A video intercom system will be provided at all entrance locations needing more security as determined by Project Co security planner.

7.7.14 Integration with Health Authorities

7.7.14.1 Basic Requirements

- 7.7.14.1(1) The electronic health record (all patient information is stored electronically) is the standard that the Authority has adopted. The Facility's electronic systems will allow for the transmission, storage, and retrieval of electronic health records within the Facility.
- 7.7.14.1(2) Comply with all applicable IEEE, CSA, TIA / EIA and BICSI standards and all applicable Authority standards in effect at the time of installation of the communications and technology systems.

7.7.14.2 Performance Criteria

- 7.7.14.2(1) Provide technology and communications systems that integrate with the Authority's existing systems and future new systems to allow seamless communications between other health facilities in the region and the Facility.
- 7.7.14.2(2) The systems to be integrated include video conferencing, telephones, all networks, patient entertainment, patient education, access control, CCTV, timing, intrusion detection, and specialized clinical equipment such as picture archiving and communication systems (PACS), cancer treatment systems, electronic registration, and dictation systems.

7.7.15 Patient Entertainment System

7.7.15.1 Basic Requirements

- 7.7.15.1(1) Provide patient entertainment systems at each chair and bedside in the chemotherapy treatment areas of the Facility.
- 7.7.15.1(2) The patient entertainment system will be embedded in an integrated bedside terminal that will provide access to the internet, TV and movies, and will also allow the caregiver to access patient records.
- 7.7.15.1(3) Project Co will consult with and obtain the Authority's approval of the type of patient entertainment services. Services may include digital systems with file servers, pre-programmed movies, internet access, games, standard TV, satellite TV, and on-demand access or standard analog television systems with cable service. The content of the

services and service restrictions will be at the discretion of the Authority.

- 7.7.15.1(4) The type of end-use device is dependent upon the type of system Project Co utilizes but patients and staff will be able to change program channels, as easily as a standard television, via a menu and a remote control.
- 7.7.15.1(5) The system will be manufactured by an industry leader and all components will be of that manufacturer.
- 7.7.15.1(6) If the system is networked based, it will meet the networking standards specified in this Schedule. This network must be secured from the Hospital network.
- 7.7.15.1(7) If the system is NTSC broadband video, it will meet the CRTC standards and operate in the 8dbmv to 7dbmv range.

7.7.15.2 Performance Criteria

- 7.7.15.2(1) Provide entertainment application servers, web servers, controllers, including all software for a complete operating system. Access to digital radio, standard TV, on demand TV, digital TV, games, Internet, and other entertainment services is encouraged. All content will be reviewed by the Authority and, if deemed inappropriate by the Authority, removed.
- 7.7.15.2(2) Provide portable cart based systems with personal computers or TVs and CD / VCR players that can connect to this system in each conference room and boardroom.
- 7.7.15.2(3) All cabling will be via the structured cabling system if the system is ethernet based.
- 7.7.15.2(4) The system will access the network allowing the Authority to display education materials and potentially other clinical applications on the integrated bedside terminals and on the patient education kiosks in waiting areas.

7.7.16 Patient/Staff Education System

7.7.16.1 Basic Requirements

- 7.7.16.1(1) The Authority will provide the application services, programs and electronic educational material that will be displayed on the patient/staff education system.

- 7.7.16.1(2) Staff education programs will become available on the network that can be accessed via any computer. Rooms with network access like conference rooms will be able to display this information.

7.7.16.2 Performance Criteria

- 7.7.16.2(1) Provide power and data infrastructure to support patient education kiosks as noted in the Equipment List. Also provide power and data infrastructure to support patient registration kiosks in all waiting areas, including a power outlet and a data outlet in each waiting area at locations determined in consultation with the Authority.

7.7.17 Time Systems

7.7.17.1 Basic Requirements

- 7.7.17.1(1) Provide a wireless centralized master clock system that will synchronize all network clocks to matching time, provide automatic correction for daylight savings time and self correct if power fails.

- 7.7.17.1(2) The master time controllers and all clocks will be provided by a recognized industry leader and all components will be of the same manufacturer.

- 7.7.17.1(3) Use a system from one of the following manufacturers:

7.7.17.1(3)(a) Visiplex;

7.7.17.1(3)(b) Primex; or

7.7.17.1(3)(c) another manufacturer that is approved in advance by the Authority.

7.7.17.2 Performance Criteria

- 7.7.17.2(1) Clocks will be provided in locations as listed in Appendix 3C [Electrical] Table 3 as a minimum. Clocks will be analog type, at least 14" diameter with 24-hour numbering.

- 7.7.17.2(2) Clock correction signals will be available throughout the Facility.

7.8 Electronic Safety and Security (Division 28)

7.8.1 Fire Alarm

7.8.1.1 Basic Requirements

- 7.8.1.1(1) The fire alarm system will be designed and installed to meet the latest applicable versions of the following standards.

- 7.8.1.1(1)(a) Can / ULC S524 Standard for installation of Fire Alarm Systems
- 7.8.1.1(1)(b) Can / ULC S537 Standard for Verification of Fire Alarm Systems
- 7.8.1.1(1)(c) Elevator Code CAN3-B44
- 7.8.1.1(2) In addition to the building wide audio and visual fire alarm indications, the fire alarm system will annunciate the approximate fire location on the in use wireless staff communications devices and on the BMS.
- 7.8.1.1(3) The system will utilize the latest proven technology available at the time of installation.
- 7.8.1.1(4) The Authority's preferred fire alarm system supplier is Simplex, as use of a Simplex system will allow network integration with the existing Hospital fire alarm network. Project Co may use a system from Simplex or one of the following other suppliers:
 - 7.8.1.1(4)(a) Notifier
 - 7.8.1.1(4)(b) GE Security (Edwards);or
 - 7.8.1.1(4)(c) another supplier that is approved in advance by the Authority.
- 7.8.1.2 Performance Criteria
 - 7.8.1.2(1) Provide a fully addressable, two stage computer based fire alarm system throughout the Building.
 - 7.8.1.2(2) Provide fire alarm devices connected to the Building fire alarm system as necessary to comply with applicable Laws. If any parking structure is fully detached from the Building, provide a separate fire alarm system and a network connection to the Building fire alarm system for that parking structure. Locate addressable modules for manual stations in areas where the ambient temperature will remain between 0 °C and 32 °C and which are not subject to condensation.
 - 7.8.1.2(3) Provide a fire alarm network connection to the closest existing fire alarm panel located in the Hospital to allow for total integration of the fire alarm system so that fire conditions can be easily shared between the Hospital and the Facility.
 - 7.8.1.2(4) Provide updated annunciators in both the Hospital and the Building to indicate the fire alarm status for each of the Hospital and the Facility.

- 7.8.1.2(5) If the fire alarm system is used for overall building paging, the following conditions will apply:
- 7.8.1.2(5)(a) The microphone in the fire fighters' command centre or the emergency operations centre will override general paging;
 - 7.8.1.2(5)(b) General paging via telephone handsets will not take longer than 2 seconds before paging can begin.
- 7.8.1.2(6) The fire command centre will include a fire alarm control panel, a fire alarm active graphic annunciator panel, a fire alarm colour graphics computer, any required fan control and an elevator status/control panel.
- 7.8.1.2(7) Smoke and heat detectors will be individually field programmable and include multiple elements for earliest detection, individually adjustable for ambient environmental conditions.
- 7.8.1.2(8) Audible annunciation will be a zoned overhead fire alarm speaker system that may also form part of the building public address system. Audible alert levels will be 10dBA above ambient with minimum of 75dBA and be audible in every room and area of the Facility. A provision will be made to mute the audio systems located within the multimedia rooms when the fire alarm system is active.
- 7.8.1.2(9) Emergency paging will be accessible via microphone at the fire command centre.
- 7.8.1.2(10) Facility wide paging will be accessible via telephone by dialing a local access number.
- 7.8.1.2(11) Train staff on operation of system and incorporate fire plan in training to alert staff to policy and procedures in case of fire alarm and safe gathering points in case of evacuation.
- 7.8.1.2(12) Visual annunciation will be via building graphic annunciators, a computer workstation, room annunciators provided at all care (nursing) stations (excluding care substations) and main control reception areas.
- 7.8.1.2(13) All alarms, trouble signals, other information will be annunciated at the Facility call centre location and, at the Authority's option, in the Hospital security room.
- 7.8.1.2(14) The system will include pre-programmed voice messaging to automatically audibly annunciate the location of the alarm.

7.8.2 Access Control, Panic Duress and Incident Reporting Systems

7.8.2.1 Basic Requirements

- 7.8.2.1(1) Provide an access control system, intrusion detection systems, a Facility wide panic duress system (wired and wireless) and an electronic incident reporting system to record events.
 - 7.8.2.1(2) Programming of photo ID cards, location of all security devices and monitoring requirements to be identified. All alarm annunciation requirements are to be identified. Project Co will arrange meetings with the Authority and NHA to coordinate system interconnections.
 - 7.8.2.1(3) All security systems will connect to the structured cabling system and network devices to allow the Authority the opportunity (with permission of Project Co) to review events and monitor the status of these systems from off-site locations.
 - 7.8.2.1(4) Train Authority staff on the use, operation, and location of all security devices.
 - 7.8.2.1(5) All systems to be the latest proven technology supplied by industry leading manufacturers in the security industry at the time of construction.
 - 7.8.2.1(6) Systems will be interconnected to the fire alarm system where required.
- 7.8.2.2 Performance Criteria
- 7.8.2.2(1) Design, provide and install the security systems with the Authority input to meet the objectives of their security programs.
 - 7.8.2.2(2) The access control system will be PC based, contain an integral photo identification card system, and have sufficient capacity to handle at minimum 10,000 regional employees down to the field panel level, can grant or restrict access to employees via a programmable classification system, and run over a standard TCP / IP Ethernet network.
 - 7.8.2.2(3) The system will utilize a central file server with automatic switching to a separate backup file server in case of failure. Allow for a minimum of (5) workstation licenses.
 - 7.8.2.2(4) The access cards will use the smartcard technology and be compatible with the existing Kantech system in the Hospital to allow staff to use access cards in both the Hospital and the Facility.
 - 7.8.2.2(5) Alarms will be annunciated at the Facility management call centre/alarm management centre location and have the option to be annunciated in the Hospital security room and/or via Hospital pocket paging or radio systems.

- 7.8.2.2(6) Coordinate the location of access control doors and door alarms within the Facility. Areas to be included are:
- 7.8.2.2(6)(a) the main entrances
 - 7.8.2.2(6)(b) pharmacies
 - 7.8.2.2(6)(c) departmental main entrances
 - 7.8.2.2(6)(d) entrances to locker / change rooms
- 7.8.2.2(7) Provide a wired and wireless panic duress system for staff in all internal areas where there is a danger to staff from the patients or public. The system will be RF and infrared based and will annunciate the location of the alarm at the call centre.
- 7.8.2.2(8) Provide panic duress push buttons within 10m of each parking area edge or exit stairs and space such buttons every 30m. The panic duress buttons will activate a blue strobe light and high intensity sounder located above the button and notify the call centre with the location of the activation.
- 7.8.2.2(9) Institute a training program that initially trains all staff, trains new staff and refreshes staff training each year on all aspects of the security systems. Coordinate these efforts with the Authority staff.

7.8.3 Intrusion Detection

7.8.3.1 Basic Requirements

- 7.8.3.1(1) Intrusion detection systems will be part of the access control system and installed in all areas where protection of physical assets is critical.

7.8.3.2 Performance Criteria

- 7.8.3.2(1) The intrusion detection system will utilize industry proven devices for intrusion detection. These devices include motion detectors, magnetic door contacts, and glass breakage detectors. If the area is under 24 hour video surveillance, video analytics may be utilized for intrusion detection.
- 7.8.3.2(2) Intrusion detection will be provided in areas defined by the Authority including pharmacy, drug storage rooms, communications rooms, and computer rooms.

7.8.4 CCTV

7.8.4.1 Basic Requirements

- 7.8.4.1(1) 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.
- 7.8.4.1(2) 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.
- 7.8.4.1(3) The system will be a 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. Storage capacity will be for 30 days at four frames per second minimum. Provide file servers, workstations, and optical storage devices and connect to network. System will have network and web access for remote monitoring. System will be of sufficient quality to be used as court evidence in Canada.
- 7.8.4.1(4) The CCTV system will be integrated with the access control system to automatically record high quality images if a security breach is detected. The access control system will be able to control PTZ cameras associated with secure access areas.
- 7.8.4.1(5) The CCTV network will be accessible to authorised users in both the Facility and the Hospital.
- 7.8.4.2 Performance Criteria
- 7.8.4.2(1) Provide a complete CCTV system. CCTV cameras will be installed at all entrance and exits to all departments and in the elevator lobby. Cameras will also be placed in high profile areas such as gift shops, cafeterias or areas where cash is exchanged, and exterior locations such as parking areas.
- 7.8.4.2(2) Activation of a parking panic duress button will cause the nearest PTZ controlled camera to auto-locate to the button location and zoom to a point where objects within 5m of the activation are of sufficient quality to be used as court evidence. Areas with no PTZ cameras will have sufficient coverage to include the button location in field of view.
- 7.8.4.2(3) The cameras are to be monitored at the Hospital's security office (as per the existing cameras) and will provide facial images of people coming and going from the department as well as surrounding areas.

- 7.8.4.2(4) Cameras will have the ability to be monitored by Hospital security staff using a dedicated PC located in the Hospital security room.
- 7.8.4.2(5) Cameras will not be set up in private areas such as patient rooms, treatment rooms, locker rooms or washrooms.
- 7.8.4.2(6) Cameras will not be placed or reviewed for the purpose of observing work performance of employees.
- 7.8.4.2(7) Indoor cameras will be smoke glass dome type, coloured view, with an auto iris fixed lens.
- 7.8.4.2(8) Outdoor cameras will be coloured view with auto switching to black and white during low light conditions, an auto iris fixed focus lens, complete with weatherproof housing and internal heater.
- 7.8.4.2(9) Viewing monitor will have a visible range from 200mm to 450mm, depending on location and application.
- 7.8.4.2(10) Provide security cameras in the following locations in any parkade structure:
 - 7.8.4.2(10)(a) elevators;
 - 7.8.4.2(10)(b) stairs;
 - 7.8.4.2(10)(c) pay stations;
 - 7.8.4.2(10)(d) duress stations;
 - 7.8.4.2(10)(e) vehicular entrance(s);
 - 7.8.4.2(10)(f) and exit(s).

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) Granular sub-base will be utilized 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) Aggregate base courses will be designed to 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) Asphalt paving will be utilized 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 will be designed 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) Unit pavers will be utilized in areas where a high level of finish is desired and/or a requirement for removal and replacement of paved surface in the future.

8.1.4 Concrete Paving

8.1.4.1 Basic Requirements

- 8.1.4.1(1) Concrete paving will be utilized in areas that require firm, long lasting hard surfaces for activities such as pedestrian pathways, loading docks and building entrances.

8.1.5 Crushed Stone Surfacing

8.1.5.1 Basic Requirements

- 8.1.5.1(1) Crushed stone will be utilized on roadways, in parking areas, and on pedestrian paths where a loose surface is acceptable to Facility Users.

8.1.5.2 Performance Criteria

- 8.1.5.2(1) Stone surfaces will be specified and installed in lifts that maximize both stability and absorption of surface water.

8.1.6 Fences and Gates

8.1.6.1 Basic Requirements

- 8.1.6.1(1) Fences and gates will be designed to support the Clinical Specification, and will be located in areas as required to support exterior programmed spaces.

8.1.6.2 Performance Criteria

- 8.1.6.2(1) Fence materials will be designed and fabricated to guarantee a minimum 40-year lifetime.
- 8.1.6.2(2) Fences will be installed as per manufacturer's directions, or custom designed with footings to withstand freeze thaw cycles in the region averaged over the last twenty years.

8.1.7 Exterior Site Furnishings

8.1.7.1 Basic Requirements

- 8.1.7.1(1) Site furnishings will consist of benches, garbage containers, tables and chairs, and umbrellas, to provide seating for a minimum of eight (8) people in any outdoor area adjacent to the Facility for staff, patients and visitors. Products will be selected on the basis of safety, comfort, design and materials that relate to the building architecture and landscape design, durability and required maintenance.
- 8.1.7.1(2) A 10.7m height cone tapered flagpole will be provided which has been fabricated with type 304 alloy. It will include a revolving trucking ball, and a shoe anchor base, and the finish will be clear Anodized Aluminum. Rigging will consist of an internal halyard provided with a locking door.

8.1.7.2 Performance Criteria

- 8.1.7.2(1) Products will be selected for their suitability and durability in a northern climate.

8.1.8 Growing Medium

8.1.8.1 Basic Requirements

- 8.1.8.1(1) Growing medium will be a mixture of mineral particulates, micro organisms and organic matter which will provide a suitable medium for supporting plant growth.

8.1.8.2 Performance Criteria

- 8.1.8.2(1) Seed mix will have demonstrated suitability to the climatic and soil conditions found at the Site.

8.1.9 Sodding

8.1.9.1 Basic requirements

- 8.1.9.1(1) Sod will be located in areas near building entrances, and outdoor patio spaces to provide a usable surface for staff breaks, visiting, passive recreation and occupational therapy.

8.1.9.2 Performance criteria

- 8.1.9.2(1) 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.

8.1.10 Trees, Shrubs and Ground Cover Planting

8.1.10.1 Basic requirements

- 8.1.10.1(1) Planting will support the landscape design by reinforcing spatial relationships and way-finding. The plant selection and placement will address micro-climates surrounding the Facility, and will mitigate heating and cooling loads as well as providing a comfortable exterior environment for patients, staff and visitors. The planting design will respond to program requirements for therapeutic outdoor spaces.

8.1.10.2 Performance criteria

- 8.1.10.2(1) Planting design will emphasize species indicative of the Sub-Boreal Spruce Biogeoclimatic Zone, which includes the following tree species: Hybrid White Spruce; Douglas Fir; Trembling Aspen; Lodgepole Pine; Balsam Poplar; Tamarack; Subalpine Fir; and Paper Birch.
- 8.1.10.2(2) Trees, shrubs and ground covers will be selected and placed to mitigate temperature fluctuations and winds.
- 8.1.10.2(3) Trees, shrubs and ground covers will be selected from species that are indigenous or adapted to the region, such as Purple peavine (*Lathyrus nevadensis*), Pinegrass (*Calamagrostis rubescens*), Black huckleberry (*Vaccinium membranaceum*), Highbush cranberry (*Viburnum edule*), oak fern (*Gymnocarpium dryopteris*), common juniper (*Juniperus communis*), Cladonia (*Cladonia* spp.), Saskatoon (*Amelanchier alnifolia*), Rocky Mountain juniper (*Juniperus scopulorum*), slender wheatgrass (*Elymus trachycaulus*) or spreading needlegrass (*Achnatherum richardsonii*).
- 8.1.10.2(4) 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.
- 8.1.10.2(5) Plant material will be grown in Zone 3 in accordance with Plant Hardiness Zones in Canada.

8.2 Utilities (Division 33)

Utility works, including those set out in Section 4.3, must service the Facility with a reliable infrastructure that is maintainable without disrupting the effective operation of the Hospital, Facility or related land uses.

8.2.1 Manholes and Catch Basins

8.2.1.1 Basic requirements

8.2.1.1(1) Provide:

- 8.2.1.1(1)(a) Monolithic concrete manholes with transition to lid frame, covers, anchorage, and accessories.
- 8.2.1.1(1)(b) Modular precast concrete manhole sections with tongue and groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

8.2.2 Site Water Utility Distribution Piping

8.2.2.1 Basic requirements

8.2.2.1(1) Provide:

- 8.2.2.1(1)(a) Pipe and fittings for Site water line including domestic water line and fire water line.
- 8.2.2.1(1)(b) Valves, fire hydrants and domestic water hydrants.

8.2.3 Site Sanitary Sewerage Piping

8.2.3.1 Basic requirements

8.2.3.1(1) Provide:

- 8.2.3.1(1)(a) Sanitary sewerage drainage piping, fittings, accessories, and bedding.
- 8.2.3.1(1)(b) Connection of building sanitary drainage system to municipal sewers.
- 8.2.3.1(1)(c) Clean out access.

8.2.4 Storm Sewer Water Drains

8.2.4.1 Basic requirements

8.2.4.1(1) Provide:

- 8.2.4.1(1)(a) Site storm sewerage drainage piping, fittings and accessories, and bedding.
- 8.2.4.1(1)(b) Connection of drainage system to municipal sewers.

- 8.2.4.1(1)(c) Catch basins, plant area drains, paved area drainage, and Site surface drainage.

8.2.5 Foundation Drainage

8.2.5.1 Basic requirements

8.2.5.1(1) Provide:

- 8.2.5.1(1)(a) Building perimeter, retaining wall and under slab on fill weep drainage system.

- 8.2.5.1(1)(b) Filter aggregate, fabric and bedding.

8.2.5.1(2) Pipe materials will comply with the following standards:

- 8.2.5.1(2)(a) Polyvinyl Chloride pipe: to ASTM D2729, with required fittings; or

- 8.2.5.1(2)(b) Concrete pipe: to ASTM C412, with required fittings.

8.2.5.1(3) Accessories will be:

- 8.2.5.1(3)(a) Pipe coupling: solid.

- 8.2.5.1(3)(b) Joint cover: No. 15 or 30 asphalt saturated roofing felt or polyethylene.

- 8.2.5.1(3)(c) Filter Fabric: Water pervious type, black polyolefin or polyester.

8.2.5.2 Performance criteria

- 8.2.5.2(1) Foundation drainage will carry all sub-surface ground water away from footings and foundation walls and into storm drainage system.

8.2.6 Natural Gas Site Piping

8.2.6.1 Basic requirements

- 8.2.6.1(1) Provide pipe and fittings for Site utility natural gas distribution.

8.2.6.1(2) Quality Requirements

- 8.2.6.1(2)(a) ANSI B31.2 Fuel Gas Piping

- 8.2.6.1(2)(b) NFPA 54 National Fuel Gas Code

8.2.6.2 Performance Criteria

- 8.2.6.2(1) Perform work in accordance with the requirements of the gas transmission utility.
- 8.2.6.2(2) Welding materials and procedures will conform to ASME Boiler and Pressure Vessel Code.
- 8.2.6.2(3) Welders certification will comply with ASME SEC IX.
- 8.2.6.2(4) Conform to NFPA 54, NFPA 58, ANSI B31.2, ANSI B31.8.

APPENDIX 3A: CLINICAL SPECIFICATION

[See separate document]

APPENDIX 3B: MECHANICAL HVAC (SPACE DESIGN COMFORT, VENTILATION AND PRESSURIZATION) AND MEDICAL GAS

[See separate document]

APPENDIX 3C: ELECTRICAL

Table 1 – Receptacle Requirements

Table 2 – Lighting Requirements

Table 3 – System Requirements

Figure 1 – Communications Single Line Diagram

Figure 2 – Draft Rack Layouts for Main Communications Room

[See separate document]

APPENDIX 3D: SOUND TRANSMISSION RATINGS

[See separate document]

APPENDIX 3E: ENERGY MODEL

[See separate document]